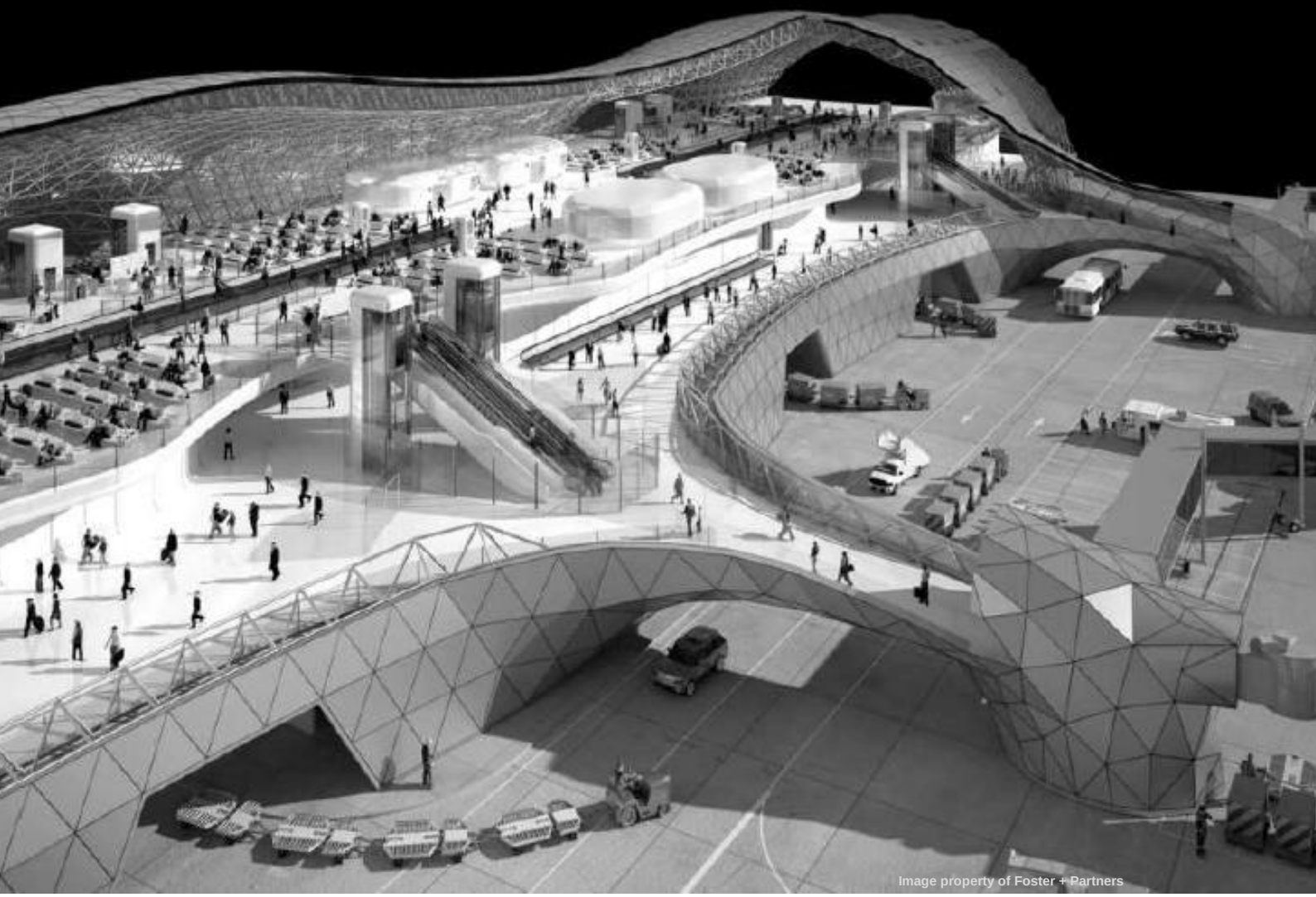
Cross-Cultural approach to Risk Management in Megaprojects

Research into the relationship and impact of cultural phenomena in the risks management process of Airport Terminal Projects

I.A. Garcia Lopez



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Cross-Cultural approach to Risk Management in Megaprojects

Research into the relationship and impact of cultural phenomena in the risks management process of Airport Terminal Projects

by

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in partial fulfilment of the requirements for the degree of

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Executive Summary

Introduction

Originally conceived only as transport infrastructure elements, today airports and its surroundings have evolved into economically strategic and social conflictive areas with a high influence on the pattern and speed of regional development and a component of the infrastructure and development of an entire nation. Airport terminals are part of the so called 'Megaprojects' which are commonly identify to be complex due to several factors such as: high investment, high level of uncertainty, technical and technological challenges, high impact on society and environment, high level of partnering; multiplicity of stakeholders with multivariate interests among them which creates an additional tension layer. The process required to cope all the aforementioned factors might suggest several critical factors and undoubtedly presume a varied and increasing level of risk for all parties involved in the planning and construction. In that sense, a purely technical approach to the design of Terminal Airports is now inadequate (Neufville, 1976).

For this research one part of this complexity is recognized to be caused by cultural phenomena, primarily triggered by a multidisciplinary and multicultural environment which is constantly susceptible to suffer a wide range of clashes and misunderstandings through the entire lifecycle of the project. In effect, this creates an increase in the level of risk but is also likely to create new opportunities -commonly forgotten. The latter proposition is supported by Hertogh, Baker, Staal-Ong, and Westerveld (2008) considerations regarding the importance to implement a systematic risk management that focus not only on threats, but also on opportunities considered to be the result of the interaction between stakeholders. Therefore, the central question of this research reads as follows:

How can considering cultural aspects help the risk management in megaprojects?

The methodological path preferred for this research is a combination of methods based on literature review, case studies, and interviews. In total a set of 14 respondents were interviewed and grouped according to the megaproject -case study- where they collaborate on: China, Mexico, Taiwan and UAE. The combination of methods contributes to maintain a chain of evidence and improve the knowledge of the organization in relation with a specific phenomenon and the desire to understand its complexity in a practical way.

Results and conclusion

Based on the data obtained during the interviews, 71% of the interviewees consider that the risks are higher in the early stages of the project where the project scope is being defined and the planning process is still running. In this respect, three main types of risks were identified in order

of importance: Scope, Organizational and Legal/Commercial. It is noteworthy that the combination of these three types of risks is considered of utmost importance to respondents due to the inherent complexity of megaprojects and to the enormous difficulty of translating the scope of work intended for the project into legal terms. Additionally, they are severely affected by social risks explained as human behaviours, selection and training of staff.

The cultural analysis executed in this research considered the premise that "culture only exists by comparison" (Hofstede, Hofstede, & Minkov, 2010). In order to understand the daily life of megaproject and its implications in terms of risks it is important to consider differences and similarities at a cultural level, explained in this research in two main levels: national and organizational level. One of the first findings after analysing cultural aspects was the perception of the level of complexity and magnificent embedded in megaprojects, and most importantly, the respondents highlighted the extremely important features of *decision making structure, type of leadership and hierarchical structure required for the execution of megaprojects.*

After providing a brief introduction to the Hofstede theory, 100% of the interviewees considered important cultural differences among parties because they have an impact on three main topics: impact on the *decision making process (24%), impact on how people work together (18%); an equal percentage (15%) for the impact on the communication process and understanding and respecting each other.* The kind of impact is different for each case study analyzed, on three out of four projects (UAE, Mexico and Taiwan) there is a major impact on decision making process and on the way how people work together. Contrary to this perspective, in China project, the impact is considered more relevant for 'knowing better the client' since this is perceived as the first task at the beginning of the project. Not surprisingly, there was a notable distinction to consider 'Power distance' as the most important cultural dimension for 59% of the respondents, followed up by Masculinity (18%), as well as Individualism (12%).

All the interviewees considered relevant the use of cultural dimensions in the identification of risks in future projects, despite this fact, they consider difficult to understand to what extent, and find a way to measure and/or quantified the impact. The identification of cultural phenomena is important in the risk management process due to three main factors: they create awareness (20%), it is supposed that the adaptation process required while entering to a new project could be easier and smooth (17%), and it helps you know better the client (13%). Besides these three benefits, interviewees also mentioned some other implications –in level of importance: 'proactive attitude towards work', 'helpful for contracts conditions', 'help profiling the risks', 'improve communications', 'impact on how decisions should be taken' and 'effect on future proposals'.

To sum up, it is important to consider cultural aspects on the risk management of megaprojects. Undoubtedly, there are some exciting implications to use them in future projects as they reduce

the level of uncertainties related to management practices, improves the communication process of the project, the level of complexity can be better understood by for example understanding better the decision making process and communication style adopted during the project, and most important the understanding of cultural differences and similarities should be considered as a powerful tool to reduce, avoid or better manage some kind of risks such as organizational, scope, and legal/commercial.

Recommendations

It is always important to consider that each organization need to understand the overall level of risk embedded within their processes, activities and preferred management style in comparison with the expectations settle by the project to be initiated. Risk management should be considered as a central part of the strategic management of NACO, and be considered as the process whereby the organization address and align the most probable risks attached to their activities, and proportionate to the level of risks accepted in the organization. Since NACO is always working on an international environment and managing multicultural contracts, the level of cultural understanding should –undoubtedly- be considered in the risk management process and be responsive to changing circumstances.

In this respect, nearly 80% of the interviewees considered that cultural aspects should be added as a risk category at the middle of the ranking analyzed in the present research. The remaining 20%, considered that cultural aspects are embedded in each of the main risk categories, or –according to them- culture is a very personal thing that cannot be ranked as a main category.

With this in mind, knowing beforehand the cultural differences and similarities could bring more creativity to the projects, reduce the frustrations among the team members and conceive a more effective and respectful environment since early phases of the project. The organization need to be aware that this type of research, based on their own data, can be useful for further projects, and can be a trigger to improve the employees knowledge on issues related to risk and cultural phenomena.

Reflection and significance of research

The combination of two different but complementary subjects established for this research, has been very interesting, difficult, and undoubtedly quite challenging process. In spite of this, the current research fulfills the initial gap of knowledge initially planned as it provide recommendations on how to understand the combination and impact of cultural phenomena in the risk management of megaprojects. The researcher is fully aware that the findings obtained from this study cannot be easily transformed in a new theory but the recommendations provided in the present research are intended to be considered as an initial exploratory approach which opens a

new interesting gap of study to quantify the impact of the use of cultural theory on the impact of risk perhaps in terms of time, money and resource use.

When considering the profile of the project from a cultural and organizational perspective, it provides the project management team a better way of implementing and monitoring the project since its inception, helping to create better communication, contribute to the creation of best practices for decision-making, reduced adaptation times, becoming more proactive and reducing the level of stress that could be develop along the lifecycle of the project.

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“Don’t be afraid to give up the good to go for the great”

John D. Rockefeller

“Aprendo mientras vivo”

Personal motto

Preface and Acknowledgements

This thesis is written as part of my graduation project to conclude my MSc programme in Construction Management and Engineering at Delft University of Technology. During various assignments along the course of the Master I had the opportunity to work in multicultural teams, sometimes the team work was smooth and successful and sometime it was truly torturous, so why this is affected?. This experience was amplified when I started a five months period internship at NACO, where I notice that working in a different culture is influenced by several factors sometimes embedded in our own culture programming who cannot be easily understood, managed or shared. This sparked my curiosity to study more about the topic in order to understand the implications of having similar or different cultural backgrounds in the risk perception of megaprojects.

I would like to thank my multicultural graduation committee. Profr. dr. ir. Marcel Hertogh, thank you for accepting my proposal since the beginning, for supervising this research, and for your valuable feedback during important meetings. My first supervisor Erfan Hoseini, thank you for the weekly counselling of my work, for our interesting discussions and assistance in terms of guidance and suggestions, I know that sometimes it was difficult to put all my thoughts in paper but thanks for your encouragements throughout the research process I wish you all the best in finishing your PhD research. My second supervisor, Dr. Li Sun thank you for your insights with regard to cultural aspects and suggestions to keep my work simple but significant. Finally, Tim van Vrijaldenhoven for the trust and facilitating this research on behalf of NACO.

Additionally, I would like to thank the many interviewees from NACO who took time to help me and provide the data necessary for this research without your contributions this research would have not been possible. Also, I would like to thank Karen Smits for taking time to discuss my proposal and for your inspiring talk.

Last but not least, I truly believe that this Master would have not been possible without the loving support of my entire family, I will be eternally grateful for that. Thanks for teaching me how to persevere until achieving goals, thanks for all the weekly good vibes thorough skype calls. Thanks for keeping me focused during the last two years until success. We will celebrate very soon!

Hope you enjoy reading,

Adriana Garcia Lopez
Rotterdam, September 22th 2016.

1. Introduction

Originally conceived only as transport infrastructure elements, today airports and its surroundings have evolved into economically strategic and social conflictive areas. Airports are seemed to be vital national resources that establish a complex interaction with the region in which they are located (ACRP, 2009). ACI Europe (2016) estimates that 4.1% of GDP in Europe is originated by airports contribution. Neufville (1976) describe airports as part of a complex economic and social system with a high influence on the pattern and speed of regional development and a component of the infrastructure of a nation. According to the World Bank, 10% rise in infrastructure assets directly increases GDP of the country up to 1% (Beckers & Stegemann, 2013) and the economic return is even more favourable in countries with severe infrastructure deficits (AfDB, 2011).

Airport terminals are part of the so called Megaprojects or Large Infrastructure Projects (LIPs). These kind of Infrastructure are commonly identify to be complex due to several factors such as: high investment, high level of uncertainty, technical and technological challenges, high impact on society and environment, high level of partnering; multiplicity of stakeholders with multivariate interests among them which creates an additional tension layer.

The process required to cope all kind of economic, social needs and the high level of complexity roughly described above into just one infrastructure –such as airport terminal- might suggest several critical factors and undoubtedly presume a varied and increasing level of risk for all parties involved in the planning and construction. In that sense, a purely technical approach to the design of Terminal Airports is now inadequate (Neufville, 1976).

Nowadays, airport terminal designers have a major task. They should be responsive to the aspirations of a country and sensitive to prevailing cultural values and social desires by learning how to model these economic, technological and social forces. Therefore the overall planning of such infrastructure acquires a relevant role for anticipating and reducing the impacts of the negative externalities and conflicting requirements the infrastructure produce likewise maximizing the benefits it can bring to the region (Horonjeff & McKelvey, 1994).

Changing the traditional design practice into a wider view of planning and engineering with consideration of cultural, economic and social context might require, among many other factors, a proper and supportive Risk Management Plan, conceived in early phases and continuously improved throughout the life cycle of the project. As stated by many authors an adequate management of risk is a prerequisite for a project to be successful. (Beckers & Stegemann, 2013; Bosch-Rekveldt, Jongkind, Mooi, Bakker, & Verbraeck, 2011; Garemo, Matzinger, & Palter, 2015).

As previously mentioned, megaprojects are full packed with high level of complexity; one part of this complexity is recognized to be caused by cultural phenomena. The latter is primarily triggered by a multidisciplinary and multicultural environment characteristic for this kind of projects, which is constantly susceptible to suffer a wide range of clashes and misunderstandings through the entire lifecycle of the project. In effect, this creates an increase in the level of risk but is also likely to create new opportunities, commonly forgotten. The latter proposition is supported by Hertogh et al. (2008) considerations regarding the importance to implement a systematic risk management that focus not only on threats, but also on opportunities considered to be the result of the interaction between stakeholders.

Surprisingly, very few studies have been developed in the field of analyzing risk management through more cultural phenomena -avoiding the common approach-. The present research aims to provide a more practical and creative approach to the understanding of megaprojects risk management, through the analysis of cultural phenomena and their effects of misconceptions in an international context.

1.1 Research Background

Netherlands Airport Consultants (hereafter NACO), a consulting and engineering firm provider of airport planning, airport design and airport engineering services is willing to improve its *Risk Management internal process*. NACO which is established since 1949 has collaborated in more than 550 airports around the world from Europe to Asia and Africa to Latin America. NACO represents 6% of the total turnover by market group for Royal HaskoningDHV with a workforce of nearly 173 persons.

NACO is an expert in long term strategic planning (master planning), for all type of airports including domestic, regional or international. They aim to provide its clients a clear roadmap for the development of their airport and affordable solutions for their future challenges. Their main activities cover from airside planning, such as: runways, taxiways, aprons, airside planning, access and exit roads and parking to airport related studies including strategic development, process optimization and aeronautical studies. They specialized in functional planning and design of airport terminals and all associated buildings, they usually have a strong collaboration with international project architects. They also provide airport planning implementation providing services as: program, design and project management, as well as construction supervision.

After a period of five months' internship in NACO collaborating in the Project Management Team I recognized three major factors affecting the dynamic and execution of the projects; they will be explained below and serve as context for the development of the problem statement.

"A bad beginning makes a bad ending" Euripides

First, most of the issues encountered during the project - considering a varied set of problems from technical to social and organizational- are conceived in the early Design and Planning phase which if not addressed promptly they might lead to major/minor risks for NACO and the project as well.

Second, NACO realizes that one of the key internal control processes considered since the beginning of every new project is the execution of a proper Risk Management. Risk management is a systematic process of identifying, analysing and responding to project risk used both to prevent against loss and helpful to attain greater awards (Irimia-Diéguez, Sanchez-Cazorla, & Alfalla-Luque, 2014). The Risk Management process in NACO starts by formulating a Project Risk Log (PRL). The importance of this process resides on the identification of the major risks (threats) that might affect the performance and outcome of the project followed by a formulation of the likelihood and impact of each of them resulting on an estimation of the most probable risk at stake that the project and therefore NACO can hold (appetite degree of risk). In my perspective, risk management should also be used as a process to help project managers identify not just threats but also opportunities in the project.

Risk Management should not serve only to control and measure threats but also to create new opportunities.

However, by now there is in NACO no record of previous knowledge about the major risks the company has found in projects (database, benchmarking, model, framework, etc.). That might help NACO recognize and allocate risks (both threats and opportunities) in a more systematic, controlled and organized way. This problem is probably back up by a gap of literature in the topic of Risk Management applied to airport terminals planning phase. However, the good thing is that Airport Terminals share a certain degree of complexity that it's also characteristic of a major group of projects referred as Large Infrastructure Projects (LIPs) or Megaprojects from which this knowledge might be extracted.

Third, the aforementioned complexity is also related to cultural -soft- factors that in most of the cases are not considered in NACO, but play a key role in the process and outcome of the projects. Nowadays, complex projects are more and more delivered through various partnerships between public and private organizations and/or through Joint Ventures that compromise at least two parties from different nationalities. According to Ochieng and Price (2010) the project success is difficult enough to achieve where the project team is located in close to the project environment, while considering multicultural project teams widely separated geographically and with non-similar organizational and regional cultures certainly creates an extra layer to the project complexity. They also agree that best project performance might be achieved by the development of an effective cross cultural management in which the project team is fully integrated. Other authors like Anribi et al. (2009) agree that effective cross-cultural differences can be a source of creativity, increase firm's competitiveness and avoid potential risk.

Keeping track of cultural complexity as a powerful management tool

Considering the three observations from my internship in NACO together with what has been addressed by Neufville (1976), who states that the process of airport planning should go beyond technical boundaries and presupposes establishing an intrinsic relationship with the clients for each new project as a vital way for the development of this kind of infrastructure, certainly a different approach which supports this kind of megaprojects complexity might be adequate and beneficial.

Conclusions on the background

Given the fact that NACO is constantly dealing with international projects and multinational joint ventures, it might also consider essential helping its project managers with tools to understand

issues and manage risks coming from different cultural perspectives. In this regard, Bontempo, Bottom, and Weber (1997) mentioned the significance of considering cultural influence in the risk identification and perception and implied that knowing the origin of such differences is important to avoid a cross cultural misunderstanding and is crucial to identify them as a way to improve, for example, cross-cultural negotiations.

Finally, these problems might be caused by the proposition that megaprojects (hence Airport Terminals) are by nature a complex kind of infrastructure that in combination with the following factors can be even more difficult to guide their process: (1) a poorly allocated or under management of risk as isn't properly accounted in early phases of the project (Beckers & Stegemann, 2013); and (2) certainly, there is a difference in the way people in different societies perceive and evaluate the risk during complex projects (de Camprieu, Desbiens, & Feixue, 2007). Thus, the research proposal focuses in understanding the dynamics and interactions between risk management and cross-cultural management as crucial to help NACO to assess risk in a more dynamic way and considering the extra –cultural- layer of complexity presupposed to their context.

1.2 Research Objectives

The research has two main objectives divided in two complementary perspectives. On one hand, the practice-oriented research approach as stated by Verschuren and Doorewaard (2010) "is meant to provide knowledge and information that can contribute to a successful intervention in order to change an existing situation". Therefore, the practical approach aims to offer NACO recommendations concerning how to improve the Risk Management Process, by developing a conceptual framework for Risk management in combination with the influence of cultural aspects (extracted from literature NACO's own experience). This framework is intended to be used by NACO as a guideline in early stages of the projects as a suggested solution to reduce the main problem and as a useful tool for future projects.

On the other hand, the research also provides a theory-oriented research aimed to encourage and reduce the gap of knowledge dealing with the practical application of Cultural Theory. The latter will be first analysed at a national level using the theory developed by Geert Hofstede, and secondly, the main implications of the national context are analysed in order to provide an

understanding of organizational and practical level, and the influence which both exert on risk analysis in megaprojects will also be discussed.

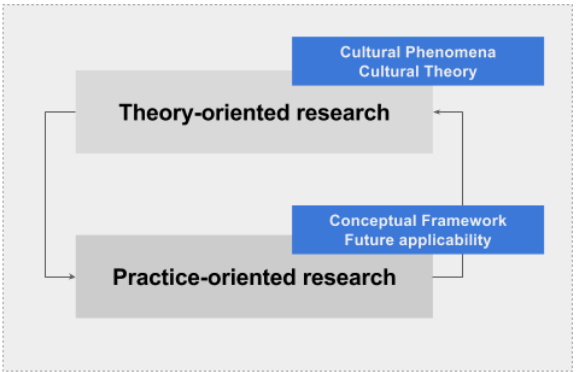


Figure 1 - Research Objectives

Relevance

The relevance expected from this research consists of two parts: scientific and social relevance. This distinction originates from the double character previously explained on the background and research objectives section. The relevance will be reflected in the following paragraphs.

Scientific relevance

This thesis will contribute to scientific progress on cultural complexity management in megaprojects, with a specific focus and reflection on the risk management (in the risk identification phase), by:

- Literature review and practice on the subject;
- Analyzing actual practices in the industry;
- Providing suggestions for performing risk management with a cultural character;
- Developing a conceptual framework that can be adapted in future projects or contexts.

In the hope that the aforementioned list serves as starting point for future research in the field of cultural analysis of risk management in megaprojects, and contribute with a creative and more social way of project management certainly required for megaprojects.

Practical relevance

The insights gained in this research can be used to improve the risk management process, and therefore project management processes not only for the niche of Airport Terminal projects but for megaprojects in general.

The development of a model compiling a risk identification influenced by cultural practices will be the most important practical contribution of the research. Improvement of activities in the risk identification phase with a better understanding of cultural behaviors and influence is expected to provide project managers an awareness and predictable useful tool leading to better project performance, by reducing and understanding project complexity with a more practical approach.

The company that provides the information and data used to perform this research, will benefit from a deeper insights with the analysis of the results, and will have the opportunity to use the model developed in the research project in future projects. Likewise, some specific recommendations and suggestions will be provided to improve the learning from projects (successful and unsuccessful) as a form to increase the performance of the projects in terms of value creation and predictability.

2. Research Design

In chapter 1, the motivation for doing this research was presented. The background research and objectives were mentioned, as well as the relevance of the project considering the most important expected results and contributions. In this chapter, the research design is presented including the following subsections: research question, research framework (schematic and visual representation of the design-oriented research chosen to achieve the research objectives); research strategy; research methodology; and scope and boundaries for the present research. This chapter aims to link the research objectives as set previously to the day-to-day research work in order to achieve the objectives.

2.1 Research question

In order to meet the research objectives, this research is focused on the following main question:

> How can considering cultural aspects help the risk management in megaprojects?

To answer the main research question a series of more precise sub questions have been formulated:

Risk Management - Identification

- SQ1: What are the main categories of risks in megaprojects?
- SQ2: How are the main categories of risks perceived in airport terminal projects?

Cultural aspects

- SQ3: How can cultural aspects influence the risk management in megaprojects?
- SQ4: What benefits can be identified while considering the influence of cultural aspects in the risk management?

NACO

- SQ5: How the understanding of these cultural aspects can help NACO?

As previously mentioned in section 1.2 a model is proposed to provide practical relevance to the research, therefore some sub questions have been also formulated to help the researcher answer the main research question: How can the proposed model be useful for

project managers and to what extent the theoretical knowledge can be retrieved and used in practice? Which lessons can be learned from the model and used to improve the performance of megaprojects in the future?

2.2 Research framework

The research framework sketched in Figure 2 provides a schematic and visual representation of the design-oriented research required in order to achieve the research objectives.

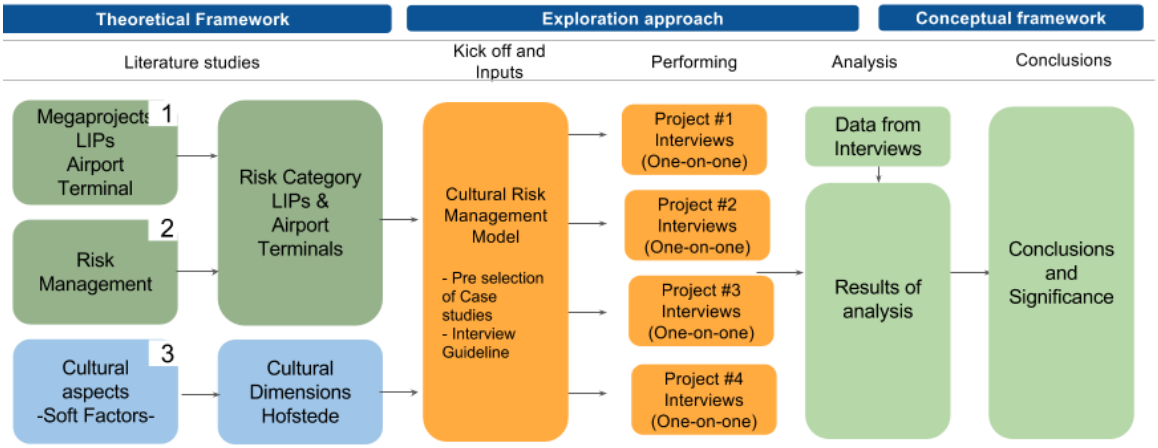


Figure 2 - Research Framework (own illustration)

As stated in Section 1.2, the objectives established for the research are theory-oriented and practice-oriented. The research strategy planned to approach them will be using a *conceptual framework* who serves to support the relationships between the core concepts and their links to an existing theory. The use of a conceptual framework in a theory-oriented research intends to obtain knowledge for the sake of knowledge and in a practice-oriented research is used to explain the reasoning as a diagnosis and evaluation process. For the purpose of this research the conceptual framework will have an ***exploratory approach*** to understand the relationship between two broader topics as risk management and cultural phenomena.

2.3 Research methodology

The methodological path preferred for this research will be a combination of methods that jointly contribute to the knowledge of the organization in relation with a specific phenomenon and the desire to understand its complexity in a practical way.

According to Yin (2009), when the main research question is formulated using “how”, the research has a more explanatory sense dealing with operational links needed to be traced over time -usually examine contemporary events within real-life context-, and over which the investigator has little or no control. In this case, the use of case studies as preferred methodology is more likely to be chosen and will favour the research.

The Case study method allows researchers to retain the holistic and meaningful characteristics of real-life events, their emphasis is on understanding the case itself and its unique features. (Van Marrewijk & Smits, 2016; Yin, 2009). Moreover, as stated by Yin (2009) the richness and extensiveness of the real life context encountered in case studies can be augmented by using multiple source of evidence such as interviews, considered by Van Marrewijk and Smits (2016), as an advantage that allows systematic collection of people’s experience, interpretation, and feelings without loss of flexibility or spontaneity; and as an appropriate tool to gain insights into the everyday world of megaproject -and its employees (Van Marrewijk, 2015).

Therefore, the preferred methodology used for this research is supported by Yin’s and Van Marrewijk and Smits considerations in combination with other sources such as literature study, current practices, and interviews. This combination is aimed to maintain a chain of evidence during the research, and most important the triangulation between them will be essential for the development of a conceptual framework, which is presented as principal outcome of the research and intended to enrich the practical validity of the research (Refer to Figure 3).

The idea to develop a ‘conceptual framework’ is that it could be used by NACO in further projects. In order to test the reliability and the applicability of the model in a real life situation the following research methodology will be used, mainly divided in three parts:

1. **Theoretical Framework:** the starting point for the research process is to provide a broader scope of the research by reviewing relatively wide and open phenomena distilled from literature studies on topics such as megaprojects, risk management and cultural phenomena. That will serve to give context to the problem. Key findings in this phase are essential for the development of the following phases.
2. **Exploratory approach:** in this phase an initial ‘conceptual framework’ will be developed based on three sources:

i. Literature review: the information retrieved from literature will serve as starting point to the development of a conceptual framework. Assumptions based on literature will be explained and confronted in the following parts.

ii. Analysis of case studies: The analysis of the selected case studies on this research is suggested only as a preliminary method to provide valuable information and serve as starting point for the subsequent phases. The selection of case studies will be further explained in section 4.1.

iii. Interviews: the main purpose is to obtain and provide useful information for the development of the conceptual framework. The sample of interviewees will be fully explained in chapter 4.2. The variety of respondents from different level and positions on the organization is intended to enrich the analysis by gathering more interesting insights.

3. **Conceptual framework:** after analysing the data collected from the interviews and checking the reliability of key findings, the last phase will be to provide NACO specific conclusions and recommendations.

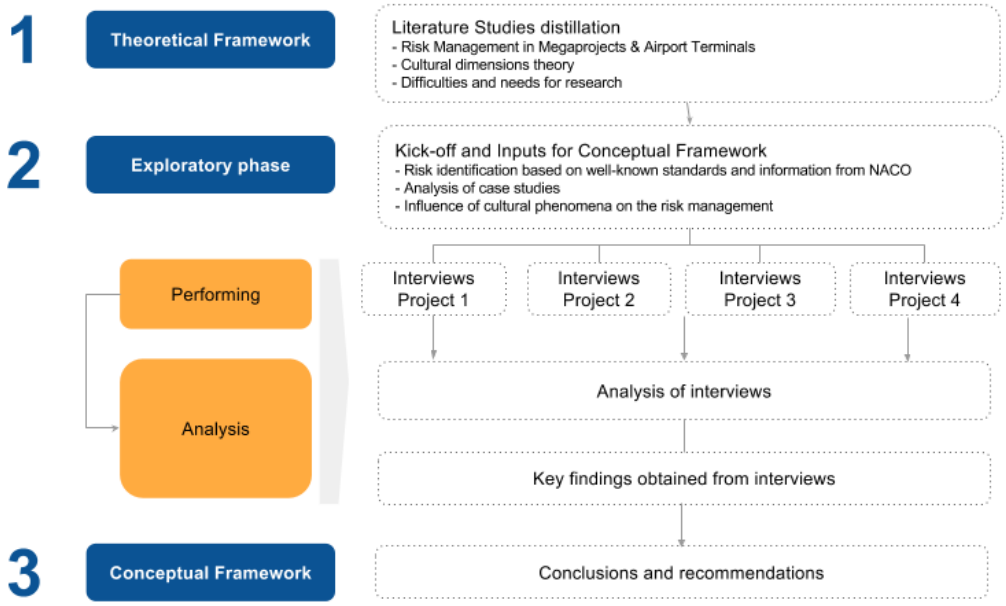


Figure 3 - Research Methodology (own illustration)

2.4 Scope and boundaries of research

The focus of this thesis is on part the understanding cultural phenomena as a way to improve risk management in megaprojects development. The scope of the research is intended to be a combination of theory and practice to provide a model to identify the main factors that play a major role from the project's environment and contribute to a better understanding of risks -conception and identification- on megaprojects.

In any solving problem process the definition of the system boundaries should be agreed to truly provide a satisfactory solution (Boateng, 2014). Therefore, the boundaries selected for the execution of this research are the following:

a. Cultural phenomena (complexity): The research–primarily–focuses on the analysis of cultural complexity as a key source and driver influencing risks on megaprojects. The analysis starts by analysing cultural influence at a national level (by using Hofstede Cultural dimensions theory); to later understand its implications at a project level (organizational). The study considers the impact and interaction between these two levels to provide useful and practical recommendations.

In this regard, Bosch-Rekveldt et al. (2011) consider that once a certain type of complexity is better understood it could be better introduced in the *front-end phase* of the project in order to improve the overall project performance–and contribute to better manage the overall complexity as well.

b. Value Identification: Various authors assume that the value identification of a project is higher in the Front-end Phase; hence a major investment in this phase represent a critical success factor for projects and creates an efficient risk management (Verbraeck, 2015). Priemus and Wee (2014) comment that complex projects which an allocation of -approximately- 35% of their overall cost to the front-end phase are: more likely to show cost reductions in the implementation phase, tend to be more socially accepted and have a better risk management. Indeed, they are more successful projects through a more systematic and inclusive problem- solving process.

Risk is an important contributor to project complexity, therefore increasingly complex projects requires a better risk management. Moreover, considering the increasingly amount of complex project occurring nowadays, an improvement of modern project management should also be

considered. For this reason, Bosch-Rekveldt et al. referring to Hillson and Simon, consider the risk management as an important contributor to project complexity and essential to successfully manage projects.

c. Risk Management: One of the first processes in the execution of risk management according to ISO 31000 is the risk identification. This process is considered to start at an early phase of the project, so called Front-end. For this reason and in accordance with the aforementioned in subsection a. and b., the risk management will be mainly studied on the risk identification (and categorization) phase. According to Boateng (2014) the process of risk identification creates understanding of risks and their categories for an effective risk management system applied though the lifecycle of the project.

As a conclusion, for the purpose of this research, the cultural complexity is considered as a value enabler that might help the team to articulate, communicate and maximize value in term of the benefits offered to the project. Likewise, risk management is considered as a tool that minimises the uncertainty in delivering this value, as well as a tool that control not just threats but also creates opportunities (Hertogh et al., 2008). Figure 4 provides a visual explanation to unfold the aforementioned scope and boundaries of the research.

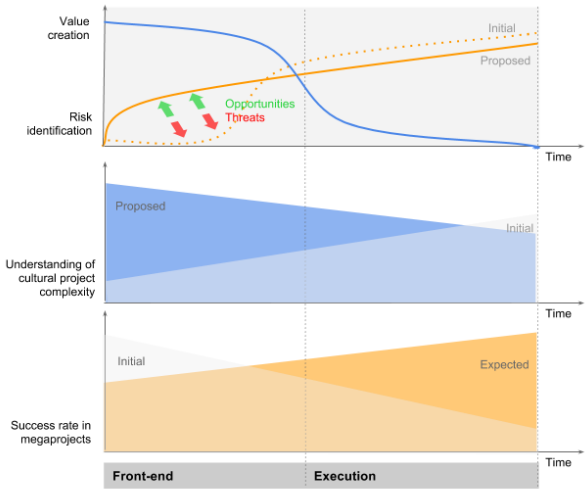


Figure 4 - Summary scope and boundaries (own illustration)

2.5 Reading Guide

According to the research framework presented in section 2.2, this research will be divided in three main sections:

1. **Theoretical framework:** This part will be developed in chapter 3. First, by providing an introduction to megaprojects concepts and characteristics, followed by risk management studies, and finally providing insights on the importance of cultural aspects in megaprojects.
2. **Exploratory phase:** Mainly developed in chapters 4 and 5. This part will be the core section of the present research as it shows the integration of the aforementioned theoretical framework combined with the insights retrieved from NACO case studies and analysed in practice by performing interviews.
3. **Conceptual framework**. After the exploration and analysis phase; Section 6 provides the answers to the research questions developed for this research, as well as present the conceptual framework developed through the entire aforementioned sections and provides conclusions and recommendations for further research.

The report ends with some personal reflections by the researcher in order to express the significance of research and its most interesting contributions from a theory perspective (mostly cultural application), and future applications in similar international firms as NACO.

3. Theoretical and Conceptual Framework

3.1 Theoretical Framework

As has been argued in the preceding chapters, a prerequisite for researching in three complementary topics related to megaprojects is necessary to provide an ideal context to form the conceptual framework. Therefore, in this chapter the results of a review of this literature are explained. Figure 5 schematize the theoretical sequence followed for this purpose.

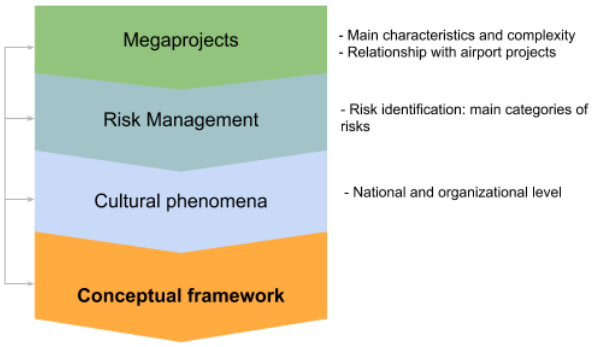


Figure 5 - Theoretical Framework Structure (own illustration)

3.1.1 Megaprojects & Airport Terminals

Flyvbjerg, Bruzelius, and Rothengatter (2003) define megaprojects as the “new animal”. They conceived megaprojects as multibillion-dollar mega infrastructure projects that constitute a new political and physical animal. There are lot of examples that meet this description. In Europe some examples are the Channel tunnel, German MAGLEV train between Berlin and Hamburg, and the European Union scheme to create the ‘Tran-European Networks’. Likewise, there are also examples in Asia for example Hong Kong’s Chek Lap Kok airport and China’s Quinling tunnel. In America, the Boston’s ‘Big Dig’ project and Denver’s new international airport are two classic examples, and more recent cases such as the metro system in Brazil and the Tappan Zee Bridge in New York (Garemo et al., 2015).

In fact, what do all the aforementioned projects share in common? First, megaprojects are conceived as economically and social transformative projects. According to Flyvbjerg (2014), megaprojects represent 8% of total global GDP and in some cases they even represent larger

GDP than economies of countries such as Kenya or Guatemala. For example, the Panama Canal contributes significantly to the country's GDP; and Dubai's international airport represents 21% of Dubai's employment and 27% of its GDP (Garemo et al., 2015). Besides its undoubtedly economic impact, megaprojects are important drivers of society changes designed to ambitiously change the structure of society and impact millions of people. (Flyvbjerg, 2014; Mišić & Radujković, 2015).

Second, megaprojects are commonly known as complex large-scale projects, involving high cost complex ventures, inherent risky due to long-term period of development and construction, and involvement of various public and private stakeholders, among other characteristics (Flyvbjerg, 2014). Bruzelius, Flyvbjerg, and Rothengatter (2002) define megaprojects as high investment expenditures of US$1 billion–or more–with at least a life span of 50 years, with demand forecasts and cost estimates plagued with uncertainty and a common misconception of user's benefits due to the inability of the operator to capture indirect benefits. Some other authors like Brockmann and Girmscheid (2007) refer to megaproject as projects requiring a large amount of resources, high capital costs, long duration, turbulent environment, working on the edge of technology, and with innumerable interactions.

Thirdly, they are characterized by having a bad performance reputation often result in undesired outcomes with enormous cost and time overruns (Haidar & Jr., 2010). Flyvbjerg (2014) mentioned that nine out of ten megaprojects experience cost overruns, take much longer in its execution phase–than initially expected–and presented poor performance in terms of economy, environment and public support; most probably caused by an underestimation of costs and overestimation of benefits. Therefore, good megaprojects are the exception rather than the rule.

Cost overruns in megaprojects are between 50 to 100% as a common measure, but also higher levels above 200% have been encountered. There are plenty of examples that support these facts to mention but a few the Wembley Stadium project (US$1.3 billion) which was 80% over budget and was delivered four years later than original planned (Ahiaga-Dagbui, Smith, Love, & Ackermann, 2015; Brady & Davies, 2014; Flyvbjerg & Cantarelli, 2013).

The Organization for Economic Cooperation and Development (OECD) is forecasting a global cost investment in infrastructure as $70 trillion through 2030 (OECD, 2007). Bearing this data in mind the future of megaprojects foresees challenging and definitely something to be considered. So, when this kind of projects goes wrong whole companies and national economies may be badly affected; conversely, well-functioning megaprojects help societies to thrive and individuals to prosper. Additionally, it is extremely important to carefully understand the benefits and intrinsic complexity far beyond its simple functional implications.

For some authors, a key process to understand this complexity is by referring to the decision-making process. Flyvbjerg (2014) analyses the subject thoroughly and investigates the process behind the approval and implementation phases determining some major causes that affects its success such as: commitment at early phase resulting in "lock-in" effect, principal-agent problems due to the high investment required, constantly scope changing, likely to transform in 'black swans', misinformation about costs, benefits, schedules and risks is the norm throughout project development and decision-making processes.

> "Construction "mega-projects" live up to their reputations in many ways, including mega-size, mega-cost, mega-complexity, and mega-risk". (KPMG, 2013)

Other authors like Brockmann and Girmscheid (2007) deconstruct megaproject complexity into four major categories to understand the context of megaprojects and approach them in a better way. By using the Luhmannian system theory, they describe the first type of complexity called *overall complexity* defined as the degree of manifoldness, interrelatedness and consequential impact of decision field, and considering this process as essential to understanding three subtypes of complexity embedded in megaprojects: task, social, and cultural. *Task complexity* refers to the density of activities in a spatial and temporal frame such as organizational planning, design planning, work preparation and construction management processes, all these tasks are interrelated and thus create a high repercussion on the decision making process essentially required for megaprojects. *Social complexity* depends on the number and diversity of actors communicating and working together, which can be reduced by creating an environment of trust and commitment within the parties. Lastly, *cultural complexity* is described as the efforts that are placed before the project starts also referred as the diversity of the cultural software of the mind defined by Hofstede; this kind of complexity might be reduced by using a sense-making process.

Considering the interrelation and type of complexity described by Brockman et al. there is also a strong need to conduct critical analysis on the repercussion of social and cultural factors affecting megaprojects. Bosch-Rekveldt et al. (2011) develop the so called 'TOE framework' which was originally introduced by de Bruijin's break down complexity concept defined as: *Technical* related to technological uncertainty, dynamics and uniqueness of the project; *Social* attributed to the actors' interests, risks and outcomes of the project related to its environment; and *Organizational* related to people and teams involved in the project. 'TOE framework' as mentioned by the authors is planned to, in first place, assess and understand better the structure of the complexity of the project. Secondly, after understanding complexity in a deeper way, the framework could be somehow introduced in the front-end phase to provide benefits to the management and performance of large engineering projects.

Brady and Davies (2014) suggest the study of complexity as a significant factor to overcome common pitfalls related to time, cost and quality objectives. Other authors like Ahiaga-Dagbui et al. (2015) suggest the adoption of systems thinking to grasp projects complexity and deeply understanding of the nature of cost overruns in megaprojects. Hence, understanding complexity in mega projects helps to deliver projects more effectively.

Not only complexity, but also the idea to understand that megaprojects represents a different scale of projects; therefore they are expected to be managed in a different way far from conventional management practices. Flyvbjerg (2014) provides some "cures" to overcome this situation as for example: proper front-end management and an increased collaboration between public and private parties to improve the knowledge of successful project and replicate them in the future. In my opinion, Flyvbjerg's suggestions should be considered in case wanting to improve the current situation of megaprojects.

As has been explained, breaking down the complexity is in the top agenda of megaprojects by many reasons: (1) complexity in megaprojects should be considered as priority and understood it since early phases of the project. (2) Traditional management practices are questioned and therefore opt for a change towards innovative management practices that consider megaprojects in different levels of complexity such as: social, technological, technical, cultural, organizational, etc. (3) It is supposed that the analysis of complexity in megaprojects could bring benefits to the performance and management of the project, and reduce as much as possible the common errors as explained by Flyvbjerg.

After understanding, to some extent, the structure of megaprojects the next question should be how does Airport Terminal Projects compare with them?

In the book Strategic Airport Planning, Caves and Gosling (1999) recognize the influence of most of the aforementioned types of complexity embedded in the process of planning airports. They perceive the airport planning process as a complex system where an enormous interaction of stakeholder is fundamental to start the process. Likewise, they recognize some other factors that are strongly related to the stakeholders such as: a high level of information –from all kind of parties- will be required in the process to pursue a high level of quality; the process has usually a strong political influence and there is a required level of understanding of the society where the airport is going to be used, as well as the environment it will affect. Additionally, the process also requires a strong sense of creativity to support the high level of uncertainty embedded in this type of infrastructure, and a flexible framework to support the continuously technological challenges.

In this respect, the authors make some recommendations to cope all these factors as for example: develop an early participatory planning process including all actors in order to agree mutual goals and to explicitly recognize power structures. The recognition of the actors and thus the linkages between them in terms of economic and physical effects are essential to the process. More importantly, they recognized that farther than using active predictive methods for traffic and airline behaviour they might also be used for technological, cultural and political settings and their causal links to the airport final user's behaviour to reduce as much as possible the high level of uncertainty embedded in all the factors. They concluded that planning is a cheap process compared to the ultimate project cost and the cost of wrong decisions or lengthy delays. So, even though foreseeing the possible benefits of a good planning process is difficult but undoubtedly should be analysed.

Some other authors as Richard Neufville, in his book Airport Systems Planning, understand that the airport system planning requires an approach to foster the wisdom to integrate the analysis effectively with social preferences and cultural values to foresee the broad aspects of the problem in order to fulfil the complex role in the transport network.

Based on what the authors defined as megaprojects and their main characteristics, we can determine that Airport Terminal projects are part of the so called megaprojects, thus the use of information gathered from these sorts of projects is reliable to the study of Airport Terminals.

3.1.2 Risk Management in Megaprojects

Considering the fact that the most common pitfalls identified in megaprojects are related to its intrinsic complexity, unequivocal management practices and overlooked situations in early phases of the projects; the following section provides an initial approach to risk management also perceived as a fundamental tool to analyse and improve the performance of megaprojects in early phases.

As explained by Flyvbjerg (2014), a better understanding of the causes that originates risk on megaprojects should be initiated with a proper front-end management, in order to provide a better accountability of the project. Flyvbjerg also considers the need to make research in this field as the beginning to help us understand success –of megaprojects- and how to replicate it in the future. In this respect, Bosch-Rekveldt et al. (2011) comment that a proper risk identification can improve the management of the project and its uncertainties, and also contribute to the understanding of project complexity.

Priemus and Wee (2014) mention that megaprojects are "options on opportunities that are not fully known and for which commitments must often be placed far in advance of the resolution of key uncertainties"; they also mentioned the importance of recognizing the multiple complexities affecting megaprojects in the early phases due to its impact on risk and uncertainties during the continuous decision making process. And consider the importance of judging, shaping and recognizing risks thorough different perspectives and outcomes.

Studying risk

"Designing risk management without defining your risk appetite is like designing a bridge without knowing which river it needs to span. Your bridge will be too long or too short, too high or too low, and certainly not the best solution to cross the river in question. " (RHDHV, 2012)

The previous extracts from RHDHV Risk Analysis Process, reflects exactly what should be assumed as starting point to discuss the following ideas:

- Which kinds of risks are affecting megaprojects, and thus airport terminal projects?
- Poorly allocated or undermanaged risks can potentially diminish the outcome.

- ‘The seeds of many project failures are sown in the early stage of development’, so how does an accurate risk management improve this process?

As stated by Merrow (1988) “The absolute value of cost overruns and schedule slippage increases with the size of projects, putting very large sums at risk in the case of megaprojects”. So, any big project carries a big opportunity for failure, likewise higher risks. Boateng, Chen, and Ogunlana (2015) suggested that large and complex projects usually are the results of an unbalanced subjective beliefs and information in assessing risks and uncertainties, and taking corrective actions to control and manage the identified risks. Garemo et al. (2015) agreed with Merrow and Boateng et al. mentioning that “Building big infrastructure projects is always risky” and most of the errors began at the beginning of the project due to poor justification and need for the project, misalignment among stakeholders, insufficient planning, and the inability to use appropriate capabilities. To overcome these issues and improve the ‘odds of a smooth landing’ they suggested performing the engineering and risk analysis before starting construction to improve projects’ performance.

“…the seeds of many project failures are sown in the early stages of development”
Beckers and Stegemann (2013)

According to Beckers and Stegemann (2013) on their interesting report about risk management, major infrastructure projects share a huge history of problems mostly related to cost overruns, delays, and failed procurement. Besides these common factors, their unsuccessful history is associated to its intrinsic long-term complexity urgent of a strategy that reflects the uncertainty and variety of risks embedded in their life cycles, and considers a promptly interface management that pursue the involvement of several kinds of stakeholders coming in and out of the project each of them with their own risk-bearing profile and risk-management capacities. The authors believe that most of these problems are foreseeable and avoidable with a proper forward-looking risk management if developed early on in the concept and design phase. Conversely, a poor risk management could bring a direct value losses besides considering the lost in GDP terms represented to the host country and the associated collateral societal effects and loss of reputation. Consistent with this idea, the authors mentioned that the under management of risk in later phases of the projects is also a potent trigger that decreases significantly the share of value of the project. Project owners often fail to recognize that risks generated in one stage can have a significant impact throughout the lifecycle of the project.

As previously explained, the poor management of risk has been encountered in all phases of the lifecycle of the project, beginning with a poor risk assessment and a fragile risk allocation. To overcome such problematic Beckers and Stegemann (2013) provide some suggestions as for example: to pursue a proper front-end project planning that serves as engine to shape an accurate project's risk profile in accordance with the particularities of the business; a forward-looking insight of the root causes of identified potential risks and a true understanding of the capabilities and willingness of each stakeholder to manage, allocate and price them.

Avoiding failures and maximizing success – Avoiding threats and maximizing success

Some other authors adopt a broader scope of the problem and analyse risk management with a different approach. Boateng, Chen, et al. (2015) consider that megaproject performance are not only affected by time and cost pitfalls as mentioned by Flyvbjerg; instead they introduce five major challenges that impact the performance of megaprojects explained as: social, technical, economic, environmental and political (STEEP). They consider that cost and schedule risks are somewhat managed in the project planning phase; however, the implications of the interactions with other STEEP types of risks have not been clearly studied. The authors found that various risk variables which influence the project cost, time and quality are interrelated within a chain of cause and effect STEEP networks creating a domino effect. They suggest the development of a model that combines a Risk Priority Index (RPI) with the use of Analytical Network Process (ANP) as a useful tool for megaproject managers to help them recognize, prioritize and focus on key factors that influence the project negatively.

If the aforementioned suggestions are considered, the project is supposed to exhibit a better performance and overall value. For these reasons, it is essential to provide a framework that introduce risk management across the value chain of the project and most important in early phases to control and foresee as much as possible the most critical issues and design choices that can be used in case of something goes wrong. It is also important to remember that most of the cost and schedule overruns in projects are related to an ineffective management of risk and uncertainty consequently resulted of a poor understanding of the systemic and dynamic nature of the project (Boateng, Ahiaga-Dagbui, Chen, & Ogunlana, 2015).

Additionally to this perspective, other authors adopt a deeper and practical approach of the risk management by adding an extra layer of **risk perception**. For example, de Camprieu et al. (2007)

reported that there are significant differences in the way project managers from different nationalities (Canada and China) perceive and evaluate risks of a complex project, and the value implications that they might have in practice. Although the analysis focuses on only two countries the authors suggest extending the analysis to different cultures and make a cross validation of findings. This approach is particularly important to NACO due to their regular involvement on international joint ventures, PPP contracts, and constant interaction with foreign clients.

As has been noted, some of the key findings encountered in the previous literature research are the following: the interrelation between the most common pitfalls of megaprojects with the risk management process and the importance to approach them on an early phase of the project. Secondly, a more tailor-made approach -based on literature research and practical experience- on how risks are managed in order to improve the projects' performance. Lastly, the participation of different actors on megaproject influence the conception and impact of risk management, so it should be interesting to considering a cultural perception embedded in each of them.

Risk analysis

Referring to ISO 31000:2009 (as cited in AIRMIC, Alarm, and IRM (2010)), risk is defined as the "effect of uncertainty on objectives". Lark (2015), mentioned that the risk could have positive and negative consequences that enhance or limit the achievement of objectives, thus the effect -positive and/or negative- is a deviation from the initially expected. Uncertainty on objectives can be related to different aspects and used or impact at different levels. Usually, risks are referred to potential events with latent consequences and they are associated to a specific likelihood of occurrence.

According to International Organization for Standardization (ISO), managing risk effectively helps organizations to perform well in an environment full of uncertainty; remembering that the latter is a common characteristic of megaprojects, Kardes, Ozturk, Cavusgil, and Cavusgil (2013) mentioned that megaprojects involve both high risk and uncertainty, and usually a classification of risk is done at the macro and micro levels for a better understanding.

As previously mentioned in section 2.4, the risk management will be mainly studied on the risk identification phase, and extensively used for the development of the conceptual framework as described in Figure 6. According to Boateng (2014), this phase is utmost important for understanding risks and their categories for an effective risk management system applied through the entire lifecycle of the project. For this purpose, the definition of risk identification given by ISO 31000 will be used “process of finding, recognising and describing risks”.

Overall, the conceptual framework will be useful, first, as a warning tool to reduce uncertainty and complexity at an early phase of the projects and prevent potential critical information on risks to successful completion, and secondly, as an enhancer to create an accurate risk profile including the positive aspects encountered during the process to be used as a continuous improvement guide for future projects.

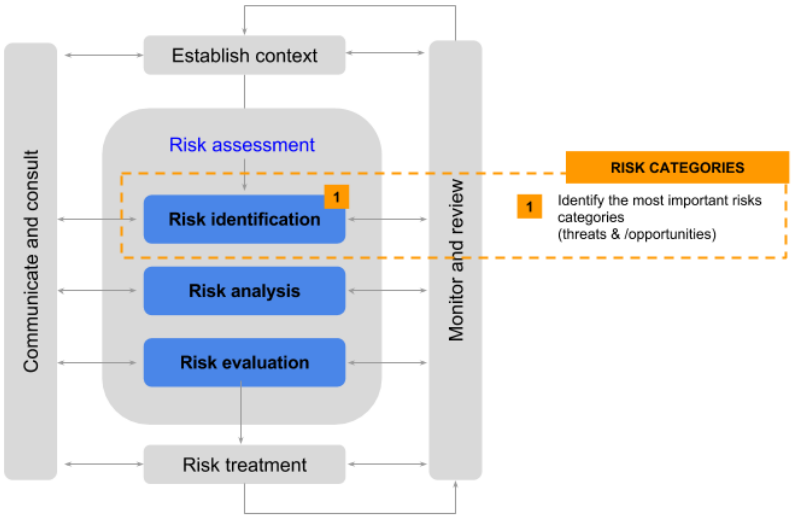


Figure 6 - Risk management process (adapted from ISO 31000)

3.1.3 Introduction to cultural practice in megaprojects

After understanding, to some extent, how does complexity and risk management occur and can be analyzed in megaprojects, the following section will discuss the influence of the extra –cultural- layer encountered on them. As previously explained, cultural aspects play a vital role in the development of megaprojects (and airport terminals) due to several factors such as: high level of stakeholder involvement, an increasing global trend for making project internationally, and the need to establish a deeper relationship with the client as a vital way for its development.

Therefore, this section aim to discuss the influence of cultural aspects in the field of megaprojects, and how does the analysis of this complexity –layer- enrich the understanding and management of risk, considered by Bontempo et al. (1997), as a major influence in the perception and identification of risk crucial to improve, as for example, cross-cultural negotiations, inter-organizational conflicts and communication processes.

Referring to their interesting book about cultural practices inside megaprojects, Van Marrewijk (2015) consider that due to the complexity of 'new' megaprojects (explained as increasingly political-sensitive, with complex contractual arrangements, participation of interest groups, citizen opposition and stakeholders, etc.) more attention has been recently put on considering the performance indicators far away from traditional notions such as time, cost and scope. For this reason, he proposes that the approach should be guided to a more organizational culture and cultural patterns.

Sanderson (2012) (cited in Van Marrewijk & Smits, 2016), mentioned that one possible explanation why megaprojects are often problematic is because cultural differences are embedded on their organizational complexity and ambiguity. He explained that the actors involved behave with certain premeditation trying to build governance models to face the uncertainty and ensure the project run as smooth as possible. However, in practice there are micro-processes of governing, so called 'ex-post governance', that are even more important, and by now, little known and thoroughly studied.

According to Van Marrewijk and Smits (2016), megaprojects associate competing partners with different styles, sometimes extreme interests, different nationalities and organizational cultures, that are translated on different management practices –'different ways of doing and thinking'-. Megaprojects also perceived as social interactions within multiple interdependent networks, thus they should be seen as **cultural phenomena**. By adopting this approach, they consider an improvement on the understanding of ex-post governance practices. In this respect, Bosch-Rekveldt (2015) mentioned that "managing projects is a people process", meaning that, it is all about people solving problems and working together in order to deliver a specific result. So, recognizing and sensibly employing cultural differences could allow improvements in the efficiency and profitability of megaprojects.

Cultural practice

Nowadays, project managers are urged to increase their awareness of how culture influence human behaviour–especially teams–. According to PMI (2014), the ones that lack this distinction are on serious disadvantage, as culture is considered an important factor who determines as for example leadership and management in projects.

The figure below depicts the commonly known iceberg metaphor related to the perception of cultural complexity. It mainly shows two different sections. Usually, the attributes above the waterline are observable (so called external), explicitly learned, and conscious as for example: some beliefs and behaviours. Contrary to this, below the waterline exist attributes that cannot be easily visible (also called internal), they are commonly implicitly learned, subjective to knowledge and difficult to change, as for example: attitudes toward expectations, sense of authority, competition and cooperation, approaches to problem-solving and decision making processes, concepts of time, notions of leadership, communication styles and rules, among many others.

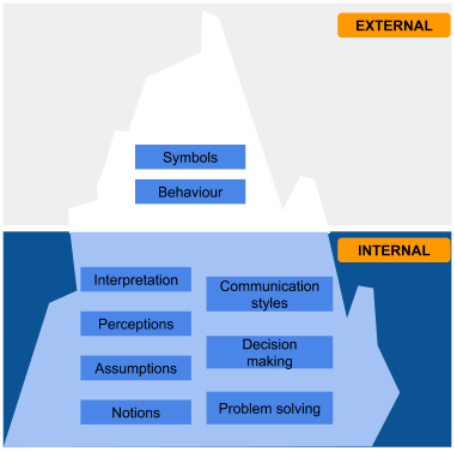


Figure 7 - Culture iceberg (own illustration)

Hence, the internal aspects–below the waterline of the iceberg–are those who increase the complexity factor for project managers and for projects in general. Certainly, here is where lies the importance of considering these factors as fundamentals to provide a better interpretation of the risks involved in megaprojects far beyond the typical practices; and by considering the implications of having different risk perception between parties involved in the project.

Nevertheless, the study of the internal aspects is not a simple task further considering that, more than ever, there is an emergent global trend towards working on multicultural environments. Ika and Hodgson (2014), consider that international development should be seen as an exceptional breed of projects that provide fertile ground for a critical analysis due to their specificity, uncertainty, complexity–specially socio political–and multinationality; and who certainly requires a new management style to correspond match the expectations planned.

Similarly to Ika and Hodgson (2014), Liu, Meng, and Fellows (2015) mentioned that implementing projects in a foreign country is a high risk business activity. First of all, considering the fact that these kinds of projects are risky by nature and usually combined with other factors such as: differences in legal, social and cultural systems unfamiliar to contractors. Secondly, they are highly influenced by the cultural diversification backgrounds, and by the amount of members resulting on a potentially impact and increase of conflicts. See Figure 8.

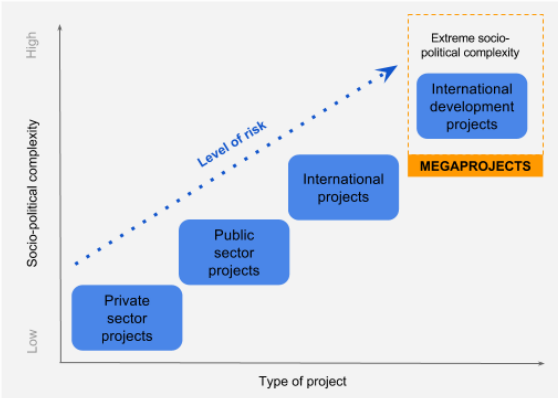


Figure 8 - Socio-political complexity (adapted from Ika & Hodgson, 2014)

Analysing cultural practice in megaprojects

According to Smits (2014), “culture is a serious business”. Given by the assumption that every party working on the project have their own culture as described by Smits (2014) as the “way of doing things here” –referred to one specific environment or project; therefore it should be considered in a higher level on the organizational agenda due to the implications that the interactions (clashes and overlaps) between parties might arise during the project execution.

Culture as "the way we do things around here"; however, it do not reflects the real complexity.
(Smits, 2014)

Van Marrewijk (2015) mentioned that "collaboration in multi-national megaprojects is influenced by national cultural differences and differences between partners". He also consider that the dynamics within megaprojects are more complex than just their cultural differences due to each participant take advantage of their own culture and strategically used them to gain more power. As a consequence, according to Van Marrewijk (2015), cultural differences should be understood as "shifting social constructs dependent on the specific interest at stake" creating different cultural tensions and management styles. In this regard, Liu et al. (2015) referring to Hofstede et al., 2010, consider that every societies use different ways to face problems of social life which are rooted in cultural differences.

According to Hofstede et al. (2010), culture is defined as "the collective programming of the mind distinguishing the members of one group or category of people from another". As human beings we gain our collective programming along years of evolution; since childhood we have a large capacity for absorbing information and continue developing it throughout the following years. Culture is always a collective phenomenon and a process that is learned, a social game derivative from one's social environment and enables a group to function smoothly.

So the next question is how is this effect impacts the work of NACO? As an international consultant NACO is constantly dealing with the kind of issues aforementioned by van Marrewijk, Ika et al. and Liu et al. They have as many problems and challenges as, dealing with lot of uncertainties, managing a huge variety of stakeholders, dealing with a high public pressure to accomplish the project, and on the top of it a multidisciplinary and multicultural environment susceptible to misunderstanding communication and well known lost in translation issues. Likewise, it should also be considered that every stakeholder gets involved in the project in a very different way, make decisions in a more collectivistic or individualistic way, expect different kind of result in short or long term, and definitely perceive risks in very different way. Indeed, we can assume that each party conceive the process in a different way influenced by their cultural aspects.

Therefore, for the purpose of this research and to get a better understanding of cultural influence on risk management; the author will consider the proposal of Van Marrewijk and Smits (2016) as cornerstone for its research, and will reflect on the idea of looking at megaprojects as a "cultural

phenomena" to improve the understanding of risk management. In order to do so, the research approach proposed by Smits (2015), considering a "zooming in – zooming out" process, will be used to provide an initial overall context and then go through specific context.

As it has also been mentioned by Smits (2015), focusing on traditional practices (mainly used to provide specific solutions) are not enough, because figuratively, if you go to the surface there are always different things going on, this process is what she called "submarining". Considering the aforementioned; the author proposes the analysis of culture, initially, at a national level using the 'well-known' theory developed by Geert Hofstede; to further analyse the most probable implications at an organizational level.

By considering both levels, the author aim to enhance the analysis and knowledge of megaprojects; and provide (NACO's project managers) a conceptual framework to better understand cultural and organizational behaviours on their projects, and create a better understanding of the combination of 'soft and hard' complexities. As implied by Smits (2014) on her interesting talk, if the culture dynamics of the other parties are understood it would be less frustrating for the project managers when encountering unfamiliar behaviour on the organization, similarly, if we understand culture we might find why it is so difficult to change them.

Culture at a national level

This subsection provides an introduction to culture at a national level by using the work developed by Geert Hofstede, which has become an established theory and dominates quantitative culture research in international practice.

After a worldwide long research started on IBM employees during the 60's-70's, and continuously improved nowadays, Dr. Geert Hofstede was able to obtain a database of cultural statistics based on a classification and quantification of cultural differences. His study found clear patterns of similarity and differences between the employees which allowed him to attribute different cultural dimensions. "A dimension is an aspect of a culture that can be measured relevant to other cultures" (Hofstede et al., 2010). It is important to consider that the aforementioned database, dimensions, and its indices will be widely used through the following chapters of this research and will serve as basis to create the conceptual framework.

A brief summary of the six dimensions and their relevant implications will be explained above:

- Power distance (PDI)

Power distance describes “the extent to which the less powerful members of institutions and organizations within a society expect and accept that power is distributed unequally”. High power distance scores means that few people on the top of a society hold a lot of power which is more or less accepted by others.

- Individualism –vs- Collectivism (IND)

Individualism pertains to societies in which the ties between individuals are loose. Collectivism on the other hand “pertains to societies in which, from birth onwards, people are integrated into strong, cohesive in-groups” which continue to protect them throughout their lifetime in exchange for unquestioning loyalty

- Masculinity –vs- Femininity (MAS)

Masculine societies lay focus on competition, achievement and success; with clear distinction between emotional gender roles. In feminine societies generally emotional gender roles overlap considering both men and women are supposed to be modest, tender, and concerned with the quality of life

- Uncertainty avoidance (UAI)

The uncertainty avoidance describes “the extent to which the members of a culture feel threatened by ambiguous or unknown situations” and have created beliefs or institutions that try to avoid these. In societies with high scores of uncertainty avoidance people try to control the future while in societies that show low scores people let future just happen.

- Long-term Orientation (LTO)

Long-term orientation stands for the fostering of virtues oriented towards future rewards. In the opposite pole, short-term orientation, stands for a society that fosters virtues related to the past and present, in particular respect for tradition.

- Indulgence Versus Restraint (IDG)

"Indulgence stands for a tendency to allow relatively free gratification of basic and natural human desires related to enjoying life and having fun. Its opposite pole, restraint, reflects a conviction that such gratification needs to be restricted and regulated by strict social norms." (Hofstede et al., 2010)

Although there is strong critique by some authors regarding the inappropriate use of Hofstede’s dimension scores nowadays due to the fact that scores (indices) were collected more than 45 years ago; some researchers like Beugelsdijk, Maseland, and van Hoorn (2015) suggest that “the relative positions of and differences between countries are remarkably stable”; therefore, we

should not dismiss the country scores of Hofstede's framework simply by the idea that they are outdated and implies that managing cultural differences remains important.

In fact, the national cultural scores given by Hofstede will be considered as fundamental and sustenance to understand how project actors influence the conception and perception of risk in each of the case studies selected. If differences are encountered, they will be reflected and analyzed in the context of an organizational level and in relation on how to deal with risk.

Culture at an organizational level

The aim of this subsection is to provide an introduction on how does the differentiation of Hofstede cultural dimensions scores within countries can also be reflected at an organizational level, and consider if they might or might not contribute to the risk identification process. As suggested by Van Marrewijk and Smits (2016), megaprojects should be understood as "living worlds with their own subcultures, rituals and practices".

Smits (2014), believes that the study of culture in terms of nationalities (indirectly referring to Hofstede dimensions) is insufficient because they ignore social variations, diversity, and power relations, among others. As also been exposed in section 3.1.1, culture is largely invisible for this reason it should also be studied at an individual, functional and organizational level.

By understanding the national level of the analysis (related to Hofstede cultural dimension) embedded in the project profiles we could be able to grasp, in a soft manner, the impact of cultural differences in a variety of aspects concerning people, management practices and the project itself such as: organizational and planning issues, risk appetite, tendency in negotiation, commitment to achieve goals, frustration and dealing with problems, decision making process, building trust, teamwork, communication, and so on.

The analysis of this layer would open the gap to know how the stakeholders use their national scores as a way to differentiate organizational behaviours and study its influence on the risk management (identification process). Moreover, gaining knowledge in the field of cultural variation could be specifically transformed into skills for project managers and can be applied to many situations. The concept of 'cultural quotient' defined as the "capability to deal effectively with people from different cultural backgrounds", is ideal to support the initial statement. (PMI, 2014)

Conclusion of subsection

As a conclusion of this subsection, the research aim to have two main contributions. First, develop an alternative conceptualization of complexity related to cultural aspects on megaprojects, suggesting that megaprojects should be understood as “living worlds with their own subcultures, rituals and practices” (Van Marrewijk & Smits, 2016). Second, provide a deep understanding of the influence of these cultural aspects in the risk identification process of megaprojects. Both aim to understand the complexity of megaprojects risks, governance and management styles.

As it has been exposed since the introduction, Airport terminals are part of a broad and complex kind of infrastructure so called Megaprojects. They are planned to provide a greater wealth to the country, and in most cases, they also provides collateral impact to the region due to the economic scope that they represents. This kind of infrastructure is plagued by a high complexity not just in a technical point of view but also in the untold story management behind the outcome.

On this concern, airport terminals share many characteristics with megaprojects and are particularly identified by having: (1) a high level of partnering; (2) as a result of the partnering there is a high number of stakeholders involved in the process and the multivariate interests among them creates an additional tension layer for the project; (3) of course the environment given for this kind of projects is characterized by a multicultural, multi-language and multi-location.

Most of the authors that have been studied recognize that part of the complexity is related to both soft and hard aspects. Some of the most commented errors occurred in megaprojects are related to the risk management process and the inability to approach them better in an early phase of the project. Lastly, the participation of different actors on megaproject influence the conception and impact of risk management, so it should be interesting to considering a cultural perception embedded in each of them.

By now, it seems to be unclear which could be the benefits of considering the megaprojects breakdown complexity in terms of cultural aspects in combination with the risk management process. This might represent an improvement to the risk management process in early phases of the project (as perceived to be a root cause of the major errors of megaprojects), and also

probably affect the project performance in future stages of the projects. The reality is that there is not an absolute well-rounded approach to the topic and moreover there is lack of information in the specific context of airport terminals. As stated by Neufville (1976), airport system planning requires an approach to foster the wisdom to integrate the analysis effectively with social preferences and cultural values, to foresee the broad aspects of the problem in order to fulfil the complex role in the transport network.

The integration of the aforementioned ideas combining the assumptions that for each kind of risk embedded in megaproject, the conception and perception of them is certainly influenced by cultural aspects embedded in the stakeholders and participants of the project. Therefore, if we could understand how does this process occur, affect and impact the projects we could gain valuable information since early phases of the project that seems to be crucial for its performance. The figure below provides a graphical approach of this integration, which will be extensively analysed in the following chapter.

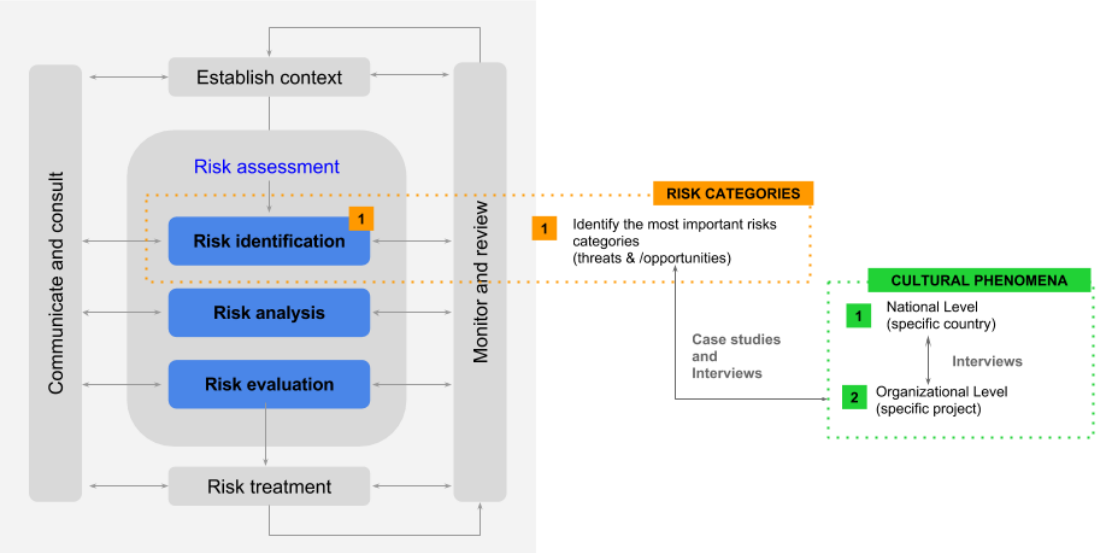


Figure 9 – Overall approach integration

3.2 Conceptual Framework

As mentioned previously the preferred methodology used for this research is supported by Yin's and Van Marrewijk and Smits considerations in combination with other sources such as literature study, current practices, and interviews. This combination is aimed to maintain a chain of evidence during the research, and most important the triangulation between them will be essential

for the development of a 'conceptual framework'. As well as provide insightful answers to the research questions described in section 2.1. After providing the theoretical framework, this section explains the procedure to develop the conceptual framework consisting of two main parts explained below:

Part 1 - Risk identification

In this part of the framework, the risk identification process should be deeply analysed to gain insights on the type and categorization of risks that affect the megaprojects selected, and consequently NACO's core business. It is also intended to provide knowledge on the opportunities that the risk identification process might offer, as well as, response to SQ1 formulated for this research 'What are the main categories of risks in megaprojects?'. The latter provide fundamental support to answer SQ2 'How are the main categories of risks perceived in airport terminal projects?' -extensively analysed in section 5.2 after processing information from the interviews.

Part 2 - Cultural dimensions recognition

As explained before the analysis of culture is going to be analysed at a national and organizational level; followed by a comprehension of the impact of cultural differences on the risk identification process. This part of the conceptual model provides information to response to SQ3 and SQ4.

3.2.1 Part 1: Risk identification

According to Boateng (2014), the process of risk identification creates understanding of risks and their categories for an effective risk management system applied though the lifecycle of the project. Risk management is also considered a tool that minimises the uncertainty to deliver more value to the project, as well as a tool that control not just threats but also creates opportunities (Hertogh et al., 2008).

The identification of risk (considering threats and opportunities) depends on multiple factors such as the ones exposed in the case studies exploration: the type of project and its complexity, type of contract, stakeholders involved, among others. In the case of NACO, they recently adopted a Risk

Management Policy, and particularly they use a *Project Risk Log (PRL)*[1], which is mainly intended to be used as a tool to recognize and provide a forecast of the contingency budget that each project should consider being at stake, and also used as a preventive tool for the most common risk that might affect projects at some point of their lifecycle. However, by now the PRL does not give NACO the possibility to expand the use of it and deliver, as for example, a breakdown assessment of whether the risks are dealt with threats or opportunities and in which category should they be considered, as shown in Figure 10 - Evaluating risks (retrieved from BSI, 2001). In this case, we could infer that there is an inefficient use of the PRL as enabler for identifying both threats and opportunities.

In this respect, some authors like Kardes et al. (2013) propose an integrated risk management framework that includes, at an initial stage, the definition of risks categorized as both exogenous and endogenous and by considering threats and opportunities. At an endogenous level (project level) it aims to connect several stakeholders; at an exogenous level (internal level) aim to serve as key decision maker for the board of directors and also as a governance model for project (risk) managers; therefore it might include lots of relevant information and insights to get produced. They define exogenous risks as political, economic, social, etc.; and endogenous as stakeholders, resources and operational risks among others.

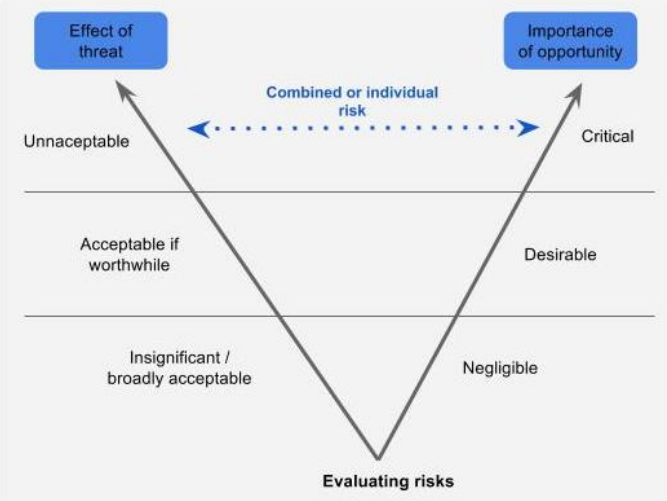


Figure 10 - Evaluating risks (retrieved from BSI, 2001)

[1] The *PRL* describes the risk profile of the project by identifying risks and the control measures for each of them. If there are residual risks, the Project Manager should determine what risks remain and what is the likelihood of occurrence and determine a project contingency budget. (retrieved from RHDHV Risk Management Policy)

Therefore, it is important to consider both aspects (endogenous and exogenous) in order to provide a truly risk identification framework and improve the overall process of risk management, as well as it helps to recognize potential problems that might be costly to fix in later stages of the project.

As has been previously explained in chapter 3, the complexity of megaprojects goes beyond technical and financial complexities, thus different approaches should be used in order to improve the risk management and subsequently the value and performance of the project. To emphasize this topic, an improvement on the risk identification is proposed by using different sources based on literature analysis in order to create a more robust classification for the risk identification process.

The risk classification system developed in this section will serve as input for the interviews and model. The reason behind improving this classification is that there is no universally applicable risk classification system for all types of organization. Therefore, each organization is strongly advice to create its own risk classification depending on their size, nature and complexity (AIRMIC et al., 2010).

Categories of risks according to different standards

For the purpose of this research, a combination of standards[2] from different sources will be used to provide a more robust risk identification classification. The inputs for this part have been extracted from eight (8) well-known sources as described in the section below. It is important to denote that most of the standards based their own approach on the International Organization for Standardization (ISO) guide for Risk (ISO/IEC Guide 73 Risk Management Vocabulary - Guidelines for use in standards; ISO 31000:2009). A complete description of the risk management process for the aforementioned standards can be consulted in Appendix a.

AS/NZS 4360:1999, AS/NZS 4360:2004 2004, AS/NZS ISO 31000:2009

(Originated as AS/NZS 4360:1995; following revisions 1999 & 2004; revised and re-designated as AS/NZS ISO 31000:2009)

[2] Standards are living documents which reflect progress in science, technology and systems http://sherq.org/31000.pdf

As part of a routine five yearly revisions made to the original standard AS/NZS 4360:1999, the Joint Standards Australia/Standards New Zealand Committee decided -in 2009- to promote the development of an international standard on risk management ending on the publication of AS/NZS ISO31000:2009. For the purpose of this research a combined literature research on the background of the final standard will be used to extract useful information regarding risk assessment (categorization & identification processes).

AS/NZS 4360:1999 & AS/NZS 4360:2004 – Risk Management (For full comprehension of this standard see Appendix a*)*

The initial process that AS/NZS 4360:2004 identifies in the Risk management process is to establish general context both internal and external. Internal context is referred to the recognition of organizational goals and objectives, and to the recognition of strategic, business and project objectives that coexist inside the organization. It is also necessary to understand the culture, internal stakeholders, structure, main capabilities in terms of resources such as people, systems, processes, etc. On the other hand, external context is defined as its name indicated by the external environment in which the organization operates and the relationships between the organization and: business, social, regulatory, cultural, competitive, financial and political environment; the organization's strengths, weaknesses, opportunities and threats; external stakeholders (perceptions and values); and key business drivers. The importance of external context must ensure that all stakeholders and its objectives are considered.

Jointly internal and external context ends up in the overall risk management context and definition of criteria in which there should be a balance between cost, benefits and opportunities, considering the use of resources and limiting some boundaries (depth and breadth) of the applicability of risk management. After developing the general context and criteria, the following steps to be considered are related to the identification and analysis of risks.

Identification process is basically seeking for the risks to be managed using a well-structured systematic process by developing a list of sources and events of risks that might impact the achievement of the initial objectives (what can happen, where and when). In this phase it is important to consider the main cause and most probable scenarios (why and how). Analysis of risks merely understands the source of risk in terms of: its consequence (positive or negative) and the probability of the consequence to occur. This phase aims to provide inputs to decisions on respect to the treatment of risks and the development of cost-effective treatment strategies.

In this respect, AS/NZS 4360:1999 provides a generic framework -so called source- for risk identification and analysis. The generic sources might have, at the same time, multiple components related or not to the organization (internal / external context). The categorization strongly depends on the functions and objectives of the organization, some of them use terms as hazards or risk exposure.

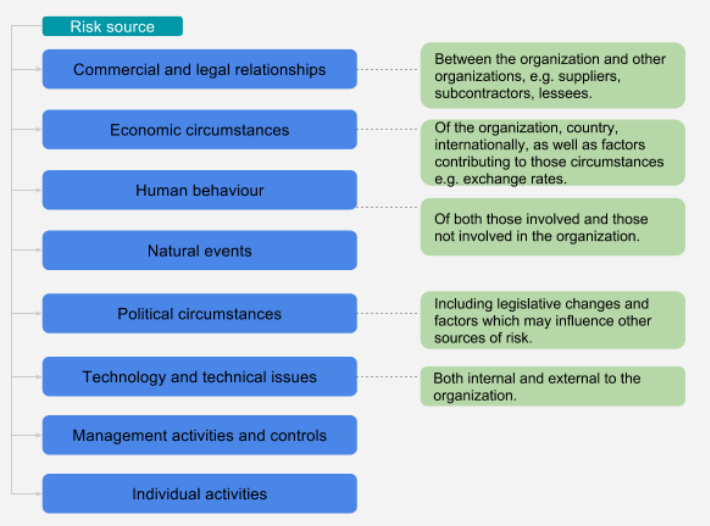


Figure 11 – Generic risk source (adjusted from AS/NZS 4360:1999)

British Standard (BS 6079-3:2000)

According to British Standard Institution (BSI, 2001), one of the first steps to effectively manage risk is to clearly identify the business, project, and sub-project goals and objectives; and identify business risk that affect the project, and vice versa, project risks that affect the business. Without a clear view of the full range of both of them (business and project objectives), the risk identification, and therefore risk management, could be severely affected and mislead.

In order to achieve the initial steps, a proper identification of project and business *stakeholders* is required. This process is seen as cornerstone because it help recognize the relationships that exists between the business and project's environment and its context; by carrying out this process at an early phase of the project, we could recognize the source of much risks. In my opinion, this process is especially essential for the case of Airport Projects because the terminal airport planning process (in which NACO is mostly present) requires a high level of involvement from a varied group of stakeholders coming in and out of the project at different stages. In this

respect, Schaar and Sherry developed an interesting model showing the airport stakeholder relationship, for more detailed information on this model refer to Appendix c.

Identifying risks is described by BSI (2001) as a “creative task that should involve all those likely to be affected by the decisions reached”. Thus, they propose the risk identification at three different levels (focus) described as: business, project and sub-project level. Each level corresponds to long, medium, and short-term goals and requires the participation of different people within the organizational depending on their status or hierarchy and the type of decision making that should be taken (appropriate level of management). For example: given the case of a strategic and business decision making level is necessary the participation of an executive senior management. The classification suggested by BSI is shown in Figure 12 - Risk approach according to BS 6079-3:2000 (own illustration). For a full comprehension of the project risk management process proposed by BSI refer to Appendix a.

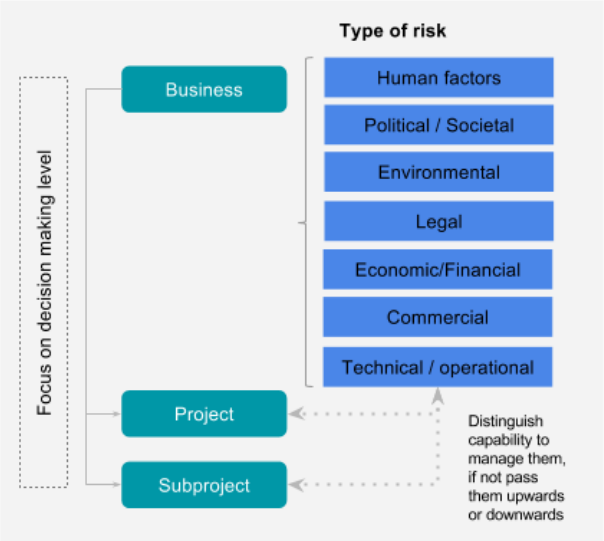


Figure 12 - Risk approach according to BS 6079-3:2000 (own illustration)

Canadian Standards Association (CAN/CSA-Q850-97)

The Canadian Standards Association (CSA) considers that risks should be evaluated according to the potential impact and perception of different stakeholders, because each of them views the acceptability of risks differently. Therefore, the risk management process requires a highly involvement of the stakeholders; considering risks in simple terms of probability and consequence would be insufficient and unsuccessful for the project and decision-maker (CSA, 1997).

According to the CSA (1997), the management of risk is a process that: (1) demands 'priority-setting' due to limited use of resources; (2) ensure the identification and appropriate actions to decrease the risks; (3) the decision process used with respect to risk is conceived as a "pre-loss planning tool" because if used efficiently risks are managed before they occur; (4) should be considered as iterative. The complete risk management model for decision-makers proposed by the CSA can be consulted in

Similarly to the British Standard, CSA guidelines considers the establishment of a stakeholder dialogue process as an integral part of the risk management process, and recognize the importance to develop a communication process at an early phase of the project by creating dialogue and avoiding just one-way flow of information from the decision-maker with the rest of the stakeholders. This process becomes essential because it recognize the issues to be dealt with throughout the decision process, and ensures that all stakeholders are identified and keep on board on the decision process, likewise it reduce time and effort over the rest of the project and its useful when dealing complex issues and help make decision with more confidence.

The second phase of the risk management includes the identification of hazards using risk scenarios. Risk Scenarios are defined as a sequence of events (hazards which generate potential loss) with an associated frequency and consequence. Thus, it is supposed that the greater the exposure to hazard, the greater the consequences, hence the risks.

CSA propose four type of hazard that generates risks: (a) natural hazards; (b) economic hazards; (c) technical hazards; and (d) human hazards. Each type of hazard might generate seven different types of loss as follows: (a) health losses; (b) property losses (tangible and intangible); (c) net income losses; (d) a liability loss (legal duty); (e) a personnel loss; (f) environmental losses; and (g) any of the above may also generate a loss of reputation or status.

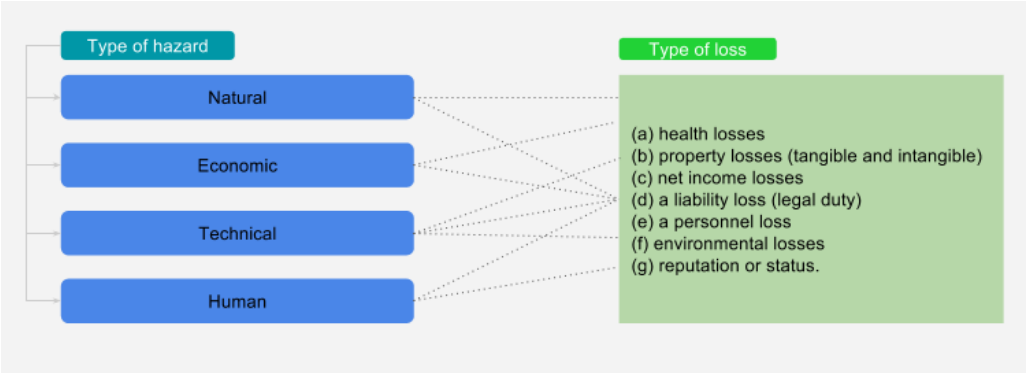


Figure 13 - Risk approach according to CAN/CSA-Q850-97 (own illustration)

FERMA: 2002 (Federation of European Risk Management Associations)

According to standard described by FERMA (2002), risk has both an upside and a downside; benefits and opportunities should be studied in its own context but also in relation to the impact on other stakeholders. The risk identification process helps organizations analyse its exposure to uncertainty, and it requires a deeply knowledge of the following areas: the organization, the market in which it operates, the legal, social, political and cultural environment; and also an understanding of the strategic and operational objectives (success factors and objectives). Therefore, FERMA provide a classification of risks based on the business activities and decisions to be made: strategic, operational, financial, knowledge management, compliance. A more detailed sub classification is provided in Figure 14.

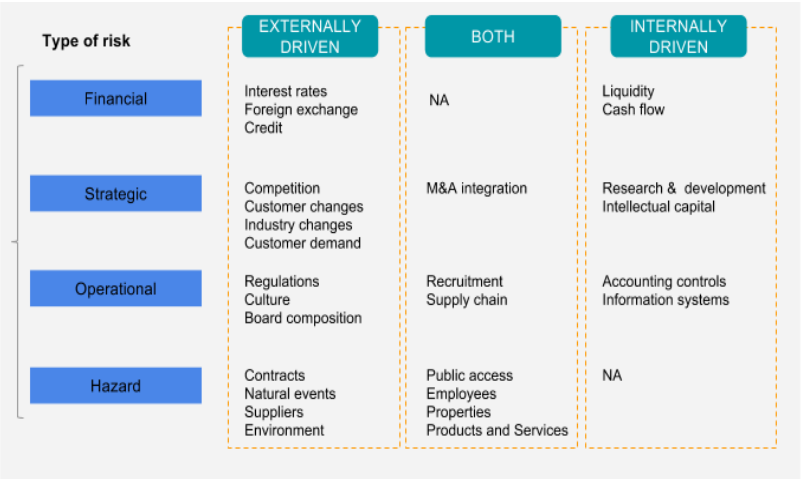


Figure 14 - Type of risk according to FERMA (own illustration)

RISMAN

According to Well-Stam, Lindenaar, Kinderen, and Bunt (2004), the core of identifying risks is to examine the project in a systematic manner from many points of view as possible to recognize the potential risks for the project. They provide a general classification specifically delivered for infrastructure projects (further explained in figure 15). Additionally to the recognition of different point of views, they authors also consider important to perform an environmental analysis, a stakeholder analysis and use information from similar past projects to achieve a sufficient degree of understanding.

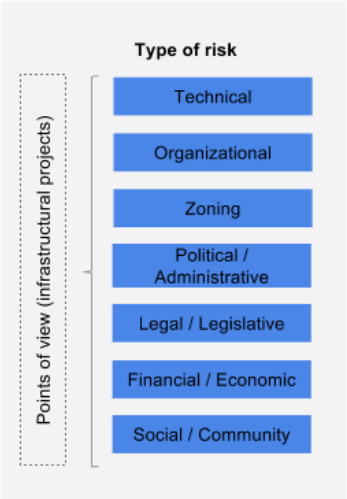


Figure 15 - Type of risks according to Well-Stam et al. (own illustration)

KPMG

The consultancy firm KPMG has developed a three-part practical series named how to successfully manage your megaproject and classified as follows: (1) early planning and organizing; (2) stakeholders communication and project controls integration; and (3) continuous improvement. For the purpose of this research, Series part 1 will be used to understand how does risks management is pursued in megaprojects. According to KPMG (2013), risk management is the process used to identify internal and external risks, it should be initiated in early phases of the project (prefeasibility studies if possible) and continuously monitored and controlled during the entire lifecycle of the project in order to avoid significant issues and enhance opportunities. In this respect, KPMG provides a risk classification explained in the figure below.Figure 16

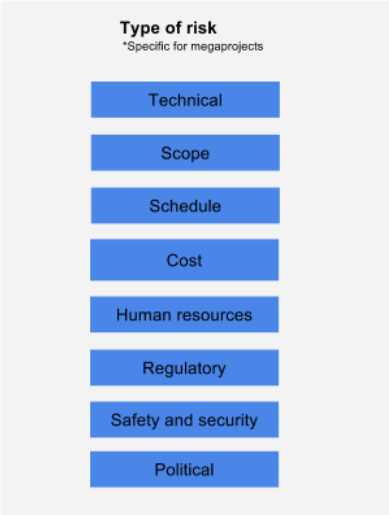


Figure 16 - KPMG risk classification (own illustration)

ACRP 116

It is also important to consider how the airline industry makes use of risks management in its own context. ACRP[3] defines risks as “potential problems creating uncertainty in the project’s success” (ACRP, 2014); therefore project risk management focus on managing the risks, at an acceptable level, and creating opportunities that might help the project capitalize on additional aspects such as schedule, scope and budget and be beneficial to the organization holding the project. The second step of the project risk management process according to ACRP is the identification of risks, in this concern they define the following general classification (see Figure 17).

[3] The Airport Cooperative Research Program (ACRP) is an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. ACRP is managed by the Transportation Research Board (TRB) of the National Academies of Sciences, Engineering, and Medicine and is sponsored by the Federal Aviation Administration (FAA). The research is conducted by contractors who are selected on the basis of competitive proposals. (Retrieved from http://www.trb.org/ACRP/ACRP.aspx)

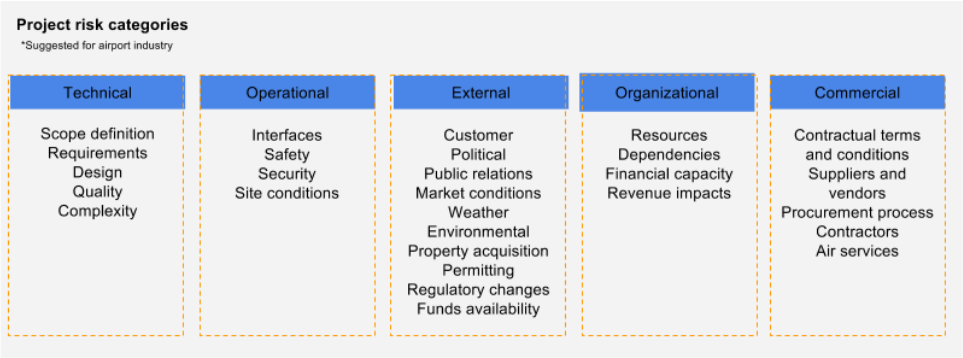


Figure 17 - ACRP risk classification adapted from ACRP, 2014 (own illustration)

NACO

NACO (as part of Royal HaskoningDHV) base their internal risk management process on the Dutch Corporate Governance Code and the Business Control Framework same which in turn are based on COSO[4] Enterprise Risk Management. The general policy used in Royal HaskoningDHV recognize the use of Risk management as a tool that (1) helps recognize and achieve the -strategic, tactical and operational- objectives of the company; (2) as an added value to understand risks in a better way and take appropriate decisions, (3) improves the Royal HaskoningDHV management for the identification and management of risks as part of their normal work by creating early awareness and if necessary escalate risks to another level.

As previously mentioned, RHDHV recognize risk management at three different levels inside the organization: strategic, tactical, and operational; each classification corresponds to a certain kind of decision making -long, medium or short-term- and to a different hierarchical level within the organization (executive board, business lines, projects and supporting processes), commonly these distinctions are used according to the amount of the contract awarded (budget of the project).

The identification of risks is the initial step of the risk management process used in NACO. In this respect, NACO use one specific risk category that will be explained in Figure 18.

[4] Committee of Sponsoring Organizations of the Treadway Commission (COSO) is a joint initiative of five private sector organizations (American Accounting Associations, American Institute of CPAs, Financial Executives International, The Association of Accountants and Financial Professionals in Business and The Institute of Internal Auditors) dedicated to providing thought leadership through the development of frameworks and guidance on enterprise risk management, internal control and fraud deterrence. (Retrieved from http://www.coso.org/)

Figure 18 - Risk category used in NACO (own illustration)

Final classification

After analysing the classifications used in several fields such as well-known international standards (ISO, UK, Canada, FERMA, etc.); consultancy parties like KPMG (specifically suggested for megaprojects); ACRP (suggested for the aviation industry) and the one used internally in NACO (mostly based in COSO); the researcher is able to answer SQ1 'What are the main categories of risks in megaprojects' by developing a general risk categorization.

In addition, a subcategory has also been formulated in order to have a more detailed insight on the type of risks influencing the megaprojects selected. Both classifications will be used along the interview process and serve as the basis for the development of the generic conceptual model (See Figure 19).

Further information concerning the development of Figure 19 - Risk category and subcategory proposed can be consulted in Appendix b – Risk category general support

No.	Main Category	Short definition	Subcategory
A	ECONOMIC / FINANCIAL	Related to macro and micro economic factors	. Macroeconomic factors: foreign exchange, inflation, taxes . Interest rate instability, Liquidity and cash flow
B	LEGAL / COMMERCIAL	Mostly related to contractual conditions preset to manage and execute the project	. Contractual terms and conditions (Failure to achieve satisfactory contractual arrangements) . Procurement process (competition) . Regulatory changes and controls
C	ORGANIZATIONAL	Related to the organizational, management and leadership structures embedded in the project	. Strong interface management process (Individual or group interests) . Management competence and practices (Lack of clarity over roles and responsibilities) . Poor leadership: Board composition, Inadequate authority
D	POLITICAL	Related to political conditions encountered in the host country of the project and influencing the project.	. Change of government . Failure to obtain appropriate approval . Periodic funding approvals
E	SAFETY / SECURITY	Related to the environment and significant risks to personnel and property.	. Employees safety & security (integrity) . Hazard environment -Site conditions-
F	SCOPE	Project scope defined adequately and in sufficiently detailed	. Scope definition: adequately in sufficient detail . Customer changes, demand and requirements
G	SOCIAL	Related to human behaviors and human resources	. Human Resources: Poor staff selection procedures, poorly trained employees. . Human behavior: Personality clashes, Perceptual errors regarding risk
H	TECHNICAL / TECHNOLOGICAL	Maturity of technology and adequacy of design to the project complexity	. Level of complexity . Maturity or technology . Inadequate design

Figure 19 - Risk category and subcategory proposed

3.2.2 Part 2: Cultural dimensions

According to Van Marrewijk, Clegg, Pitsis, and Veenswijk (2008), in order to understand the daily life of megaproject differences in national culture, religion, history, politics, and ethnicity should also be analysed. As previously mentioned in section 3.1.3, megaprojects are influenced by cultural differences embedded at two different and complementary levels: national and organizational. In other words, the influence of national cultural differences between partners sometimes can be used by parties, for example, to take advantage of their own culture and strategically used to gain power. Likewise, this approach should be used to study the influence on risk identification.

Some authors refer to the idea that national level culture influences the relationship of organizational culture to organizational outcomes. Studies have found that matching societal and organizational cultures resulted in higher job satisfaction, more effective quality circles, and better decision making (Thomas, 2002).

Nevertheless, other authors like Yeganeh and Su (2006) suggest that cultural differences between parties should not be merely seen as an impediment to organizational effectiveness. The authors imply that cultural differences may have different level of results in terms of collaboration and conflict, explained by four different configurations: (1) similar, (2) dissimilar but complementary, (3) dissimilar and unrelated, and (4) conflictual. They also imply that not all cultural differences lead to conflict, some might be useful, and some others neutral –see Figure 20 - Interaction between cultures retrieved from Yeganeh and Su (2006)

Based on the figure below, similar cultures share common values and their interactions are supposed to be smooth, increasing the collaboration and reducing the risk of conflictual situations. On the other hand, different cultures do not share most of their values, but they can still benefit from each other. Unrelated cultures are not compatible to each other and are not in a competency or rivalry relation. Lastly, conflictual cultures, as its name refers, are those who show a degree of conflictual relation between them.

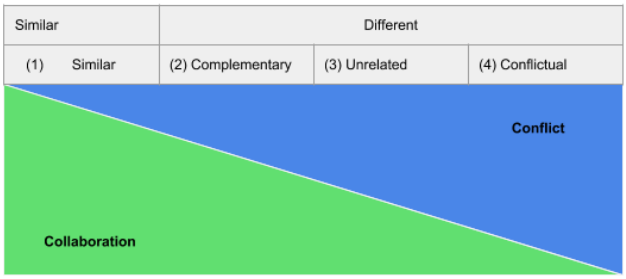


Figure 20 - Interaction between cultures retrieved from Yeganeh and Su (2006)

Considering the aforementioned, we can analyse the four different projects in comparison with Dutch culture–at starting point–and provide a better understanding of the most probable relationships and risks that might appear between them; sometimes they might result in harmful relationships or into a more collaborative interface useful for the projects. The following sections provide an introduction to the national and organizational cultural analysis for the four case studies.

National & Organizational level analysis

In this sub section, differences at national level will be analysed using the Hofstede Cultural dimensions theory. The main purpose is to detect whether these differences have any impact on the risk identification process and how it is performed.

The first step of this analysis is to present the statistical data of each of the countries analysed in the case studies according to their six cultural dimensions scores using Hofstede national scores (previously explained in section 3.1.3).

As can be seen in Figure 21, there are lot of variations between the cultural scores of the countries (projects) studied. Principally, we can foresee three extreme cultural profiles if comparing Netherland with the other four countries explained below in terms of a more organizational approach as for example management practices, communication style, decision making processes, etc.

- Power distance: with countries scoring high in PD we can expect an unequal distribution of power among the parties involved in the project and widely accepted of status differentiation among different groups. As explained by Flyvbjerg (cited by Van Marrewijk, 2005), power play an utmost role, however in most of the cases it is used as a competitive power relations causing negatively effects in the outcome of megaprojects

"instead of commitment to deliberative ideals". It has also been mentioned by Marrewijk (Van Marrewijk, 2005), that due to the nature of megaprojects involving high complexity, uncertainty and risks, using a dominant control approach in the project organization might not be beneficial because it creates risky situation to partners which also decrease the commitment of the parties to the project itself and also reduce the level of cooperation and .

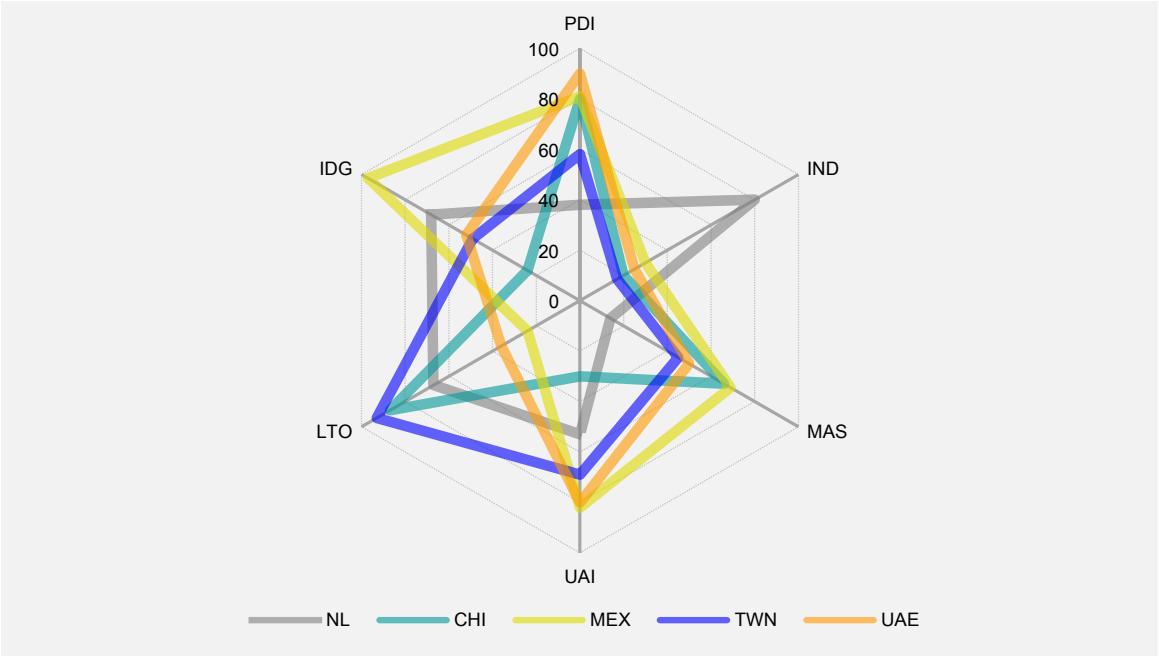
In terms of communication a larger power distance difference between countries implies not having an open communication in the hierarchical structure, while in the case of the Netherlands a more transparent and open communication to all members is preferred (Zhang, Marquis, Filippov, Hassnoot, & Steen, 2015)

- Individualism –vs- Collectivism: as can be seen the four countries score opposite to the Netherlands. Those differences have an impact on management styles this may mean that there is a preference of a more collaborative approach rather than a competitive atmosphere, more team focus –vs- task focus, and decision making process might be perceived as a consensual process instead of a more freedom and independent process.

  In a more individualistic culture the tendency is to clarify responsibilities and roles in a written agreement -contract, whereas countries from a more collectivistic culture tend to trust on human relationship rather written agreements. In the case of megaprojects, this might have a huge impact if considering the high number of participants working together in the same project; therefore, defining clear boundaries for scope of work to be executed, interdependencies and interface management will be a paramount process.
- Masculinity –vs- Femininity: In my opinion, this cultural dimension goes by the hand with individualism and collectivism. Essentially, in a more feminine countries, as the case of Netherlands, the decision making process is made by agreement of the parts while in a more masculine country as Mexico the preference is translated on a more centralized decision making process. Differences in the leadership styles and problem solving processes could also be explained; in a countries scoring high (>Masculine) the use of hierarchical structures is preferred and problem solving process tend to be done with a non-flexible approach and usually reaching agreements by severe discussions; on the other hand, in a more feminine country an open posture and supportive leadership style is preferred, and a flexible approach to problem solving (more consensus between parties) is favoured. Zhang et al. (2015), explained that in feminine countries like Netherlands, there is a need for constant balance between compromises and harmony, while in masculine countries (like China, Mexico and UAE) there is a more competitive oriented.

It is also important to denote that Long-vs-Short term orientation and uncertainty avoidance are also important cultural dimensions due to NACO core business mainly related to the Master planning and capacity studies developed to cope with future uncertainties. The combination of these two cultural dimensions is especially crucial to the project planning process. Zhang et al. (2015), compare the case of Dutch and Chinese culture and explain that Dutch spend long periods of time in the planning stage with the main purpose to prevent as many errors and unnecessary mistakes that might occur in further phases of the project, while Chinese act with a different approach of learning by doing and trial-and-error approach. This was commented in the Interview-CHN01 –making reference to Chinese culture "they always want something innovate but first they ask you to show them an example where it has been done already, but they also like to see something brand-new so it is somehow contradictory. If it has been proved to work elsewhere they adapt it, but at the same time they want something new, they don't want to copy, this is where the contradictory effect occur".

These two cultural dimensions, as explained by Hofstede (Bontempo et al., 1997), are important to understand the *risk perception* noting that cultures with greater scores in uncertainty avoidance tend to be more affected by potential losses and less by potential gains. Zhang et al. (2015) explained that in terms of risk management, the Chinese have a higher risk-taking appetite –not formalised- originated by their "entrepreneurial spirit"; compared to the Dutch they are more aware of the potential risks which create more formal systems for efficient management.



Country	PDI	IND	MAS	UAI	LTO	IDG
Netherlands	38	80	14	53	67	68
China	80	20	66	30	87	24
Mexico	81	30	69	82	24	97
Taiwan	58	17	45	69	93	49
UAE	90	25	50	80	23*	34*
*Scores not yet defined, data considered for Arab countries in general						

Figure 21 - Cultural dimensions scores for the case studies analysed (Data retrieved from Hofstede-Centre, 2016; Hofstede & Hofstede, 2016)

An interesting study by Turner (explained in Zhang et al., 2015), shows that there are some preferred cultural approaches that can be drawn for each stage of the projects life cycle. By using Turner's approach and comparing it with the main activities that NACO has interference in the projects (mostly feasibility and design phase) and by considering their –national– cultural scores, we can assume that during the first two phases of the project the set of cultural differences are in opposition to the Hofstede cultural scores expressed for Netherlands.

Table 1 Preferred Cultural Approach at Each Stage of the Life Cycle

Trait	Feasibility	Design	Execution	Close-out
Power distance PDI	High	Low	Low	High
Individualism IDV	High	Medium	Medium	Low
Masculinity MAS	Medium	Medium	Medium	Medium
Uncertainty avoidance UAI	Low	Medium	Medium	High

Source: Turner (2009), p. 401

Figure 22 - Turner cultural approach (Zhang et al., 2015)

Jackson (as cited in Thomas, 2002) mentioned that even when we could determine the optimal cultural mix for a particular work-group, it is nearly impossible for managers to control the *cultural composition* of them, so he instead propose to find ways to maximize the positive consequences of both homogeneity and diversity while minimizing the negative difference of both.

In my interesting discussion with Karen Smits, she mentioned that there is a need to make a cultural scan between the parties involved in the projects but without measures [referring to Hofstede cultural scores], she continued by saying that “it’s more important to put more attention on the similarities that the parties share and reduce the differences among parties” -commonly predetermined in the national scores. She also mentioned that she personally preferred “to know from the people involved in the project instead of using national scores as Hofstede theory”.

Therefore, the approach selected by the researcher will be to initiate the study of cultural phenomena during the interviews by using the theory developed by Hofstede (without considering national scores and just by briefly explaining the theory). By doing so, the researcher can gain a more practical and critical approach from the interviewees and a better understanding of how they can be related to the interviewees experiences in the project while identifying risks.

4. Case studies and Interviews

As aforementioned in the Research methodology section, the methodological plan preferred for this research is a combination of methods that jointly contribute to provide a specific knowledge and truly understand the complexity of it by providing a chain of evidence during the research. In order to do so, the first step will be the case studies analysis.

The Case study method allows researchers to retain the holistic and meaningful characteristics of real-life events their emphasis is on understanding the case itself and its unique features (Van Marrewijk & Smits, 2016; Yin, 2009). The emphasis of this phase is to have a strategic sample of projects and gain a profound and full insight into them to identify, compare and interpret results that will be later used as input in further phases (interviews and development of the model).

4.1 Case studies selection and exploration

This section provides a brief introduction to the case studies that will be used in the following chapters. As stated by Hertogh et al. (2008), when comparing projects we can find that often similar challenges has to be faced, thus the chance to learn from them and from others is a land to be discovered.

Van Marrewijk et al. (2008) mentioned that, differences in national culture, religion, history, politics, and ethnicity are very important to understand daily life of megaprojects. Therefore, the selection of the case studies is intended to (1) reflect those differences in an extreme ways to provide key findings; (2) be able to investigate the influence of cultural differences at a national and organizational level; (3) be able to study the impact of these differences in the context of risk identification. Thus, case studies satisfy the following criteria:

- The project is considered to be a megaproject (specific characteristics such as: budget, organizational structure, lifespan of the project, etc.)
- The project shows a certain level of complexity (technical, technological, social, cultural, and/or political, etc.)
- The projects present a certain level of risk originated by the fact of being a megaproject and its level of complexity embedded on it.

- All of the projects are located in different countries (outside from the Netherlands/Europe).
- Three of the projects show at least three extremely different Hofstede cultural dimensions scores compared to the Netherlands country scores (specifically in Power distance, Individualism and Masculinity); hence, this creates an ideal opportunity to conduct comparative analysis taking place in different cultural locations and contexts. (Further explanation provided in section 3.2.2)

The selection of the case studies was made jointly with the help of NACO supervisor. The selection of the case studies is consistent to each other's in respect to its size, complexity and level of risk involved. Four case studies from the NACOs portfolio were selected, thereof which are listed Table 1.

It is important to denote that the aforementioned projects were developed in such different contexts, as a consequence the project organization, structures of the project in general, and conflict and decision making processes might differ from each other. Subsections 4.1.1, 4.1.2, 4.1.3, and 4.1.4 provide a brief introduction to the case studies selected.

Country	Project	Status
China	Beijing Capital International Airport expansion and T3	Completed in 2008 (for the Summer Olympic Games)
Mexico	Nuevo Aeropuerto de la Ciudad de México (NAICM)	Currently delivering construction tendering documentation. Project TBC by 2020
Taiwan	Taiwan Taoyuan International Airport (TTIA)	Currently delivering construction tendering documentation. Project TBC by 2020
United Arab Emirates	Abu Dhabi International Airport	Under construction TBC by 2017

Table 1 - Case studies selected general data

4.1.1 China

Brief introduction

The origin of the Beijing Capital International Airport (BCIA) data from 1958, since then it has evolved to become one of the second busiest airport in the world, reflected in its increasing demand of passenger since 1978 with a capacity of 1.03 million to 86.13 million in 2014. Nowadays, the BCIA is known as the "China No.1 Gateway", thus it represents an important

impact to the regional economy as it contribute with RMB133.948 billion to Beijing's economy (accounting for 8.24% of Beijing municipality) and it's a huge source of employment creating 676.9 thousand jobs -6.23% of all employees in the capital city (BCIA, 2016).

Figure 23 - General view BCIA (Image retrieved from F+P)

To accommodate such demands, BCIA has been continuously evolving since its inception. The first expansion made to the original airport building was done in 1980 with the opening of Terminal 1 (T1), consisting of 60,000sqm and a capacity docks for 10 to 12 aircrafts. By the mid-1990s T1 size became insufficient. Consequently, in the late 90's the airport had a series of renovations and expansions with the opening of Terminal 2 with a floor area of 336,000sqm and a capacity to handle 20 aircrafts.

Finally, in 2003 a major renovation was required because Beijing was responsible to host the 2008 Olympic Games. This event pulled the trigger to start the design and planning expansion for the new terminal building (T3).

Back in 2003, NACO together with Foster and Partners and ARUP, won the international design competition for the expansion of Beijing Capital International Airport, consisting on the design of the new terminal building (T3), Ground Transportation Centre (GTC), landside and airside infrastructure (new third runway). The project consists of a floor space of 1.3million square meters –considering the GTC and the Terminal building-, able to accommodate 50 million passengers per year by 2020, and designed to host 100 aircraft stands.

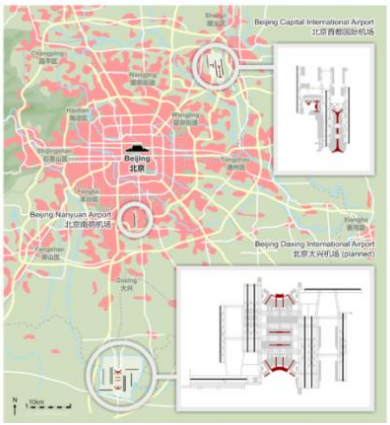


Figure 24 - Location BCIA & New Beijing Daxing

The project was conceived as the gateway to the city for athletes participating in the Olympic Games and as the first impression for well-wishers. This encompasses connections to public transport had to be fully integrated within the terminal building, provide an efficient combination between functionality, passengers experience and enjoyment, commercial opportunities, all within a remarkable architecture. The project had also to meet other

requirements such as be environmentally sustainable to reduce significantly the operational costs related to energy consumption.

With the notable pressure due to the initiation of the Olympic Games, the only option available to cope with the extremely high and complex requirements settle for the project was to execute the project as a fast-track. Interviewee-CHN02 explained that after three months of working in the schematic and detailed design the construction was already starting, so “it was a very time challenging schedule”.

Currently, the Beijing Capital International Airport, will be reaching its design capacity within a few years, making the need for a new airport is again imminent. For this reason, the New Beijing Daxing International Airport is now under design with a planned completion date for September 2019 and a maximum capacity of 130million passengers per year (see Figure 11).

CHINA	
Project	Beijing Capital International Airport expansion and T3
Main client	Beijing Capital Airports Holding Company, China Public Agency
Financing	Public financing
Total Project cost (approx.)	USD6.5billion
Planning (time schedule)	2003 – Design and Planning 2004 – 2007: Construction (45 months / Fast track “Chinese speed”) 2008 – Opening
Services / Scope of work (NACO)	Master plan; concept design, schematic design; signage; preliminary design T3 and Ground Transport Centre (GTC); concept design airside and landside; specifications; cost estimates; bills of quantity; design development support T3 and GTC.
Official language	Chinese

Table 2 – Facts and figures Beijing Capital International Airport project

Organizational structure

According to Bosch-Rekveldt (Bosch-Rekveldt, 2015), “Selecting the right organization structure is a balancing act between addressing the project’s need (scope), the project team’s need (and stakeholders’ needs) and the individual needs”. The figure below shows the organizational structure used on the Beijing Project.

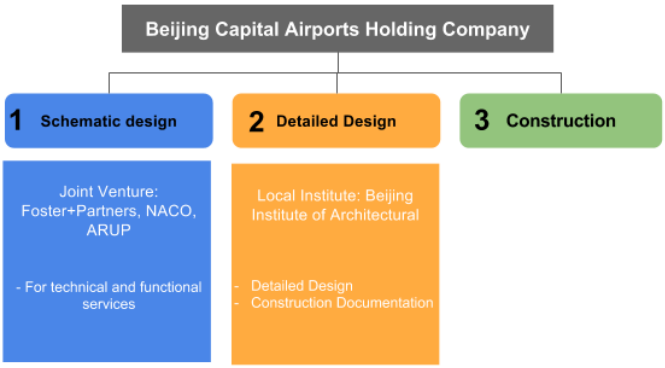


Figure 25 - Organizational structure Beijing project

Risk management

No information related to risk management during the Design phase has been provided for this project.

4.1.2 Mexico

Brief introduction

Nearly two decades after the first international terminal was inaugurated, in 1952, the Mexican government was already exploring options for either expanding the existing airport or building a new one for handling a growing air transport demand. However, the vast space needed combined with the lack of land use planning and the exponential growing population of Mexico City make it nearly impossible to conceive an expansion of the actual airport in this location. As a result, in November 2014, the Mexican Government announced the construction of a new airport with an investment of US$9.5 billion (58% public funding and 42% private/debt funding) to satisfy the forecasted demand capacity required for the next 50 years.

Mexico has ambitious goals for the future; its target is to be in the top 20% of the World Economic Forum's Infrastructure Competitiveness Index by 2030 (TBY, 2015). However, the investment for the development of communications infrastructure and transport relative to GDP in Mexico has not been improved and even worst has been reduced in recent years, that is why Mexico has not improved infrastructure competitiveness in the global context (remaining in the 64 position from 2004 to 2013) according to the Competitiveness Index infrastructure 2012-2013 World Economic Forum (México, 2015a).

Figure 26 - General views NAICM (Images provided by NACO)

In order to keep the country growing above this level and reach the expected ones, the Mexican government has been making improvements in the infrastructure field to transform them into value-added to the country. One of the major concerns described in the "Development Plan of Mexico for the period of 2013-2018" is Airport Infrastructure (México, 2015b). The Mexican government recognizes the following requirements related to this topic: solving the operational problem of saturation of the AICM (actual airport) to achieve a higher quality service, cost and frequency of air travel; and promote regional interconnections (México, 2015a).

The project will have different phases according to the purpose of facilities requirements and responding to a short-term development planning followed by an incremental expansion capacity for the following planning years: 2020, 2025, 2030, 2065 and beyond. The initial capacity of the terminal airport is expected to be 50 million passengers per year, reaching a maximum capacity on 2065 of 125million passenger per year. The project comprehends six parallel runways arranged in three pairs. Each set of them is designed to be operationally independent on each other (ARUP, 2014).

The project will provide modern facilities with LEED certifications, it will be a platform for sustained international trade in long-term growth, and serve as an economic, social and environmental engine for the country (SCT, 2015). The new terminal airport is planned to be inaugurated on the 20th October 2020 as announced by the Mexican Government.

The following table provides general facts & figures of the project.

MEXICO	
Project	Nuevo Aeropuerto de la Ciudad de México (NAICM)
Main client	GACM – Grupo Aeroportuario de la Ciudad de México Public Agency (depending on the National Ministry of Infrastructure)
Financing	Public (58%) & Private (42%)

Total Project cost (approx.)	USD$9.5 billion
Planning (time schedule)	2013 – 2014: Key Construction Plan Approval 2014 – 2015: Schematic Design & Detailed Design 2015 – 2016: Construction Documentation & Tendering 2016 – 2019: Construction (fast-track) 2017 – 2020: Operational Readiness and Testing (ORAT)
Services / Scope of work	Design of: Terminal building, runways, taxiways, platforms and support buildings as Air Traffic Control Tower (ATC) and Air Control Center (ACC).
Official language	Spanish

Table 3 – Facts and Figures NAICM Project

Organizational structure of the project –external-

The NAICM project has a top down hierarchical organizational structure lead by GACM[5] and supported by Parsons & CH2M Hill as the General Project Manager. The next level involves the Master Architect (Joint Venture between Foster+Partners & FREE), Master Civil Engineer (TASANA) and Master Planer (ARUP). At the bottom of the organizational structure there are some sub consultants–as NACO–depending directly on the Master Architect.

At first glance, considering the position of NACO within the organization of the project we can assume that the level of influence and risks considered in the project might be a little bit lower, but on the other hand, it could also imply not being fully involved in the overall progress of the project and create frustration due to the several levels of communications.

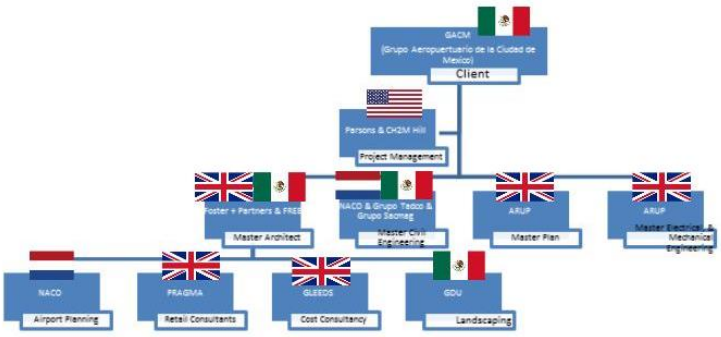


Figure 27 - Organizational structure NAICM – Design Stage

[5] Grupo Aeroportuario de la Ciudad de México (GACM) is a state-owned holding (with private financing) which holds the concession to operate Mexico city's international airport (AICM) and has also received the concession to build, manage and operate the NAICM for the next 50years (starting from the beginning of the operations).

Risk management

The PRL developed for the NAICM reveals some critical risks explained in xxx

Risk Category	% risk at stake	Risk description
Financial	44%	Delays in payments Negative cash flow at the beginning of the project NACO permanent establishment in Mexico for tax reasons
Country	23%	Weak not well defined client organization and limited direct contact to Client
Scope/Resourcing	20%	Unclear/badly defined scope - FP-FREE/Client expect more scope than offered
Process	10%	Project duration extended (Thus, contingency budget should be allocated based on assumptions made considering the most probable scenarios)
Other	3%	Language
Legal/Contractual	0%	
Grand Total	100%	

As can be seen, the major risks are related to financial issues such as payments and negative cash flows. It is important to denote that no risks were considered for the legal and contractual part and the risks related to process (organizational structure of the project) are also at the lowest level. This information can be clarified and amplified with the information obtained during the interviews.

4.1.3 Taiwan

Brief introduction

As a response to the increasing economic activities in the Asia-Pacific region and to the rapid growth of the passenger volume in the Taiwan Taoyuan International Airport (TTIA), the need to build a new to build a new Terminal (henceforth Terminal 3 or T3) arose.

Become a large-scale hub airport which serve the aviation market in East Asia are just some of the main objectives of the TTIA. The designing principles of the project are “Smart, Green and Culture”, with a special focus on the efficiency of systems to provide a high quality passenger service, in a sustainable and intelligent airport, and projected as an integrated Multi-Function

Building –MFB– (with complementary services such as shopping, culture and arts, etc.). And if this was not enough, the complexity of the project is increased by the factor that it should be constructed while maintaining regular airport operations and reducing as much as possible any negative impact.

Figure 28 - General views TTIA (www.arup.com)

The project is expected to host a capacity of 45million passenger by 2042 with a considerable enhancement of the quality of service. Besides the Terminal building the assignment compromise the aforementioned MFB, and all the infrastructure necessary to cope with this new capacity such as: service roads systems, apron and related taxiway system, Terminal access roads and related facilities (TTIA, 2016).

During January 2013, the Taoyuan International Airport Corporation (TIAC) –public agency current owner and operator of the Taoyuan International Airport- signed a contract with the NACO-TYLIN-PB Consortium for the General Consultants Technical Services in relation to the Taiwan Taoyuan International Airport Terminal 3 Area Project for the following seven (7) years until the completion of the project.

As shown in Figure 29, NACO will be involved in two different phases of the project: 1. Planning and Project Construction Management (PCM). For each of the phases different type of contract have been awarded: Lump Sum for the Planning as % of CAPEX for the PCM.

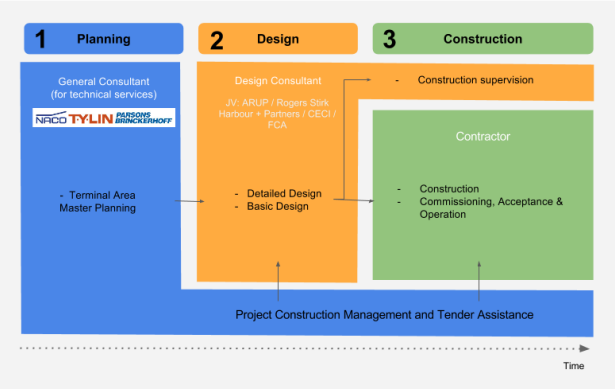


Figure 29 – Overall structure of the project (own illustration with information provided by NACO)

TAIWAN	
Project	Taiwan Taoyuan International Airport Terminal 3 Area
Main client	Taoyuan International Airport Corporation Ltd. Public (100% of shares corporatized airport)
Financing	Private financing
Total Project cost (approx.)	USD$2.3billion
Planning (time schedule)	2013 – 2014: Key Construction Plan Approval 2014 – 2015: Detail Design Consultant Tendering 2016 – 2017: Detail Design (21 months) 2017: Construction tendering 2016 – 2020: Construction (39 months / fast-track) 2020 – 2021: Operational Readiness and Testing (ORAT)
Services / Scope of work	Study, design, tender documents, tender assistance, program management, design review, construction supervision
Official language	Chinese

Table 4 – Facts and Figures Taiwan Taoyuan New International Airport project

Organizational structure

NACO is currently part of a Joint Venture with WSP Parsons Brinckerhoff Engineering (International Engineering Firm from the US) and T.Y. Lin International Group (Taiwanese Local firm). NACO leads the JV partnership with a majority of 33,4% while WSP Parsons and T.Y. Lin share an equivalent 33,3% each. Each partner has different responsibilities and scope of work within the JV as follows:

- NACO, Netherlands Airport Consultants was responsible for the following Work packages: Airport benchmarking study, air traffic forecast, land use planning and terminal configuration, terminal area master planning, terminal and MFB functional planning, development planning and construction phasing, and commercial planning.

- Parsons Brinckerhoff International Taiwan: Project Management (in cooperation with T.Y.Lin), Programme management, procurement strategy and financial planning.
- T.Y.Lin International Taiwan - Local Engineers and Construction Management: responsible for surveys and investigations, enabling works planning, planning and tender documentation, tender assistance.

The scope of service in design stage basically consists of the following: Design tender docs preparation and tender assistance, review on the design compliance, management of design change, procurement strategy, baseline program, work Plan and Procurement Management at Construction Stage, stage Reviewing Meetings and Reports.

Risk management

No information related to risk management during the Design phase has been provided for this project.

4.1.4 United Arab Emirates

Brief introduction

By 2014, Abu Dhabi government planned to invest an amount of US$100B worth for construction projects, which include housing, education, transport and other developments (Deloitte, 2014). This investment is part of the multibillionaire economic vision for 2030 (forecasted to be of US$500B) allocated to the Emirate in order to sustain the local economy's growth.

The Abu Dhabi International Airport (midfield terminal complex) is part of this vision, it has initially been planned to cope with the significant growth in air traffic in the region and further expectations. The Abu Dhabi population is expected to grow from 1.8m to 3.1m residents, as well as the tourism to grow from 1.5m to 7.9m passengers by 2030 (Stent, 2013). Therefore, the airport should be transformed into a world-class facility with a stunning architecture.

Back in 2005-2006, a joint venture formed by NACO and KPF (Kohn Pederson Fox Associates) produced the winning design for the Midfield Terminal Complex. The terminal airport facilities have been developed on an area of circa 700,000m2. The design foresees to accommodate a capacity for 30million passengers per year (8,500 passengers per hour) with a high level of

service and adopting sustainable practices. The project will have 8 runways. The project started in 2006 and it's currently under construction with an opening date planned for July 2017.

Figure 30 - General View Abu Dhabi International Airport (Image retrieved from Arup.com)

NACO will be involved in two different phases of the project: 1. Planning and Project Construction Management (PCM). For each of the phases different type of contract have been awarded: Lump Sum for the Planning and a reimbursable contract for the PCM.

The following table provides general facts & figures of the project.

UNITED ARAB EMIRATES	
Project	Abu Dhabi International Airport - Midfield Terminal Building
Main client	ADAC (Abu Dhabi Airports Company) Public/Private (corporatized airport)
Financing	Public funds
Total Project cost (approx.)	USD$5 billion
Planning (time schedule)	2005 – 2006: Design tendering 2006 – 2011: Master planning & Detail design 2012 – 2017: Initiation of construction (54 months / fast-track) 2016 – 2017: Operational Readiness and Testing (ORAT)
Services / Scope of work	Master planning, planning & design airside and landside civil engineering, design landside, airport special systems Construction services (tender documentation, construction supervision)
Official language	English *All formal letters are received in Arabic and should be answered also in Arabic

Table 5 – Facts and Figures Abu Dhabi New International Airport project

Organizational structure

NACO has been involved in the project since the master planning phase. They are currently coordinating the construction works for the Midfield Landside and Airside Area. For this stage the organizational structure of the project is explained in Figure 31.

It is important to denote that ADAC –main client– is the first corporatized airport owner and operator of the UAE (formed in 2006) with a portfolio of four other airports plus Abu Dhabi. ADAC is independent from the national agency, regulatory and tourism authorities with the specific commitment to increase the competitiveness and continuously grow network (Stent, 2013).

As explained in the Taiwan project (and not yet defined in the case of Mexico), there is a growing tendency to seek for this kind of ownership structure –referring to privatization. Mainly due to the inability of public sector to support the rapid expansion and continuously growing demand and competition in the air transportation systems, combined with all the regulatory and institutional requirements that have to be considered. Hence, this kind of ownership has been mostly preferred releasing somehow the pressure for governments and local authorities to fund and operate these kinds of infrastructure projects.

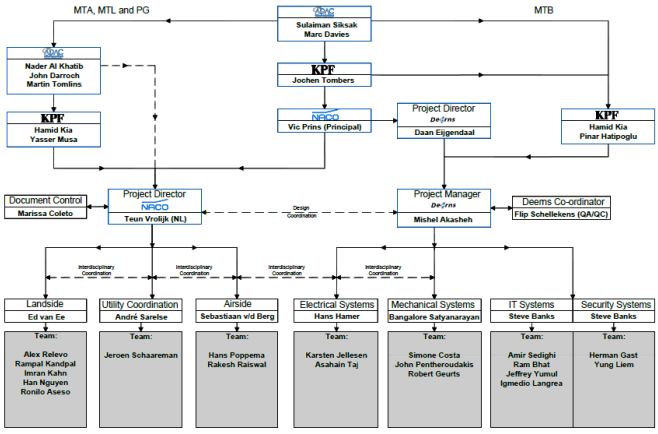


Figure 31 - Organizational structure Abu Dhabi-construction phase (retrieved from NACO)

Risk management

No information related to risk management has been provided for this project.

4.1.5 Summary

The importance of the aforementioned megaprojects is reflected at a national level with a potential impact on the economy and improvement of the whole country, crucial characteristic of megaprojects as explained in previous sections. As can be seen governments, in developed countries and underdevelopment countries, are increasingly making use of private sector firms to plan, design and construct services and infrastructure such as the megaprojects presented in the last section.

By using this kind of partnership/cooperation contracts, governments can reduce the risk involved in the project by –partially– transferring or sharing them with third parties, and allows them to adjust the size of the programs according to their needs, relieve financial pressures on national economy and encourage foreign investment. Usually, private parties (specifically Joint ventures) are seen to be better prepared to respond not only to changes in the financial market but also to technological advances and to maintain responsiveness to drastic changes.

Of course this is not an easy situation for either party, to consider a truly win/win situation high expectations are usually placed on topics like: cooperation, management practices, communication structures and control practices. In this respect Van Marrewijk (2005) mentioned that considering the characteristics of megaprojects –high degree of uncertainty, risk, and complexity– choosing a dominant control by the project organization might create risky situations were partners tend to lose commitment to the project.

Likewise, Flyvbjerg (cited by Van Marrewijk, 2005) mentioned that power play is often another characteristic of megaprojects, and refers that it might be substituted by "commitment to deliberative ideals". Situations like the aforementioned will be widely discussed in the following sections of the research while analysing risk and cultural influence of such power relations and control / management practices.

4.2 Interviews

As stated by Yin (2009) the richness and extensiveness of the real life context encountered in case studies can be augmented by using multiple source of evidence such as interviews, considered by Van Marrewijk and Smits (2016) as an advantage that allows systematic collection of people's experience, interpretation, and feelings without loss of flexibility or spontaneity, and as an appropriate tool to gain insights into the everyday world of megaproject -and its employees (Van Marrewijk, 2015).

Implied in the British Standard (BS 6079), risks should be considered from different perspectives impacting the project and the business; and is vital to consider the position of all the stakeholders in order to assess and know the most probable source of the risks and opportunities implied. This is why the interviews are intended to be executed at different level of the organization and also

depending on the participation of the project, by doing so we could gain more insights on the sources of risks and opportunities. Identifying risk is a creative task that should involve all those likely to be affected by the decisions reached (BSI, 2001), therefore its effectiveness is highly related to the skills and experience of those involved in the process. This approach is also supported by the Canadian Standard (CAN/CSA-Q850-97) which mentioned that the best way to identify risks is to include a multidisciplinary group of experts, who have specific knowledge and experience (CSA, 1997).

4.2.1 Structure of Interviews

To gain insights on the influence of cultural aspects in the risk management process, the researcher created an interview guideline which can be consulted in Appendix d. The structure of the interviews is conducted following this guideline, starting with a brief presentation of the scope of the research and its most probable expected results.

The interviews consist on open and closed questions. For the part of risk management and risk identification, interviews are primarily used to obtain a general overview of the project studied in terms of risk and determine the importance of each category of risk based on their experience in the project; for this part most of the questions were closed to gain more in-depth knowledge of certain topics related to risks and obtain more accurate results.

For the cultural part, a more exploratory approach has been chosen. Thus, open questions were preferred in order to give the interviewee an open environment for reflection based on their experiences. In this section of the interview, the participation of the interviewer is more active as a receptor and listener rather than a facilitator of information.

The goal of the interviews is to analyse the impact of cultural phenomena in the risk management process and provide recommendations that contribute to (1) understand the risk management process by using a sample of four different projects; (2) understand which category (types) of risk are more important according to each project; (3) investigate if cross-cultural topics affect the risks found in that projects; (4) investigate the applicability of cultural theory on practice and for future projects; and (5) probe whether the use of a generic model like the one proposed will be helpful for future projects.

4.2.2 Selection of participants and procedure

In total a set of 15 respondents were interviewed, however, the number was at the end reduced to 14 because one of the interviewees did not complete the entire set of questions, therefore it was discarded. The final sample of interviews -14 in total- will be grouped according to the case study where they collaborate on. An overall classification of the interviewees based on their role within the company and the project, as well as their level of experience (years) is given in the tables below.

From the total sample of interviews, 71% of them were held face to face (with an approximate duration of 45min – 1.5hrs), 14% were setup by a video connection (Skype Business), and the remaining 14% was conducted by answering the questionnaire and rectifying the information verbally. The information obtained during the interview was treated as confidential and anonymous. All personal information, such as names of interviewees, will not appear in any publications. To prevent valuable answers lost the interviews were audio recorded and the researcher was the only person with authorized access to the recordings.

Role in NACO	%
Senior Airport Architect	36%
Project Manager	29%
Associate Director Advisory Group	14%
Airport Architect Designer/Manager	14%
Senior Project Manager	7%

Role in the project	%
Project coordinator / Work Package Manager	29%
Senior Airport Architect (Design Manager)	21%
Senior Project Manager	14%
Project Manager	14%
Airport Architect Designer/Manager	14%
Representative of NACO	7%

Years of experience in the company	%
>10years	57%
6-9 years	29%
1-5 years	14%

Years of experience in the project	%
>10years	15%
6-9 years	0%
1-5 years	85%

Gender	%
Male	93%
Female	7%

Nationality	%
Dutch	93%
German	7%

Table 6 - General data of interviewees

5. Analysis and Results

As explained in section 4.2, the generic model will be partially developed based in the results obtained during the interviews. The results of the interviews will be explained in three different sections considering three -complementary- topics: 5.1-risk management, 5.2-risk identification and 5.3-influence of cultural phenomena in the risk identification process.

5.1 Risk management

The purpose of the first part of the interview is to understand general aspects of risk management process used in the company and in the projects studied. It will also be important to understand how does the risks are generally perceived among different people (with different experience and roles) and projects.

Based on the results obtained during the interviews, there is a clear opinion for determining in which stage of the project the risks are higher, 71% of the interviewees consider that the risks are higher in the first stages of the project where the project scope is being defined and the planning process is still running, Interviewee-TWN01 explained that the risks are higher at the beginning of the project because “there are lot of unknowns factors, you don’t know your client yet, you don’t how the relations are going to be, you don’t know your partners, you don’t know how they will perform, you don’t know how your client is going to act, for example if they will pay you in time, if the approvals are going to be on time”, for some others the master planning represent the higher risks because you “have all kind of options” -referring to expectations and scope of the project (TWN03).

The remaining 29% consider that risks are higher in the construction phase. Interviewee-UAE02 mentioned that “during construction, the design missing elements, scope not properly defined and gray areas not -previously- defined in the design phase have a major impact on time, cost, and quality”, and continue explaining that “in the design phase the risks can be somehow mitigated by fixing scope gaps (gray areas), but during construction phase all these scope gaps “gray areas” that have

Figure 32 - Distribution of risk depending the project phase (own illustration)

not been properly defined in the design phase have a higher impact in the construction have a cost aspect for the client and create potentially delays and claims for us".

Therefore, considering the use of a formal risk management process (as for example RISMAN) during these phases is considered by 93% of the interviewees as very important (5-6 on a scale from 1 to 6), and considering that a formal process should be started since the beginning of the project. On this respect, Interviewee-UAE02 considered that using a risk management process during the planning phase is very important and useful because it helps "to identify if something goes wrong and fix it on time". Interviewee-UAE03 added "risk mitigation is more important in the design stage of the project, [because] this will decrease the risks during the construction phase of the project. Interviewee-TWN03 also considers that the risk management process "should start immediately in the design phase, because if it's started during construction you might only have the result of everything that you couldn't manage before –so it's too late by then".

By the hand of considering important the use of a formal risk management process, it is also significant to measure the level of awareness among the sampling; thus, it was analysed on a scale from 1 to 6 -with 1 being passive and 6 adopting a more active role. The results present a divided level of awareness explained as follows: 29% have a very active role and high level of awareness between level 5&6; 43% ponder themselves on a medium to high level; and the remaining 29% consider to have a more passive low level of awareness (level 3). It is also important to denote that the lowest level of awareness was found in people working (and more involved) in roles related to design and mid-low involvement in management; however, since the core business of the company is mostly related to design and engineering duties this should also be something to be considered.

As long as the level of awareness is higher and the whole sample of respondents makes clear evidence of risks while they encounter any, the use of a formal risk management process perhaps should also be more necessary. For this purpose the RHDHV management team has developed some formal procedures (as the PRL previously explained) to control risks on a better way.

The use of a PRL is specially well-known among the interviewees (64%); despite this fact, a huge number of respondents consider that the management of risk is and should be carried out by the Project Manager/Project Director in charge, therefore they consider their role as a facilitator of risks –to "flag them". Interviewee-MEX04 stated that "it's important to make sure that people are

aware of risks, but it's the project manager role to continue and decide how to express them [referring to specific tools as for example the PRL]". According to Interviewee-TWN03 he considers the use of PRL as "just a list of risks". In his perspective, it is not very useful because "if you ask different people to express the risks found in the project there will be quite different results and normally it should not be very different". Therefore, the perception of risk is expected to be different within the team depending on the role played by each member and the level of experience, they are basically worried about different risks. Interviewee-MEX02 mentioned that "the problem with the risk management is that it's requires to have experience to 'flag' things [risks] and discuss them on the table as a team, it is not just one person taking the entire responsibility or control, it's a team effort"

Besides the PRL aforementioned, other respondents pointed out the use of two different documents used in the company as a procedure to identify and control risks in the projects – according to their perspective. One of them is a (newly) document called 'Project Health Check' and the second one is the 'Issue list'. The first one is used as a report of the overall status of the project. It is executed by the project manager and monthly revised with the project excellence manager of the business line. The report contains the following subsections: stakeholders/client, cost (financial status), time, scope, QHSE, resources and other risks.

Executing a formal risk management process might help the management team to foresee the seeds of success or failure at an early stage; therefore, they should be clearly presented in terms of its most probable consequences/opportunities. As expressed by de Camprieu et al. (2007), ''risks factors are often presented in narrative form steeped in technical methods and jargon, making it difficult for managers who are experts to make informed judgments''.

Another key point it to investigate if there are other formal processes used externally from NACO and used in the projects in a regularly basis within the joint venture structure and within the client to control and manage risks in general. Most of the participants answered that they were not aware of any formal process used for this purpose, or if so, it was carried out within the steering committee members out of their reach and understanding. Some of the interviewees discussed the following. Interviewee-UAE02 "I think there was a risk assessment made in 2006, but I was not involved in that, risks were related to payment and scope were identified by that time, but not used by now". Interviewee-MEX02 "maybe yes [referring to some formal process] but not broadly shared". Interviewee-TWN03 mentioned that for Taiwan the PMO of the project (Parsons

Brinckerhoff) is more active in this respect because is part of their role; however, the management is sometimes difficult because “the problem is that the steering committee is not interested”, he continue adding that the report “is not shared with anybody, not with the client, [because] there is no value for them [referring to the steering committee], the things that are value for them is the relationship with the client, the things that are happening in the organization”

Finally, rephrasing what previously mentioned managing risk effectively helps organizations to perform well in an environment full of uncertainty. One of the most important characteristics of megaprojects is coping with uncertainty which might create a positive (enhance) or negative (limit) impact while meeting the initial objectives settled for the project. This will be fully analysed in the following section.

5.2 Risk identification

The identification process seek for the risks to be managed using a well-structured systematic process by developing a list of sources and events of risks that might impact the achievement of the initial objectives. Henceforth, this section will –extensively– make use of the risk classification previously developed in section 3.2.1 and summarized in Figure 19. The following analysis containing figures and charts schematizing the most important results obtained from the interviews in relation to this topic. Altogether will provide the basis to answer the SQ2 formulated for this research *‘How are the main categories of risks perceived in airport terminal projects?’*

In the process of the interviews it was requested to the interviewees to always keep in mind the specific project we were analyzing in order to obtain valuable information from each of them. The researcher started this part of the interview by explaining the eight main risk categories (with the help of a summary table provided in the interview guideline). After this, the interviewees were asked to create a *ranking* considering the risks that appear the most in each of the four projects analyzed.

5.2.1 Analysis A: Main categories of risks

At this point of the interview most of the respondents began to deliberate their ranking considering pros and cons for each kind of risk. After collecting information from the interviews, the researcher can provide key findings on respect to this topic. The information has been summarized in Figure 34 by using a radar chart. The full results of the interviews can be consulted in Appendix e. Based on this analysis, the following key findings (KF) are derived:

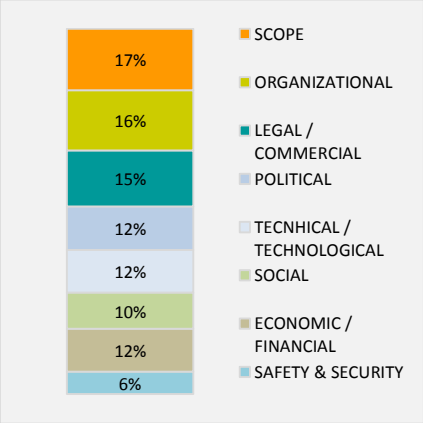


Figure 33 - Main risk category (NACO perspective)

KF1: In general, the sampling ranked at the top 3 risks related to **Organization**, **Scope** and **Legal/Commercial**.

- Organizational risks referring to Stakeholder management, interface management, and lack of clarity over roles and responsibilities are perceived as the highest kind of risk in China and Mexico project. Interviewee-CHN02 explained that the organizational structure for Beijing project was mainly based on a top management structure formed by “five commanders”; he mentioned that in this project the organizational structure was different from others because the decision-making was on the hands of the “five commanders” without any further consultation with stakeholders or end-users, according to him this was a major risk because of the following situation –also related to scope risk “we had to write the programme of requirements based on our experience without feedback from stakeholders, one because there was no time to involve all the stakeholders, and the other thing is that in China all the stakeholder involvement was not very developed certainly not at that time”. So as can be seen there is a combination of scope and organizational risks in this perspective. For the case of Mexico, Interviewee-MEX02 mentioned that “organization [risk] is important to overcome the unknowns during the project, this by the hand of social [risks] considering having competent people to work with”. Thus it is important to denote, that there is also an opportunity encountered in the organizational risk, if the organization is well structured it might reduce the unknown situations.
- Regarding scope risk Interviewee-UAE02 explained that scope risks were the most important for Abu Dhabi project –because considering the role of NACO as a consultant for the design “defining properly boundaries and gray areas for the design consultant is

key to have a properly defined project; in the other hand, for the contractor is an opportunity to get more money".

- Referring to Legal risks Interviewee-TWN02 mentioned that "people live and die by the contract", he also referred to scope risks referring to "there is no room to discuss any of the changes that of course –reasonably- could arose while the project is running considering the high uncertainties since the beginning of the project".

Finally, people more experienced in the aviation field considered that legal risks are hugely related to scope and somehow also related to social factors due to the following. Interviewee-MEX02 "[referring to the contract] they write the scope in legal terms instead of writing it –actually– in technical terms, and in the end the client is hiring engineers who deliver engineers stuff and the contract is written by legal people" he continued adding that this is also reflected in the complexity of this kind of projects "most countries do not have the legal bases for projects of this magnitude, so they rely on contractors and fall back the contract in their hands". Considering the aforementioned, it is eminent that the combination of these three kinds of risk is a powerful trigger for the general management of projects.

KF2: The projects that have a long-term contract –as Abu Dhabi and Taiwan- scored especially high in Legal/Commercial category risks. This can be reasonably understandable considering the combination of several factors as: the type of the contract, the high level of unexpected scope changes that cannot be properly expressed and controlled in the contract since the very beginning, and external risk factors as organizational changes along the life cycle of the project. Interviewee-TWN01 also refers to Legal/Commercial risks as the "different interpretations of the contract". Interviewee-UAE02 expressed the need to improve legal knowledge among NACO colleagues to reduce as much as possible the misinterpretations of the contracts "people should understand how the contract is written, the use of specific language, we as NACO are weak, everybody that do design should have a training in FIDIC to understand how contract is written and what you should be aware of them. If you understand how it works then you could understand how to reply [when there are claims]".

KF3: Surprisingly, risks related to Economic/Financial were ranked in two out of four projects (Taiwan and Abu Dhabi) in the middle part of the ranking with relative medium to low importance. This tendency matches the case of considering Legal risks at the highest level of the ranking –on both projects. As explained by Interviewee-UAE02 economic and financial risks are discussed

beforehand and addressed in the contract “the fee proposal made for the project may include the fluctuation rates, [however] all this kind of conditions are previously agreed”. Therefore, the contract might be considered a tool used to control, reduce or even avoid economic and financial risks.

KF4: There is a debatable perspective of several risks in the middle ranking of the projects. There is not a clear distinction between political, technical and social. Political risks are undoubtedly recognized by all the interviewees but are considered a medium to low risk. Usually these kind of megaprojects are on the top three infrastructural projects for the country, and as explained by Interviewee-TWN01 “they are directly affected by elections, by ministers who leave, the top management of the project are political figures that come and go during the lifecycle of the project, [thus] there is a high political tension, all eyes are in the project and if something goes wrong you will immediately have the press”. For the case of Mexico Interviewee-MEX04 explained that “the client is fully driven by a timescale that it’s based when the government changes".

KF5: Contrary to the top 3 ranking, there has been a clear tendency to score Safety & Security in the bottom of the ranking. Most of the interviewees perceived a safe environment to carry out their activities –considering the general conditions of the country and the facilities of the offices. Some interviewees have been living for some time in the host country and refer to this risk as follow: Interviewee-MEX04 “it's very important but it doesn't play a major role for the project considering that most of the people work in the Netherlands, and considering that the situation in Mexico is quite stable”. For other respondents, this kind of risk is more evident in the construction site (for the case of Abu Dhabi) and explained that Interviewee-UAE02 “Safety and Security is a hot topic, in general in construction it is a standard procedure there is always a risks, it is more standardized in terms of risks, of course there is a high risks is something really happens but most of the time it is covered budgeted and/or insured”

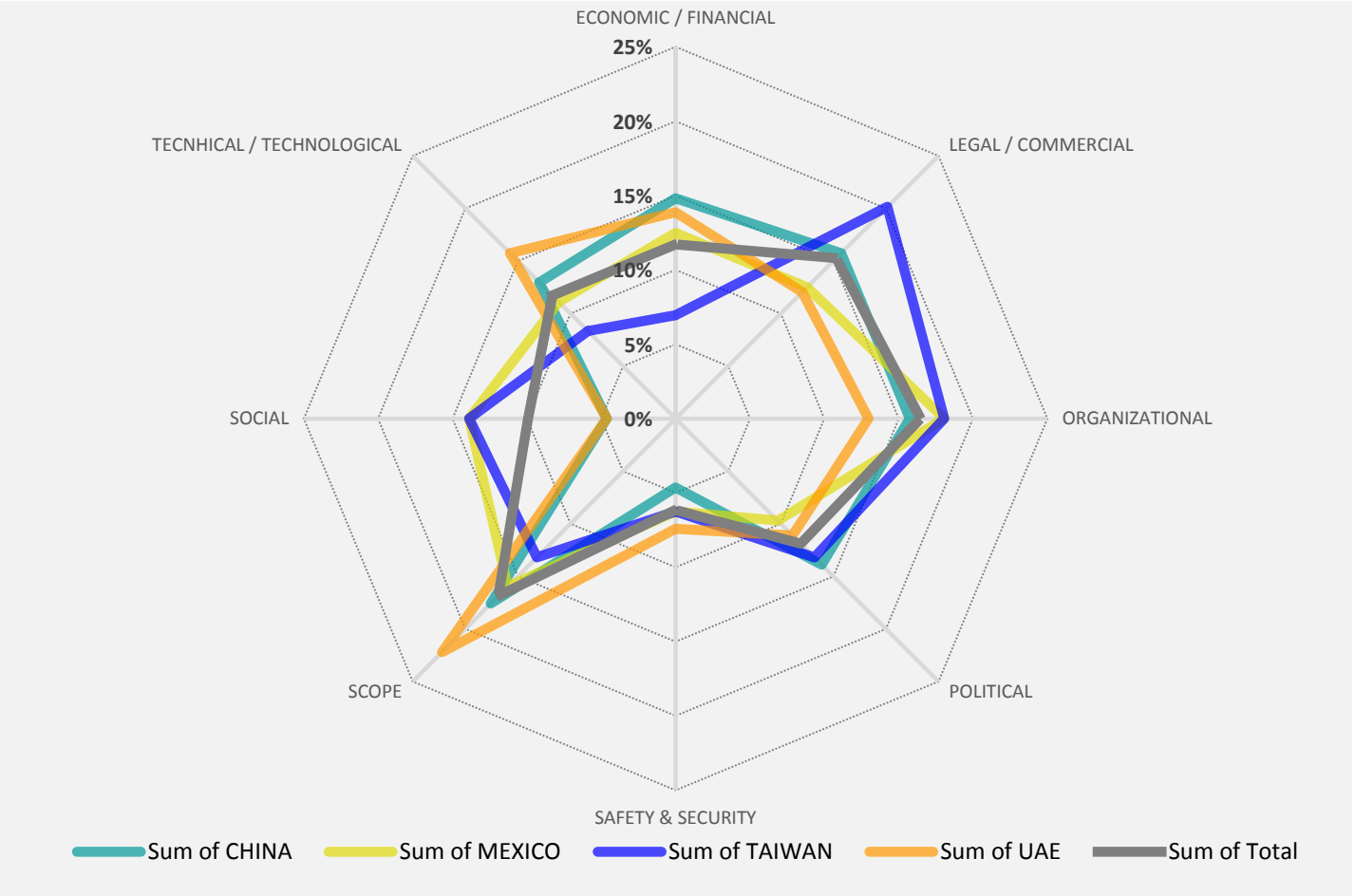


Figure 34 – Main categories of risks according to interviews

5.2.2 Analysis B: Main risk composition –breakdown- into subcategories

After analyzing, from a general perspective, the risks that affect the most in the four megaprojects selected, we are going to examine them in a more detailed manner by breaking down each category into different subcategories. The subcategory used for this section has been developed and explained in section 0.

The breakdown composition consisted on asking the interviewees to *score* each subcategory on a scale from 1 to 6 (with 1 being not relevant and 6 very important). The results are useful to explain accurately and thoroughly what is the composition of the main risks affecting each project. For this section the researcher will mainly refer to Figure 35.

It is important to mention that by this point of the interview, all respondents were more critical and reflexive about their answers. They had the opportunity to compare different subcategories in the same table, and assign different scores –weights- to each subcategory.

In the previous analysis (5.2.1), we defined the top 3 categories of risks as follows: scope (17%) organizational (16%), and legal/commercial (15%). In this section we are going to review the previous classification by using the information collected from the interviews and summarized in Figure 35.

As can be seen, scope risks remain as one of the most important categories in three out of four projects (China, Mexico and UAE). This is explained by two complimentary subcategories -see #1 in Figure 35: (1) There is a very high risk perception when the scope of the project has not been sufficiently detailed in the project; and (2) there is also a high influence when the customer demands and requirements changes through the lifecycle of the project. For the case of Taiwan, scope risk happens to be the second most important after legal risks which is basically affected by the subcategory 'failure to achieve satisfactory contractual agreements'. The latter is comprehensible if we consider the fact that NACO signed a long-term contract with the Taiwanese authorities (this perspective will be further explained in section 7.3)

The second top subcategory is vastly related to managerial aspects -specifically organizational and social risks (see #2-Figure 35). Organizational risks are explained through the following subcategories: strong level of interface management, management competencies related to a

lack of clarity of roles and responsibilities, and a poor leadership sometimes reflected as an inadequacy of the composition of the board of directors/managers.

For two specific projects –Mexico and Taiwan– organizational risks are highly related to social risks explained in two major subcategories: human behavior (as for example personality clashes) and human resources (poor staff selection and poorly trained employees). Interviewee-TWN01 explained this situation as "there is a multicultural line combined with a very long project (3.5 years until now and five more to go), so there are always lot of changes in the team, there is also lot of time used for the management of the team, usually with a long learning curve every time [referring to the theory of forming, storming, norming, performing]". He also explained that these two kinds of risks are sometimes also connected to political risks mentioning that "the top management of the project is usually formed by political figures (that come and go)". Thus this aspect makes it even more complex.

For the case of Abu Dhabi this situation is the opposite as explained by Interviewee-UAE02 due to "social risks are analysed beforehand since the beginning of the project, all the resumes has to be provided since the contracting phase; Senior staff have passed through a review process, in that sense the selection is more picky since the beginning of the project and the risk is low before the design".

The third most important subcategory of risk among the projects is related to *economic and financial*. In the main category previously analyzed economic and financial risks were appointed as medium to low importance; conversely, analyzed through a subcategory –breakdown composition- they appear at the top of the classification (see #3). This has been mostly explained by the interviewees as 'cash flow issues' and 'delay in the payments processes'. Macroeconomic factors have been disregarded, as explained by the respondents this factors "can be reasonably measured and control in the general terms of the contract". However, cash flow issues are seen to be related to organizational, political and social risks.

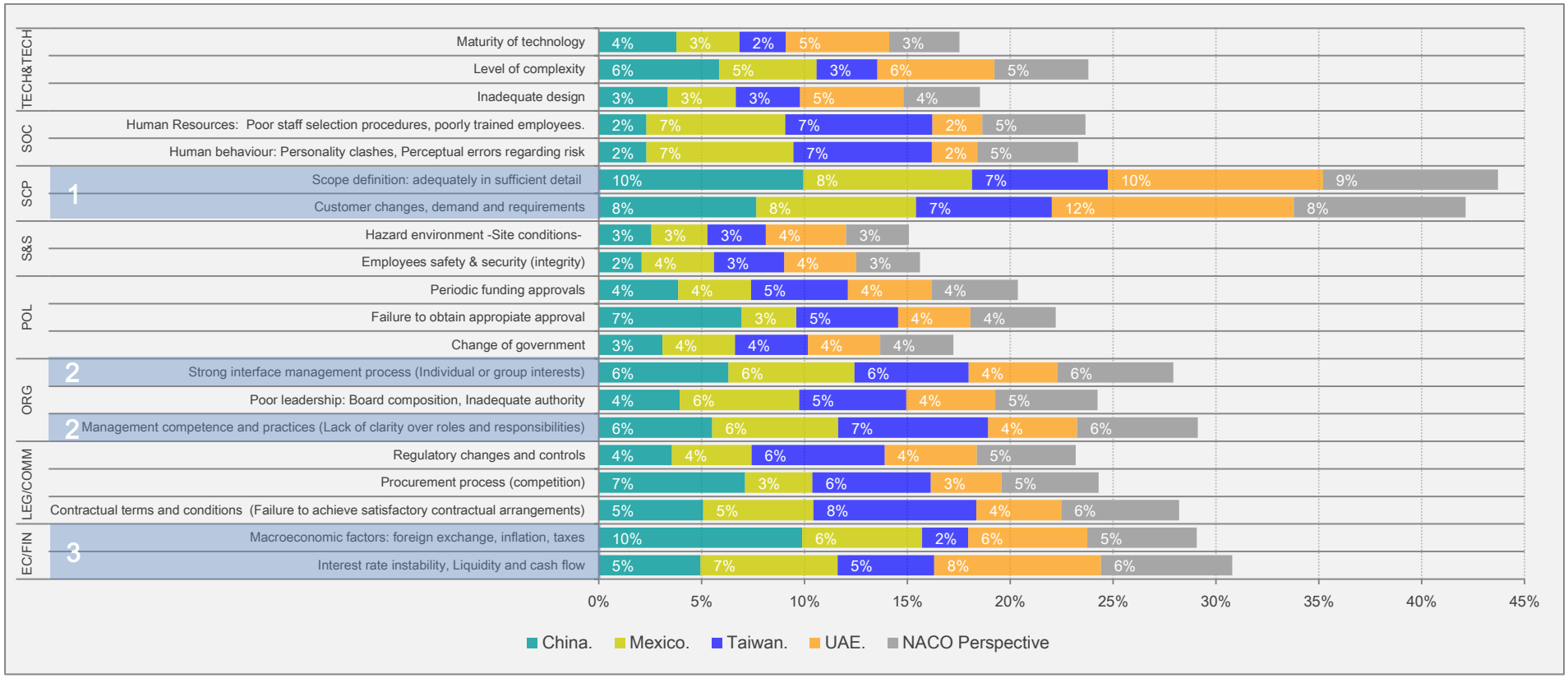


Figure 35 – Breakdown of categories of risks according to its weighted scores

5.2.3 Analysis C: Subcategory analysis

A second analysis also based on the subcategory scores is going to be provided. The analysis presented is useful to identify the 'top 2 subcategories' that –according to the respondents–affect and appear the most on each project. It is important to denote that the chart presented in Figure 36 shows an independent average of the scores given by each interviewee; hence, they do not represent any relationship with the main category explained in sections 5.2.1 and 5.2.2.

As can be observed in the figure below, for China the top 2 subcategories are strongly related to organizational risks, particularly to risks related to a lack of clarity over roles and responsibilities which is also related to the interface management that was required considering the multiple companies involved in the project. The same behaviour occurs in Mexico in combination with a strong level of complexity perceived as highly important.

For the case of Taiwan different behaviour is observed. Risks related to legal and commercial are considered as very important, and are extremely related to some economic and financial risks as cash flow and liquidity required for the project. This situation has been explained by Interviewee-TWN02 as follows "Everybody was really happy when signing the contract, but after that extremely serious cash flow problems appeared in the project, without any possibility to adjust the budget".

Comparatively speaking, UAE shows completely different risk subcategories setting mainly based on four complimentary risks: scope not clearly defined and changes are related to the level of complexity demanded for the project, same which in turn are related to political risks as the decision making, and budget, have to be made by the government. As explained by Interviewee-UAE02 "Political risks are related to scope, the scope is usually related to money to one specific budget that is usually funded by the government, if the budget is available and we stick to that budget there should be none issue but when the scope changes it is very difficult to manage"

Lastly, it is important to indicate that the level of complexity related to technical and technological risks is considered in 3 out of 4 projects as profoundly significant. This information match with one of the main characteristics of megaprojects previously mentioned by Bosch-Rekveldt et al. (2011) in the 'TOE framework' as an effort to breakdown the complexity of large engineering projects; technical complexity refers to the technological uncertainties and to the dynamics and uniqueness of the projects.

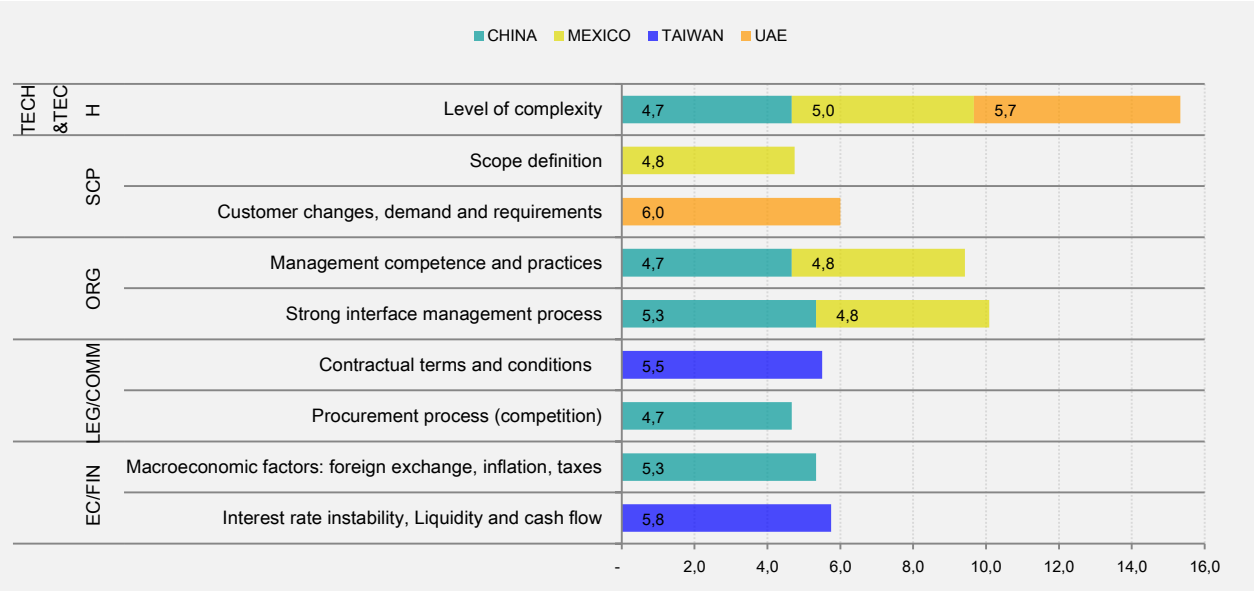


Figure 36 - Top subcategory of risks per project (analysed individually)

5.2.4 Analysis D: Subcategories variations and deviations

Finally, considering the scores for subcategories, Figure 37 presents an analysis of the trends and variations while comparing the four different projects. This analysis will be essential to recognize and introduce cultural analysis described in following sections.

As can be observed Figure 37 depicts changes over different subcategories and countries, showing trends and variations. To provide greater ease of study some trends were previously identified and marked in the graph as TRN:

- TRN1 – Management competence and practices: the four projects consider this subcategory as medium to high importance; this subcategory is greatly related to the transparency of roles and responsibilities among the parties involved that in most of the cases are unknown since the beginning of the project.
- TRN2 – Scope and changes: once again there is a common sense to score these two subcategories from medium to high levels. There are some differences between UAE and China that as explained by the respondents they are dependent on the management practiced in the project (organizational structure) and the type of contract.
- TRN3 – technical level of complexity and maturity of technology: as previously explained there is a high relation between technical complexity, maturity of technology and definition of scope. Interviewee-UAE02 explained the following “sometimes the design is conservative, and looked from a perspective that we live in Europe; so our design is based on what we know sometimes in Europe and not looking to

local practices, ignoring different technology developed in the country [thus] is something we must identify as a risk".

In opposition to the identified trends, there are some extreme variations (EV) between the projects which are going to explain in the following paragraphs.

- EV1 – financial and economic risks: as can be seen there are extreme variations between the four projects analysed. The results obtained from China appeared to be in complete opposition to the rest of the projects, respondents that have been working in China conceive this subcategory as very important.
- EV2 – legal risks: as explained by some of the interviewees legal risks are extremely related to the organizational and social risks. For the case of Taiwan (that shows the highest score and difference), achieving contractual terms and negotiating scope of changes were major tasks for the management team and often nearly impossible situations to negotiate with the client. Interviewee-TWN02 exemplified this situation on a formidable way "people live and die by the contract, [thus] there is no room to discuss any of the changes that of course –reasonably– could arise while the project is running considering the high uncertainties since the beginning of the project".
- EV3 – Political: these subcategories are also related to the aforementioned legal risks, and also related to the organizational and social risks. Once again denoting the extreme difference of Taiwan project in the subcategory of failure to obtain appropriate approval, Interviewee-TWN01 explained the situation accurately: "everybody hides behind the hierarchy, nobody likes to take responsibility, big decisions are always pushed up until they reach a guy who cannot push it up anymore"

The conclusion of this section opens a gap to discuss the implications of conceiving different cultures– embedded in each project–and provide insightful answers to questions like: why do these risks are higher in Mexico than in Abu Dhabi project? Can we use cultural phenomena to explain these tendencies and extreme variations? How do they help?

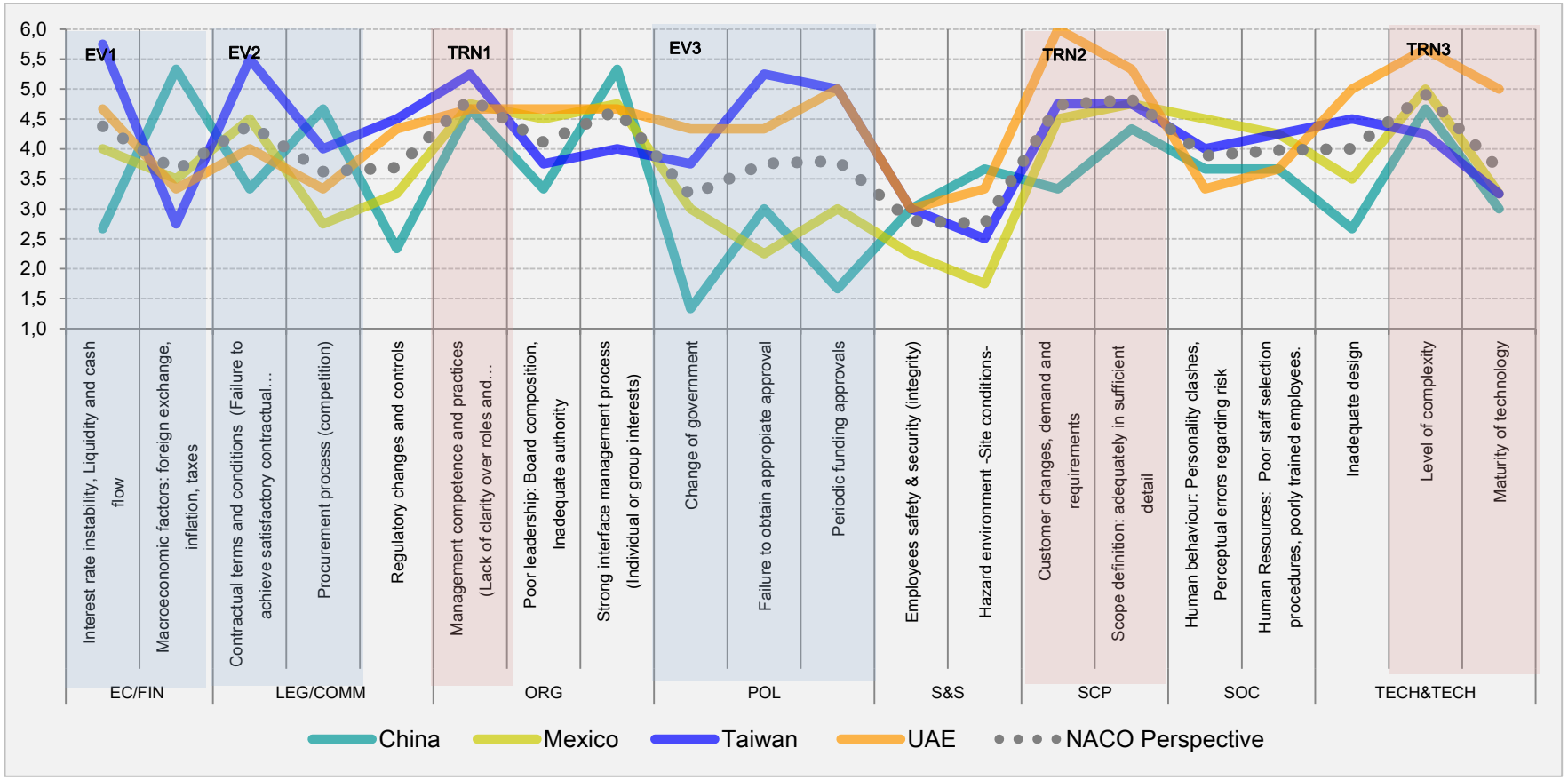


Figure 37 - Breakdown subcategory ranking: Extreme Variations (EV) and Trends (TRN)

5.3 Cultural phenomena

After analyzing the risk composition among the projects, the next part of the interviews consisted on analyzing cultural phenomena, considering the premise that “culture only exists by comparison” (Hofstede et al., 2010).

This section is the complement of the previously mentioned analysis in sections 3.1.3 and 3.2.2. The combination of these three sections together serve to answer research questions SQ3 - How can cultural aspects influence the risk management in megaprojects (analysed in section 5.3.1), and SQ4 - What benefits can be identified while considering the influence of cultural aspects in the risk management? (Analysed in sections 5.3.2 and 5.3.3)

5.3.1 Analysis A: Cultural difference in general

The analysis of cultural aspects started by asking the interviewees the following general question: Do you believe this project would have been as successful or complex, if it had been developed in the Netherlands in cooperation with Dutch companies only? Surprisingly, the response from participants has a divided opinion without a strong bias, thus opens room to further discussion.

On one hand, 57% of the interviewees considered that the project could have been less complex considering the insufficient level of experience and knowledge of the client extremely required to pursue a–fast track–project with this level of complexity. Interviewee-MEX04 referring to Mexico project “this kind of project requires a professional client with experience on complex projects, the way they [referring to the main client] manage the project doesn't suit their level of experience; compared to Netherlands the level of knowledge with the client will be higher allowing you to make a better fast track project”. Interviewee-TWN01 referring to Taiwan project "I don't think that projects are easy on the Netherlands, but they must be easier than dealing with all these people, this is my perception”.

> “If you understand the culture incorrectly, then the quality of your efforts and deliverables will not be satisfactory to the client; as long as you understand the client and its culture it's like getting the white elephant”. (Interviewee-CHN03)

On the other hand, 43% of the interviewees answered that they see no change in the complexity or successfulness of the project. They explained two different situations also related to the level of complexity and the people involved in the project. For the case of China, Interviewee-CHN01

explained two complimentary factors. Firstly, the level of magnificent and ostentation would not have been possible to develop in Netherlands, and surely not completed on time, he explained that “the size of this project in terms of sqm, the amount of workforce and considering the very short timeframe it's impossible for the Netherlands, the way they [referring to Chinese] were working - 16 hours per day, 24 hrs construction works for 2 or 3 years- that's impossible in the country”. Most importantly he added that in the Netherlands the decision making structure, type of leadership and hierarchical structure is quite different than the one used in China. “For China hierarchy is one of the most important things, if leader has spoken (major of the city, the highest rank person) if he decided to be black or white it should be done that way, here [referring to Netherlands] it's more consensus”. On this respect, Interviewee-TWN03 mentioned something similar considering that the project could have been ever more complex because [in Netherlands] “everybody has an opinion, so you cannot easily manage them then you have to deal with it, so it becomes a risk”

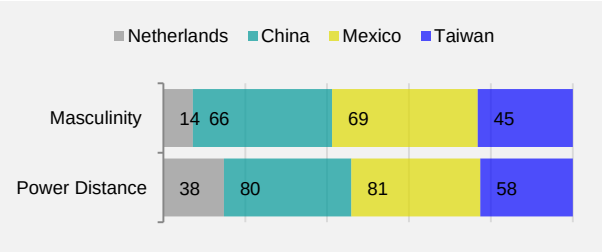


Figure 38 - Analysis 01

As explained in the latter, there have been notable distinctions between two main cultural dimensions. Power distance can be an interesting dimension that detonates decision making process to create a smooth-simple or more tedious process. Masculinity – Femininity also influence the management style of the project (more or less consensus between the parties).

Hence, these are the first insights in which the respondents recognize cultural differences as risks and/or opportunities, and consider a more reflexive perspective while comparing situations.

5.3.2 Analysis B: Introduction to cultural theory

Following the course of the interview, a brief introduction to the cultural theory developed by Geert Hofstede was explained to the interviewees. It is important to remember that the introduction of the theory was made on general terms disregarding the national scores. On this respect, the theory has been previously known for only 21% of the respondents.

After the introduction of the theory, 100% of the respondents considered important the cultural differences among parties due to several factors summarized in Figure 39. Analyzing the data presented in this graph, we can conclude that the importance of considering, at a first glance, differences between the parties involved in the project has an impact on three main topics: impact on the decision making process (24%), impact on how people work together (18%); an equal percentage (15%) for the impact on the communication process and understanding and respecting each other.

As previously explained in the theoretical framework chapter, megaprojects are seriously affected by decision making process and, in fact, the latter is considered part of the complexity. In view of this fact, a better understanding of the complexity of the megaproject in terms of task, social and cultural complexity as explained by Brockmann and Girmscheid (2007) should be essential. As explained by Interviewee-UAE03 “the cultural mixture occurred by the different nationalities involved in the project makes it more complex”. Following the social and task complexity proposed by Brockmann and Girmscheid (2007), the respondents considered that the second and third major factors of cultural differences among parties is that they have an after-effect on how people work together (organization and distribution of responsibilities) and on the way they have to communicate.

Regarding the impact on ‘understanding and respect each other’ Interviewee-TWN02 explained that most of the relationships have to be based on “respect to the norms and values of the country”. He continued by explaining that keeping a more flexible behavior and not too rigid perspective of your own values is also essential. IntervieweeTWN03 added that it is important to understand cultural differences because “you can react and response to certain situations, create and avoid tension situation among the parties”.

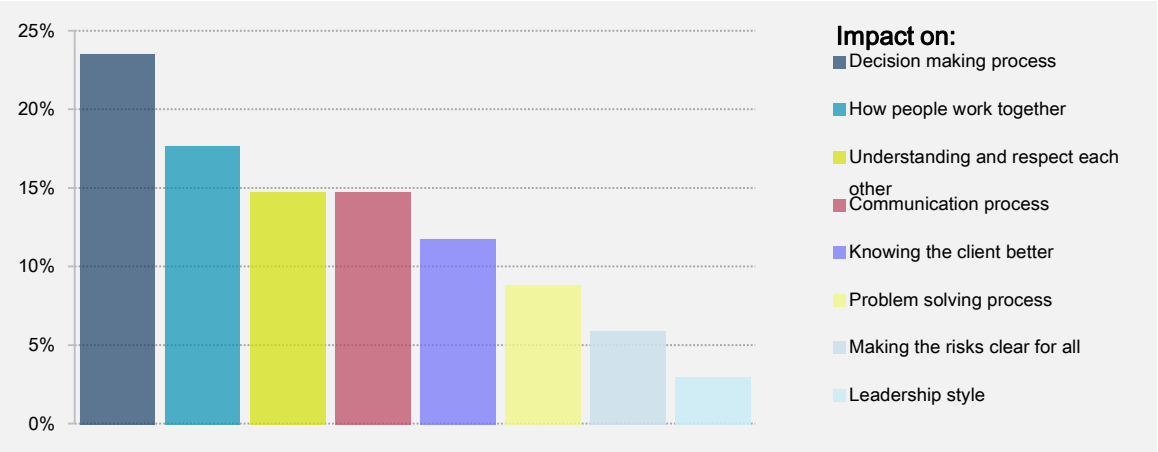


Figure 39 – Impact of cultural differences in general

Similarly to the previous analysis, the following step is to understand how does each impact is distributed among the projects and why do they have different consequences, for this analysis refer to Figure 40. As can be observed, there is a notable impact on decision making process and the way people work together in 3 out of 4 projects. However, this tendency is contrary for the case of China for which the impact is more relevant to know better the client and establish a communication process. In the words of Interviewee-CHN03 and referring to this situation "the first assignment is to be friends with the client, keep an open mind and try to understand them, that's the first effort". In the next analysis (5.3.3) we will explain further these differences with the help of cultural dimensions theory also tested during the interviews.

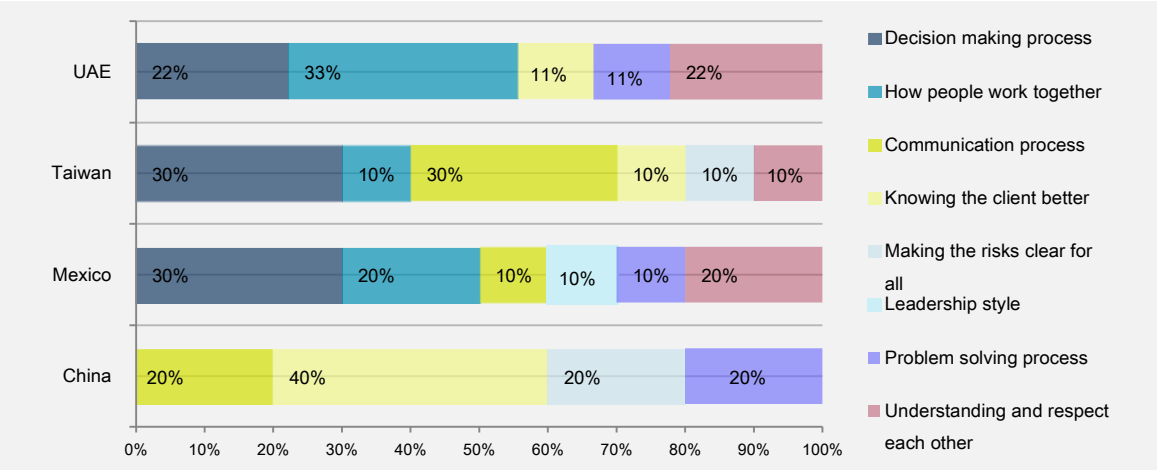


Figure 40 - Breakdown impact cultural differences per project

5.3.3 Analysis C: Understanding cultural dimensions on the projects

Similarly to the analysis provided in the previous sections, the interview continued by analyzing the most relevant cultural dimension for each project. Not surprisingly, there was a notable distinction to consider 'Power distance' as the most important for 59% of the respondents. Masculinity has also been recognized as highly important (18%), as well as Individualism (12%). Uncertainty avoidance and long term orientation have been scored with a very low percentage (6%), lastly indulgence has not been considered. To provide an insightful analysis of the importance allocated for each project Figure 41 has been created.

After analysing each project separetedly, we can deduct that respondants from Mexico, Taiwan and China projects consider power distance (PDI) as the most important cultural dimension. This corresponds with the Hofstede cultural dimension scores given for Mexico and China as a very power distance countries (80 and 81, respectively). Similarly, it has also been highly important for Taiwan but in a lower scale, also corresponding with Hofstede score considered (58). Interviewee-MEX01 considered that "power distance is always a risk", also he made a reflection considering that it could also be an opportunity explaining that "having an organizational structure too open people might take advantage, while too close it also not going to help either".

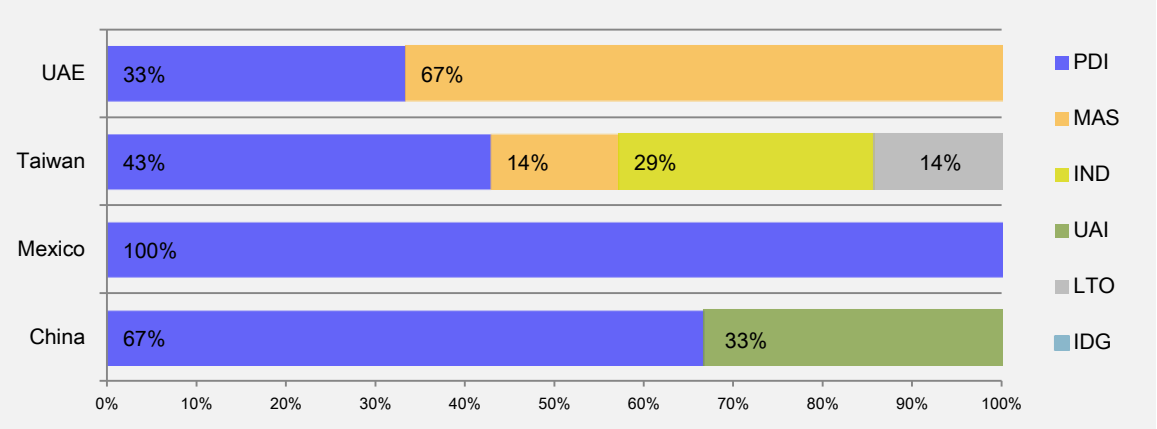


Figure 41 - Most important cultural dimension per project

	NL	CHI	MEX	TWN	UAE
PDI	38	80	81	58	90
IND	80	20	30	17	25
MAS	14	66	69	45	50
UAI	53	30	82	69	80
LTO	67	87	24	93	36
IDG	68	24	97	49	52

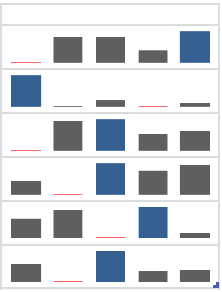


Figure 42 - Hofstede Cultural dimensions scores

Expressly, it is important to mention that despite UAE is the country with the highest score in PDI, it was not the most important cultural dimension for the interviewees. Interviewee-UAE02 explained this situation saying that due to the, very special case of UAE, having different nationalities involved in the project "taking decisions in a hierarchical position, take away the team effort and the motivation by providing better solutions to the project". Interviewee-UAE03 added that "The Arab world is largely set up as a hierarchy and the majority of the labour force and engineers are used to getting orders and being told what they have to do. This is a major difference with the Dutch culture, where we work together with all stakeholders to get a project finished".

The respondents from Abu Dhabi project considered that masculinity is the most important cultural dimension. The interviewees explained that most of the times the decisions are made without *consensus* having a huge impact on their work because "if something goes wrong they will try to blame you back". Comparing the national scores for Netherlands with UAE in the Masculinity dimension, we may conclude that the preferred style of work for NACO is much more based on 'team focus' while in for UAE the preferred style is more 'task focus'. This has a serious implication on a daily basis environment.

For the case of Taiwan, the interviewees identify that various cultural dimensions influence the course of the project which were generously commented. According to them, the most important was PDI followed by the collectivistic and equal percentages for masculinity and long term orientation. Analyzing the masculinity profile of the country and the huge influence of power distance, the respondents explained that these two cultural dimensions have an influence on the communication process and the way decisions were taken. Interviewee-TWN03 explained that people in junior positions "are afraid to speak" and compared the situation to Netherlands where there is a more open position on this respect, therefore the only you can do is to "deal and accept the difference". The communication process is also affected by the well-known "losing face" embedded in Chinese culture. Interviewee-TWN01 exemplified this situation by commenting that errors and mistakes cannot be openly and directly discussed, then you are supposed to just "rush it under the carpet" instead of dealing with them. He added that "there is no space for open

feedback, [thus] that makes lots of discussions very delicate", and ends mentioning that in the Dutch culture people are "very direct and it's ok to make mistake, make them clear to everyone and just move on".

While comparing the cultural scores from Netherlands and Taiwan, we find various notable distinctions, Interviewee-TWN02 demonstrated clear awareness of those differences and gave a great example. He was required to put the payments conditions on the agenda, for what he answered "maybe this can be done in Netherlands but not here, once the contract is set, is settled forever, people live and die for the contract" he added that sometimes he receives answers from the client explaining that the contract conditions were 'clear' upfront signing the contract. Therefore, there is no room to discuss in open manner these topics.

Additionally to the high influence of PDI in China influencing the communication and trust relationship among parties, the respondents considered that uncertainty avoidance was also an important cultural dimension for the project. Interviewee-CHN02 explained that the combination of these two cultural dimensions is complicated because, on one hand, Chinese client always demand for innovate solutions but they are less open to discuss them, whereby it is important to "build a trust relationship with the client, to build a friendship and create strong communications channels to openly discuss [the proposals]".

5.4 Implications of the results in the risk identification

After analyzing some of the implications while considering differences in cultural profiles, the next step is to understand if they could also influence the risks identified in the projects and to what extent do they can be analyzed. For this section we are going to use a combination of previous analyses and Figure 43.

First of all, 100% of the interviewees considered that cultural differences have an impact on the *risks* that can be identified on the projects. Despite this fact, they consider difficult to understand to what extent, and find a way to measure and/or quantified the impact. Interviewee-UAE02 notes that "if the client makes decisions based on what he believes is the best without considering and consulting the ones that are advising them it has a risk on the project related to time, cost, and management". He continued explaining that knowing beforehand for example how do Arabic countries make use of power and hierarchy "then those risks could be avoided or at least reduced

because then you know what to expect". Interviewee-CHN02 explained that if you are aware of the cultural profile "it's more easy to be proactive and to communicate proactively with the client; by doing so, you could lower the risks"; he also mentioned that not knowing the culture it would be more feasible to "fight with the client, because you don't understanding each other, losing time because decisions are not taken".

A final analysis was performed to find out what cultural dimension could be more important for the identification of risks. For this section, the respondents were requested to score on a scale from 1 to 6 (with 1 being not relevant and 6 very important) each cultural dimension according to the level of importance while identifying risks in the project. As can be observed in Figure 43, power distance remains to be the most important cultural dimension for all the projects. Likewise, it is interesting to denote that long term orientation (LTO) appears to be on the top of the ranking for three out of four projects. Considering the Hofstede cultural scores per country we observe that this phenomenon corresponds with the scores given for Mexico (24-STO), UAE (36-STO) and China (87-LTO), but this is not the case for Taiwan having a different score in this dimension (93-LTO).

The latter score was extensively discussed by the interviewees and considered–to their viewpoint– as a very short term oriented country (STO) in opposition to Hofstede scores. This is notably reflected on the Legal and commercial risks identified and explained by the interviewees who mentioned that the management for long term contracts should be considered, despite the redundancy, from a long-term perspective and reasonably accept that changes might occur during the duration of the contract, also related to the scope risks determined for the project. Interviewee-TWN02 associated these implications at an organizational level by comparing the case for Schiphol airport where the project is owned by the government but "internally run as a private entity", whilst for Taiwan the case is different even when the airport has been corporatized few years ago "everybody still behaves as government employees, [so that] every single meeting we got reminded that they are a government entity and they have to behave as governmental officials that means extremely risk averse". Therefore the counter effects of this situation are explained by Interviewee-TWN03 mentioning that scope changes are related to legal changes because "there is no way on earth to discuss change orders", indeed also connected to the PDI and UAI adding that "nobody will give you the green light for the change order because it has to be decided by the highest management". Interviewee-TWN01 added "nobody likes to take responsibility, big decisions are always pushed up until they reach a guy who cannot push it up

anymore; everybody is scared of making decisions, so they rather disapprove, or find something small errors (point, comma) before giving approvals". As can be seen, these implications play a major role not just at an organizational level but consequently on time and money, and most importantly affect the level of effort required as it directly decreases the team motivation whenever these problems arise.

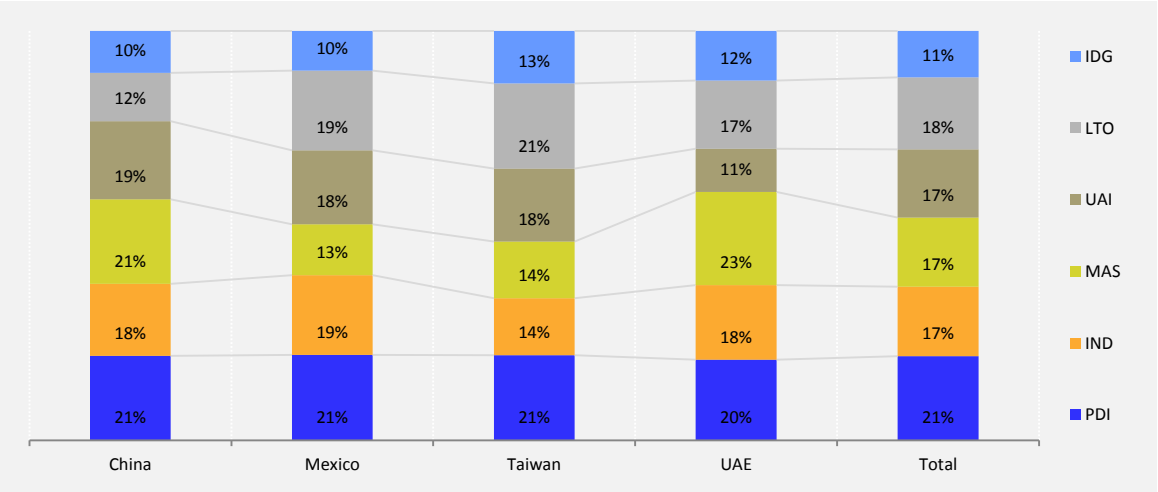


Figure 43 - Breakdown cultural dimension influence on risk identification process

For the masculinity (MAS) dimension we can conclude that it is highly related to the decision making process–mostly based on autonomous approach–and also related to the strong interface management as in China, UAE and Mexico. This also match the top three categories of risks for all the projects: scope (17%), organizational (16%), and legal/commercial (15%). Interviewees from China and UAE mentioned that Masculinity is an important cultural dimension used to identify risks. Most of them, unconsciously, make use of their feminine dimension embedded in the Dutch culture and make comparison between them to explain the importance.

Given these points, there is an imminent impact of cultural differences on the risk identification process. As explained by the interviewees the cultural part is a risk for several items. When questioned about their personal experiences where cultural differences were important to identify risks in projects most participants referred to experiences related to four main topics: organizational, communication, contractual issues and management styles.

In effect, all the interviewees considered relevant the use of cultural dimensions in the identification of risks in future projects due to different factors –explained in Figure 44. Basically the main factors are because (1) they create awareness, (2) it is supposed that the adaptation process required while entering to a new project could be easier and smooth, and (3) it helps you know better the client. Interviewee-MEX03 added that it is "always important to mention the difference with full respect". Interviewee-MEX04 remarks that "there will always be differences and it's important to identify the risks that are associated to them".

In words of Interviewee-TWN01 commenting on risk profiling and contractual terms "I think that we now consider them [cultural factors] for the risk profiling; when we start a project in India we now know that it's going to be very bureaucratic, very hierarchical, and we take into account in our proposal and go beyond the contract".

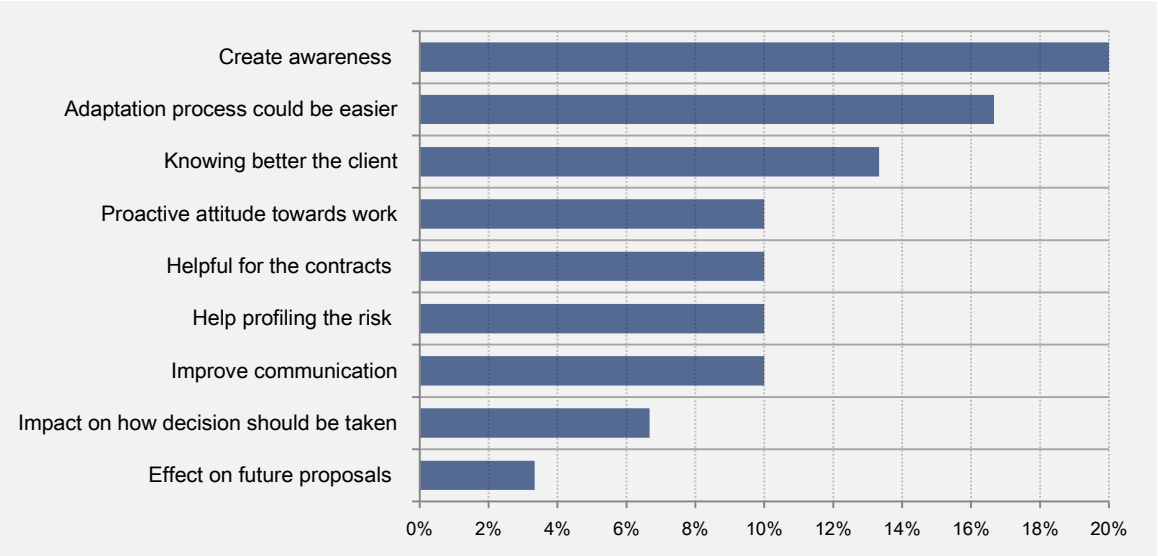


Figure 44 - Importance of using cultural theory to the identification of risks in future projects

Interviewee-UAE02 explained several of the aforementioned factors. He mentioned that there are several risks while entering to a "multicultural contract". First, the "risks of different cultures is because people look at different subjects, sometimes it's the language, sometimes is the hierarchy from how they grew up, and the impact of them on the work". Secondly, "working as a team is a prerequisite for this kind of mega-projects but in some cultures is different because people are not allowed to speak freely, so you need to make that people could talk even at lower levels".

At the last part of the interview, interviewees were asked to consider –if possible– adding cultural aspects as a main risk category and rank it within the classification initially carried out. Based on the answers from 11 interviewees, cultural risks can/should be included as a main risk category and might be ranked as 4 out of 8. The remaining interviewees mentioned that cultural aspects are embedded in most of the categories of risks. Interviewee-UAE03 “cultural aspects are part of all the 8 risks mentioned under question 11. All the 8 risks have in some way a relation with culture”. Interviewee-TWN01 “Culture is a very personal thing based on standards and values, I wouldn’t put as a specific category”.

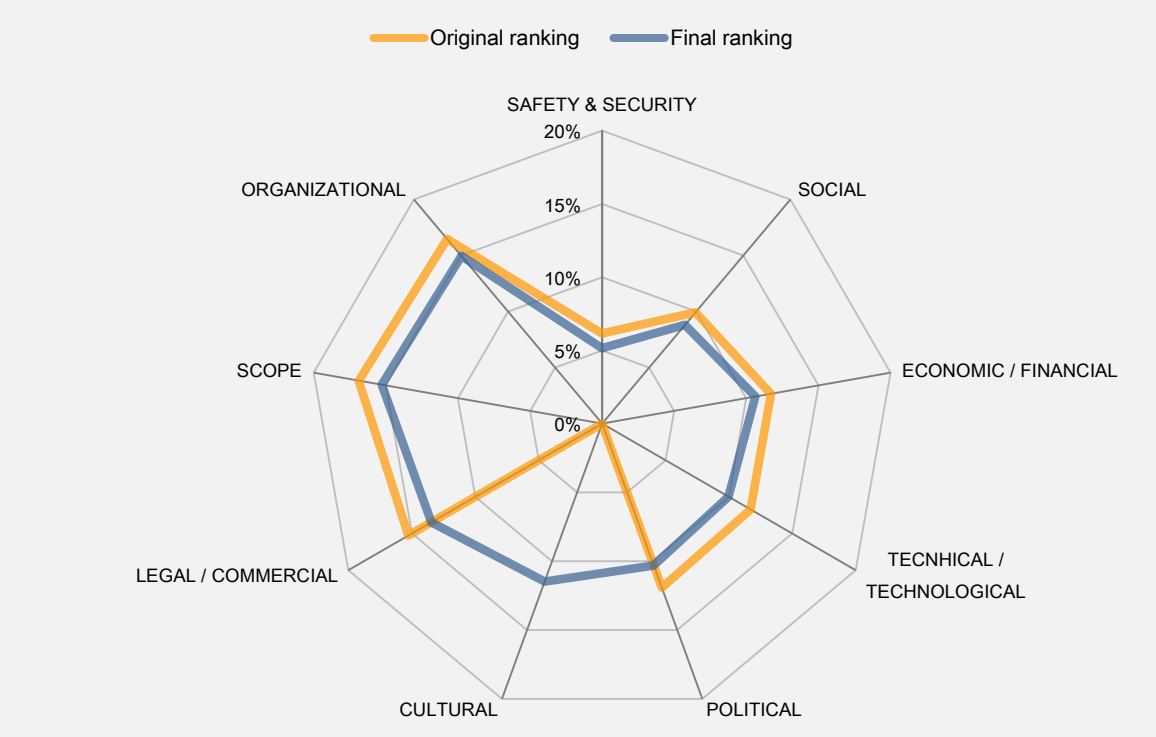


Figure 45 – Risk categories after cultural analysis

6. Conclusions and Recommendations

6.1 Conclusions

The main research objective was divided in two complementary perspectives: (1) practice-oriented research aimed to offer NACO recommendations concerning the improvement of the risks management process in combination with the influence of cultural aspects; and (2) theory-oriented research aimed to encourage and reduce the gap of knowledge dealing with the practical application of Cultural Theory analysed at a national and organizational level and understanding how both exert on risk analysis in megaprojects.

Based on the results from case study research, literature review, and interviews analysis several conclusions can be drawn. The conclusions presented in this section correspond to each of the five sub questions for research elaborated in section 2.1, all together will contribute to answering the main research question 'How can considering cultural aspects help the risk management in megaprojects'.

6.1.1 Risk Management - Identification

SQ1: What are the main categories of risks in megaprojects?

As denoted in the theoretical framework the most common pitfalls identified in megaprojects are related to its intrinsic complexity, unequivocal management practices and overlooked situations in early phases of the projects. Risk management has been perceived as a fundamental tool to analyse and improve the process of megaprojects in early phases. It is also considered as a tool that minimises the uncertainty to deliver more value to the project, and control not just threats but also creates opportunities (Hertogh et al., 2008).

Based on the data obtained during the interviews, 71% of the interviewees consider that the risks are higher in the first stages of the project where the project scope is being defined and the planning process is still running. Therefore, considering the use of a formal risk management process during these phases is considered by 93% of the interviewees as very important (5-6 on a scale from 1 to 6), and considered that a formal risk management process should be started at an early phase of the projects to identify if something goes wrong and fix it on time, and to

decrease the risks in later phases. This fact is important while considering that there is a medium to high level of awareness in 72% of the interviewees. As long as the level of awareness is higher and the whole sample of respondents makes clear evidence of risks while they encounter any, the use of a formal risk management process perhaps should also be more necessary in order to help the organization to perform well in an environment full of uncertainty.

Considering the aforementioned, one of the most important–and initial–phases of the risk management is the risk identification which creates understanding of risks and their categories for an effective risk management system applied though the lifecycle of the project (Boateng, 2014). The identification process seek for the risks to be managed using a well-structured systematic process by developing a list of sources and events of risks that might impact the achievement of the initial objectives.

For this purpose the researcher made a full analysis of eight (8) well-known sources to provide a more robust risk identification classification. After analysing the classifications used in several fields such as -well-known- international standards (ISO, British Standard, Canadian Standard Association, FERMA); consultancy parties like KPMG (specifically suggested for megaprojects); ACRP (suggested for the aviation industry) and the one used internally in NACO (mostly based in COSO); the researcher concluded on a risk classification which also includes a subcategory intended to provide a more detailed insight on the type of risks influencing the megaprojects selected. The conclusion for this sub question has been summarized in section 0-Figure 19, consider the following risks categories: (1) economical / Financial, (2) Legal/Commercial, (3) Organizational, (4) Political, (5) Safety and Security, (6) Scope, (7) Social, and (8) Technical / Technological.

SQ2: How are the main categories of risks perceived in airport terminal projects?

In order to answer SQ2, an exhaustive analysis of the main risks and its subcategories has been performed during the interviews and explained in section 5.2. Some insightful conclusions can be derived as follows.

In general, the respondents considered three categories of risks as the most relevant for the projects analyzed: **Scope (17%), Organizational (16%), and Legal/Commercial (15%);** which they

will be explained in conclusion 1, conclusion 2, and conclusion 3 and graphically represented in Figure 46.

Conclusion 1: Scope risks are highly related to the core business of NACO as a master planning designer. There is a very high risk perception of this category (1) when the scope of the project has not been sufficiently detailed; and (2) there is also a high influence when the customer demands and requirements changes through the lifecycle of the project. Scope changes are a common requirement during the lifecycle of the project who happens to be increased by the organizational and legal risks.

Conclusion 2: Organizational risks are explained through the following subcategories: strong level of interface management, management competencies related to a lack of clarity of roles and responsibilities, and a poor leadership sometimes reflected as an inadequacy of the composition of the board of directors/managers. Moreover, it is important to denote that respondents encountered some opportunities mentioning that having a clear and well-structured organization could reduce unknown situations during the project.

Organizational risks are highly related to social risks, in the sense that not having the right competent people might increase these risks. This situation has been extensively explained by the interviewees in section 5.2. For example considering the case of Mexico, the respondents mentioned that not a having a capable client makes the project more difficult in terms of management and decision making process –highly important for megaprojects.

Some other interviewees referred to the relation of organizational risks with political risks, explaining that the top management of the projects is usually formed by political figures (who are constantly changing), this situation is even more difficult when change of governments occur in the middle of the project. They added that given the conditions of long-term contracts, lot of organizational changes might occur in the lifetime of the project. Of course this forces the management team to invest more time and resources necessary for the proper operation of the

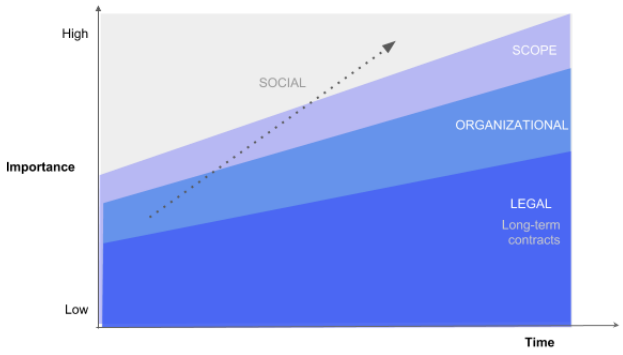


Figure 46 - Conclusion on perception of risk categories

project -usually with long learning curves periods.

Conclusion 3: Legal/commercial risks are mainly related to contractual terms and conditions. This kind of risks considerably increases when NACO enters into long-term contracts (as the case for Abu Dhabi and Taiwan), and it's even more augmented due to different interpretations of the contract referred not only to the use of language but also as a general lack of knowledge.

Some respondents expressed their need to improve legal knowledge among NACO colleagues by fully understanding how contracts are written down to reduce as much as possible misinterpretations of the contracts and to be aware on how to respond to claims made by the client. For the specific case of Taiwan, achieving contractual terms and negotiating scope of changes were major tasks for the management team and often nearly impossible situations to negotiate with the client; this is highly related to the organizational structure and political influence of the project and the country itself.

It is noteworthy that the combination of scope, organizational and legal risks is considered of utmost importance to respondents due to the inherent complexity of megaprojects and to the enormous difficulty of translating the scope of work intended for the project into legal terms. Therefore this has a big influence in the management of the contract along the lifecycle of the project.

Conclusion 4: Surprisingly, risks related to Economic/Financial were ranked in two out of four projects (Taiwan and Mexico) in the middle part of the ranking with relative medium to low importance. For the case of Taiwan this tendency matches while considering legal risks at the highest level of the ranking and having a long-term contract. Interviewees explained that

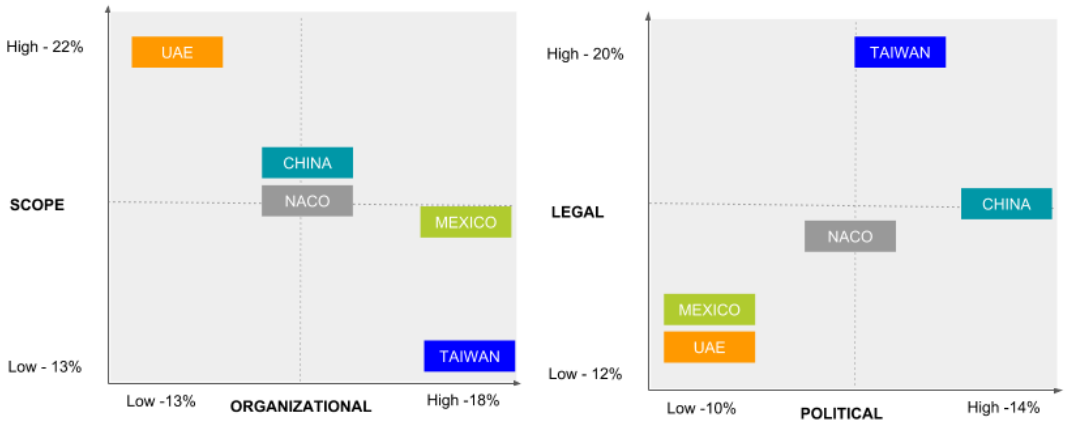


Figure 47 - Comparison of risk categories founded in case studies

macroeconomic factors such as foreign exchange, taxes and inflation can be discussed beforehand and addressed in the contract. However, the risks increases when scope changes come to play and the contractual terms are not truly developed for this purpose. Therefore, the contract is also considered as a tool used to control, reduce or even avoid economic and financial risks.

The analysis of subcategories of risks by breaking down its composition reveals that economic and financial are also important factors among the interviewees, and explained on the following subcategories 'cash flow issues' and 'delay in the payments processes', but they are somehow less important while confronting this category with others like scope and organizational.

Conclusion 5: There is a debatable perspective of several risks (political, technical and social) in the middle ranking of importance. Megaprojects are 'political-sensitive' as they are usually considered on the top three major infrastructural projects of the country/region. Interviewees explained that there is always a high political tension because all eyes are on the project. This is also reflected on the timespan and budget of the project; for example Mexico project is fully driven by the elections and government changes expected for 2018; for China project the case was similar because the project was developed for the 2008 Olympic Games. Respondents also mentioned that political risks are related to scope risks because the latter are related to an specific budget usually funded by public parties, therefore any changes on this regard have to be analyzed, and most of the times challenged, thorough the political structure of the project.

Conclusion 6: after analyzing each subcategory of risks the interviewees indicated that the level of complexity related to technical and technological risks is considered in 3 out of 4 projects as profoundly significant. These risks are related to the technological uncertainties and the dynamics and uniqueness of the projects. Interviewees explained that this kind of risk is highly related to the definition of scope; and considered that technological and technical aspects should not be considered as a given factor for megaprojects, remarking that in multiple cases the projects are designed as prototypes totally ignoring the local practices and the differences between technological developments within the countries. Therefore, those risks should be accounted during early phases of the project.

6.1.2 Cultural aspects

SQ3: How can cultural aspects influence the risk management in megaprojects?

The cultural analysis executed in this research considered the premise that “culture only exists by comparison” (Hofstede et al., 2010). As previously explained in section 3.2.2, in order to understand the daily life of megaproject and its implications in terms of risks it is important to consider differences and similarities at a cultural level, explained into two main levels: national and organizational level. Hence, the researcher first analyzed the cultural differences found in the batch of projects, given that the impact of risks can be analyzed.

Conclusion 7: Comparing Dutch culture –vs- projects culture
Our first approach to the understanding of cultural influence was by asking the interviewees if the project analysed would have been as successful or complex, if it had been developed in the Netherlands in cooperation with Dutch companies only.

Surprisingly, the response from participants has a divided opinion without a strong bias: 57% of the respondents considered that the projects could have been less complex due to considering the insufficient level of experience and knowledge of the client extremely required to pursue a–fast track–project with the expected level of complexity. On the other hand, 43% of the interviewees answered that they see no change in the complexity or successfulness of the project, explaining that this kind of megaprojects cannot be executed in The Netherlands due to level of complexity and magnificent, and most importantly, they highlighted the extremely important features of decision making structure, type of leadership and hierarchical structure required for the execution of megaprojects. They mentioned that these three factors are considerably different in the four projects analyzed in comparison to The Netherlands.

Therefore respondents recognize, at first sight, notable distinctions between two main cultural dimensions: Power distance as a dimension that detonates decision making process to create a smooth-simple or more tedious process; and Masculinity as a cultural dimension that influence the management style of the project.

Conclusion 8: Recognizing cultural dimensions

Cultural theory regarding Hofstede dimensions has been previously known by only 21% of the respondents. After providing a brief introduction to the Hofstede theory, 100% of the interviewees considered important cultural differences among parties because they have an impact on three main topics: impact on the decision making process (24%), impact on how people work together (18%); an equal percentage (15%) for the impact on the communication process and understanding and respecting each other.

The information obtained during the interviews match with the theoretical framework previously studied referring to the great level of decision making required in megaprojects, which is also part of the apparent complexity as studied by various authors -Brockmann and Girmscheid (2007) Flyvbjerg et al. (2003); Flyvbjerg and Cantarelli (2013). Thus, being more sensitive of this kind of complexity can be essential to reduce and/or provide a better understanding of megaprojects.

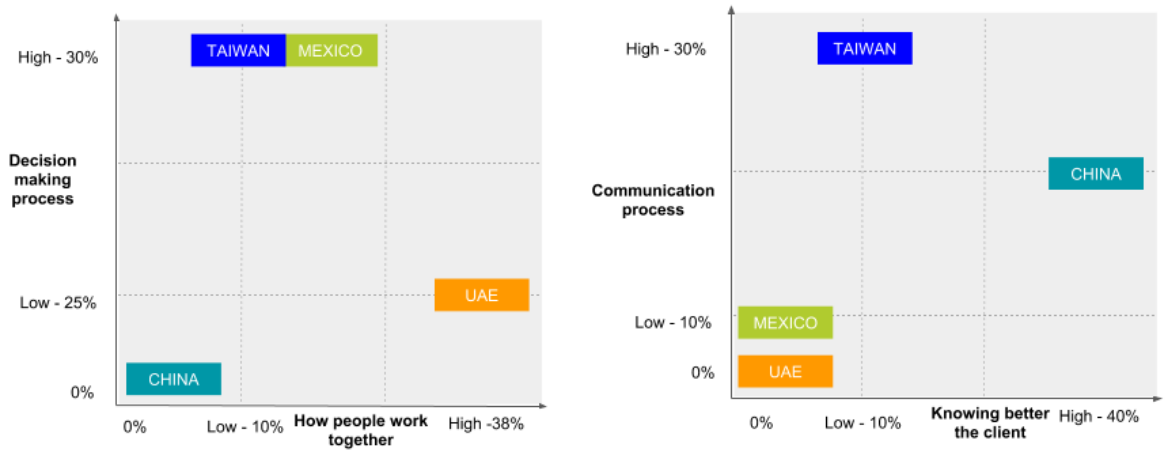


Figure 48 – Conceptual framework of the impact of cultural aspects per project

It is notable that the impact of cultural differences is perceived different in each project, hence having different consequences (previously explained in Figure 39 and Figure 40). For three out of four projects -UAE, Mexico and Taiwan- there is a major impact on 'decision making process' and on the way 'how people work together'. Contrary to this perspective, in China project, the impact is considered more relevant for 'knowing better the client' since this is perceived as the first task at the beginning of the project. The aforementioned conclusion is presented graphically in the figure above.

Conclusion 9: Power distance is always a risk

Not surprisingly, there was a notable distinction to consider 'Power distance' as the most important cultural dimension for 59% of the respondents, followed up by Masculinity (18%), as well as Individualism (12%). Uncertainty avoidance and long term orientation have been scored with a very low percentage (6%), lastly indulgence has not been considered (see Figure 41).

Similarly to conclusion 8, after analyzing each project separately we can deduct that respondants from Mexico, Taiwan and China projects consider power distance (PDI) as the most important cultural dimension. This behavior is in accordance with the Hofstede scores considered for Mexico and China as a very power distance countries (80 and 81, respectively). Similarly, it has also been highly important for Taiwan but in a lower scale, also corresponding with Hofstede score considered (58).

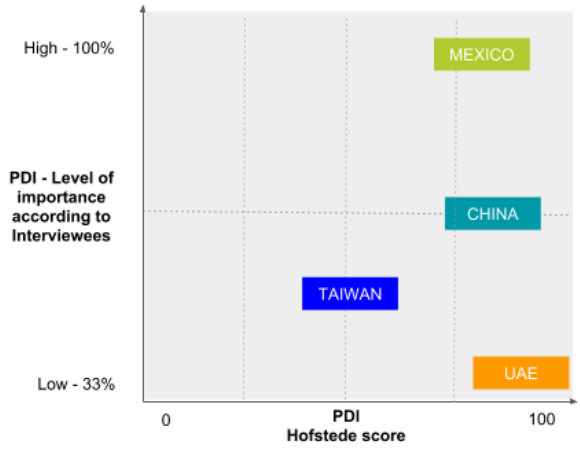


Figure 49 - PDI importance per project according to interviewees

However, although the highest score in PDI among the four projects is in UAE (90), the most important dimension recognized by the interviewees was masculinity. Of course it is well known that in Arab countries the influence of power distance is notable; however, this condition was explained by the interviewees -as a special case in UAE- where the mix of multiple nationalities play an important role in the project. They added that their approach to this dimension at an organizational/project level is in opposition with Hofstede scores, because they are always encouraging people to speak freely and tend to create a team-environment where people can speak freely and discuss openly and take decision consensually –more feminine approach. So, taking decision with a hierarchical position reduces the team effort and the motivation to pursue better solutions to the project.

Interviewees from Taiwan project compared PDI and MAS with a behavior that could be easily found in The Netherlands, the noted that differences have an influence on the communication process and the way decisions were taken. They mentioned that junior positions are afraid to

speak, so this is a big risk for the project because there are situation that can be prevented but due to the combination of these two dimensions it's nearly impossible to discuss them, consequently sometimes they have to adopt a position opposite to its principles to avoid as far as possible sever conflicts.

For China, the case was a little bit different. Additionally to the high PDI influencing the communication and trust relationship among parties, the respondents considered that uncertainty avoidance (UAI) was also an important cultural dimension for this project. The combination of these two cultural dimensions is important to the technical and technological conception of the project, on one hand NACO is requested to provide innovative solutions but in the other hand the client is less open to discuss the proposals.

This phenomenon can be related to the Confucian's principles studied by Hofstede. One of the most important Confucian principles is harmony found in the maintenance of "face". For the particular case of Chinese culture, the influence and impact of "face" or "losing face" as a mode of social organization is quite important, and certainly, rooted in its culture.

Reconsidering the previous points, if we analyze power distance dimension from a more social perspective, we can imply that for Chinese culture it might be difficult to match their willingness for innovation and uncertain situations with the Confucian principle of "face". This situation was also recognized and explained by the interviewees as a difficult situation to manage in the project because, in one hand, Chinese people required innovative solutions; but on the other hand, they are trying to avoid as much as possible "losing face" and avoid embarrassing (at a personal and social level) resulting to some extent contradictory.

If we consider NACO's perspective rooted on its Dutch culture, commonly based on a more open and direct communication and management style, meanwhile for Chinese, it's important to be aware of respecting and honoring hierarchical positions among the members of the project. This difference can be explained by the relationship between PDI and Confucian principles encountered in some of the projects. In practice, this phenomenon might represent a more closed communication process and a lack of feedback loops among the client and the joint venture strongly necessary for this kind of projects. Therefore, it might be required to create a different environment and follow a different management style in order to comply and respect each culture.

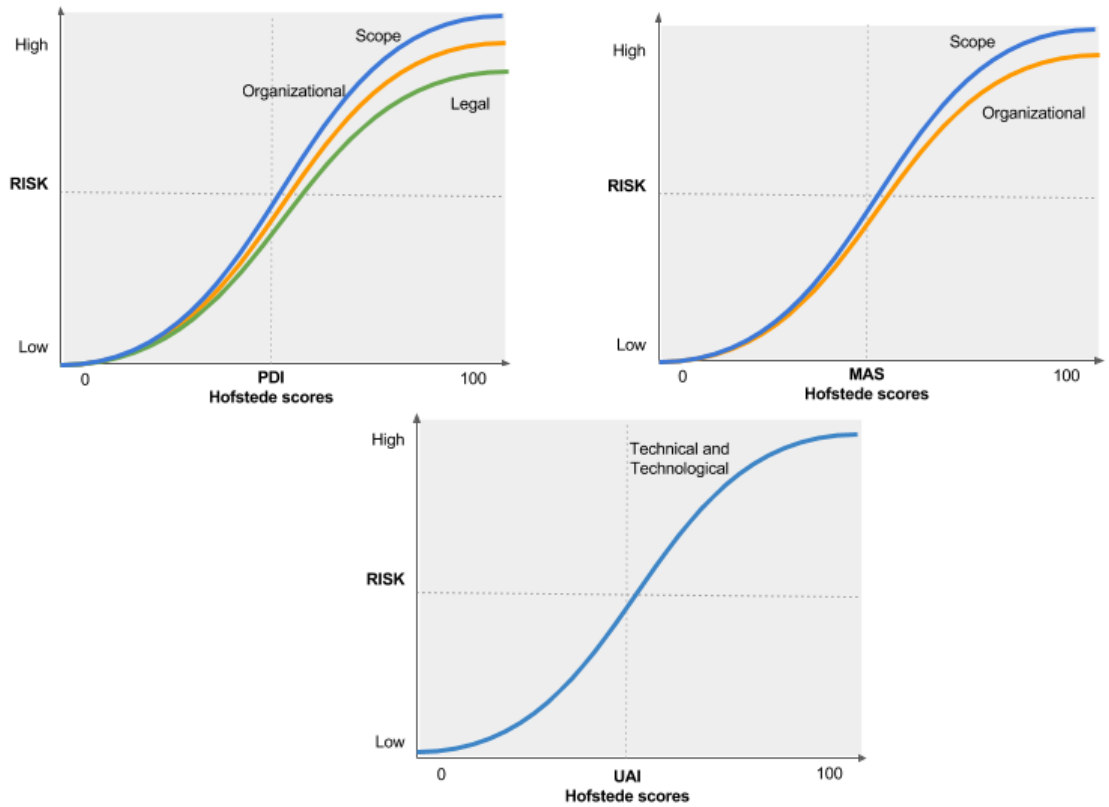


Figure 50 – Conceptual framework to provide conclusion on the relationship between cultural aspects and risk categories

Conclusion 10: LTO as an impact on long-term contracts

As previously mentioned, power distance has a major impact on the risks identification process. Similarly, long term orientation (LTO) figures as an important cultural dimension in three of the projects. This case was specially analyzed in Taiwan project. The interviewees extensively discussed, according to their experience in the project, that Taiwan is a very short-term oriented country opposing Hofstede score (93).

Long term contracts as the case for Taiwan should be considered, despite the redundancy, from a long-term perspective and reasonably accepts that changes (mostly scope changes) might occur during the duration of the contract. Long-term contracts are highly vulnerable to have changes on scope. Therefore, LTO is related to the scope risks determined for the project and the type of contract agreed.

Considering what mentioned by Hofstede et al. (2010), LTO initially named as “Confucian dynamism”, explained that in Asian countries (as China and Taiwan) having a highly score in this dimension means being a more pragmatic culture in which traditions might easily be transformed in order to be better prepared for the future, and having a strong commitment to achieve results and persevere until achieve the expected results. This can be contradictory with the low score in Uncertainty avoidance for China which means welcoming innovative solutions with a certain level of controlled risks to comply its Confucian principles and not ‘losing face’ highly undesirable. Thus, while entering into a long-term contract with Asian cultures the aforementioned might be considered as they represent implications on the decision making process when choices are made to go through a safer way.

In this context, while confronting Hofstede long term scores versus legal risk category percentages analyzed in the case studies, the researcher can provide some interesting conclusions.

As previously mentioned, terminal airport projects usually involve long-term contracts –with duration of more than 3-5years. Therefore, the assumption might be that countries with the highest scores in this dimension (meaning long-term oriented) might have lower legal risks as they are better prepared to manage such long-term projects and its associated legal risks. However, according to the interviewees this phenomenon is variable as the countries scoring high in this dimension present the highest scores in the legal risks while countries with a more short-term orientation present lower percentages (see Figure 51**Error! Reference source not found.**). This effect might perhaps correspond to the explanations found during the interviews related to and enhanced by the influence of other cultural dimensions such as high PDI and high UAI.

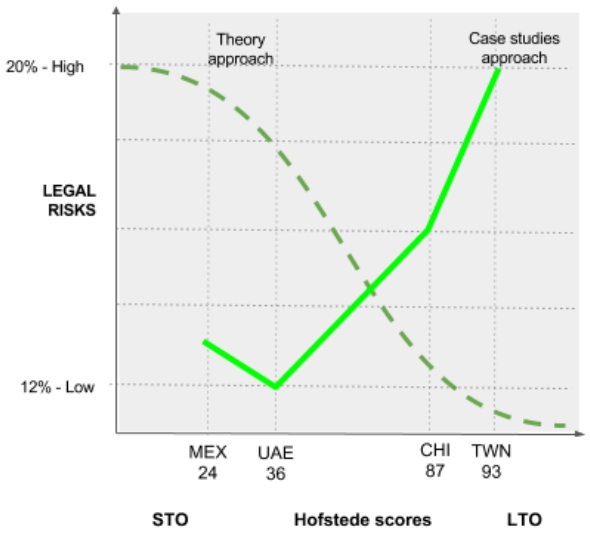


Figure 51 - LTO cultural dimension -vs- Legal risk category

Interviewees particularly mentioned the difficulty for managing the change orders in the project, first due to the rigidity of PDI

structure embedded in the project causing delays in the decision making process where people at medium and lower levels in the organization are not allowed to take decisions. Secondly, they referred to UAI in the sense that the client consider that the scope should always be fixed during the entire lifecycle of the project; this have major consequences, as for example, a decrease on the level of involvement of the team and seeking better solutions for the project in order to avoid as much as possible the tortuous management path, and lack of open communication.

SQ4: What benefits can be identified while considering the influence of cultural aspects in the risk management?

First of all, 100% of the interviewees considered that cultural differences have an impact on the *risks* that can be identified on the projects. Despite this fact, they consider difficult to understand to what extent, and find a way to measure and/or quantified the impact.

Most of the interviewees referred to an impact on time invested in the management of the team, which in turn requires additional costs and increased use of resources. Furthermore, they explained that knowing beforehand the implications of cultural differences some risks might be avoided or, at least, reduced as they serve as a preventive tool (know what to expect). In general, interviewees explained the importance of being aware of cultural differences and similarities because it encourages more active communication, avoid conflicts, and improve the management of the project.

Conclusion 11: Understanding cultural aspects on a risk management –identification- perspective

All the interviewees considered relevant the use of cultural dimensions in the identification of risks in future projects due to three main factors: they create awareness(20%), it is supposed that the adaptation process required while entering to a new project could be easier and smooth (17%), and it helps you know better the client (13%). Besides these three benefits, interviewees also mentioned some other implications –in level of importance: ‘proactive attitude towards work’, ‘helpful for contracts conditions’, ‘help profiling the risks’, ‘improve communications’, ‘impact on how decisions should be taken’ and ‘effect on future proposals’.

Therefore, since NACO is always working on an international environment and managing “multicultural contracts’’, the level of cultural understanding should be considered in the risk

identification process. Nearly 80% of the interviewees considered that cultural aspects should be added as a risk category at the middle of the ranking. The remaining 20% considered that cultural aspects are embedded in the each of the main risk categories, or according to them, culture is a very personal thing that cannot be ranked as a main category.

6.1.3 NACO

SQ5: How does the understanding of these cultural aspects can help NACO?

To provide insightful conclusions to NACO, the researcher will make use of the suggestion made by Karen Smits (Smits, 2016) concerning the implications of cultural aspects into the core values of NACO as an interesting point to compare cultural factors encountered in the projects they worked on.

NACO has a notably feminine and low power distance profile truly reflected on their core values as follows (HaskoningDHV, 2016):

- Brightness: innovate to anticipate future needs, enable others to achieve more.
- Integrity: care about clients, staff and society as a whole; commitments to long term relationships by taking responsibility and integration.
- Team spirit: pro-active, open and inclusive approach; encourage dialogue and welcome questions.

As can be observed there are notable differences in NACO core values in comparison with the cultural profiles of the projects analyzed in this research. Considering what Yeganeh and Su (2006) mentioned, this situation might represent an impediment to organizational effectiveness, as the cultural profile of NACO as a company is -sometimes- in opposition to the projects' cultural profile (see Figure 20). On one hand, this configuration might lead to unrelated or conflictual situations. But also, (in some cases) might benefit the course of the project. On this respect interviewees agreed that keeping a more flexible behavior and not too rigid perspective of their own values is essential for the management of megaprojects, and considered that cultural differences might help them to react and response to certain situations, as well as reduce tension situation with the client.

As mentioned by Anribi et al. (2009), managers of multi-cultural project teams can increase their effectiveness and their firm's competitiveness by making use of cultural literature. By being more culture sensitive, risks associated with organization and legal (contractual terms) might be potentially reduced, and scope changes could be better managed and/or established since the contractual negotiations.

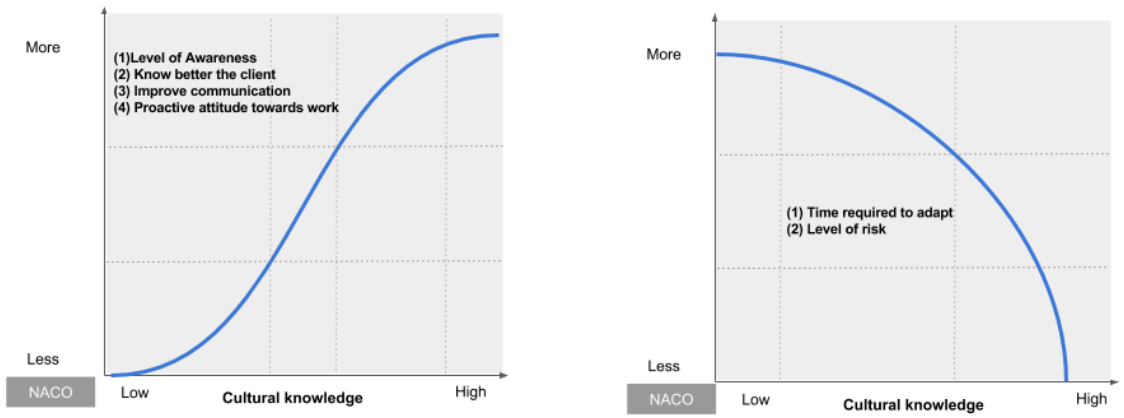


Figure 52 - Impact of cultural knowledge for NACO

6.1.4 Conclusion on main research question

To conclude, the five sub questions indicated the relations between the cultural phenomena and the risk management –particularly risk identification for four megaprojects studied as formulated in the main research question:

'How can considering cultural aspects help the risk management in megaprojects?'.

Based on these results, it is important to consider cultural aspects on the risk identification process of megaprojects. Undoubtedly there are some exciting implications to use them for future projects as they reduce the level of uncertainties related to management practices, improves the communication, the level of complexity can be better understood, and most important the understanding of cultural differences and similarities should be considered as a powerful tool to

reduce, avoid or better manage some kind of risks such as organizational, scope, and legal/commercial.

With this in mind, knowing beforehand the cultural differences and similarities could bring more creativity to the projects, reduce the frustrations among the team members and conceive a more effective and respectful environment since early phases of the project. In my opinion, there are more opportunities to be considered as accurately explained by Interviewee-UAE03 “Cultural differences are important, because it gives both parties the opportunity to learn from each other and see a different way of working or living. It challenges you to accept and understand other culture and find a way to deal with them”.

The organization need to be aware that this type of research based on their own data can be useful for further projects, and can be a trigger to improve the employees knowledge on issues related to risk and cultural phenomena.

6.2 Recommendations

In order to support the use of cultural aspects as a tool to improve the risk management in megaprojects, the first requirement is to properly execute a risk management process. To achieve this some recommendations are given:

1. **Risk management at an early phase**

“Risk is a burden but also an opportunity” (Bank, 2013)

Risk management means identifying and managing uncertainties that might impact the delivery of projects’ objectives. Therefore, my recommendation is to execute formal risk management processes for all the projects and keep updated measurements of time planning and resources through the lifecycle of the project. It is also important to include clear assignment of responsibilities to the most capable person to manage each risk. As suggested by nearly all of the risk standards analyzed in section 3.2.1, try to involve the project management team and key stakeholders at an early phase of the project, and always keep a two-way communication and information sharing system to promote the recognition of new and emerging risks.

2. **Include cultural aspects on the agenda as stated by Smits (2016)**

Lesson learned 1 – Start the recognition of cultural aspects at an early phase of the project

Lesson learned 2 – Keep an open mind and culture of open dialogue

Lesson learned 3 – Keep a proactive attitude instead of challenging –be active on improvements.

Lesson learned 4 – Governance of megaprojects is always difficult, even more difficult if the country has a different cultural profile.

Lesson learned 5 – Personally, I consider more important to understand what make us similar instead of what makes us different.

Lesson learned 6 – Cultural aspects are an opportunity to learn from each other.

3. Continuous learning process

Despite all the interviewees are generally in contact and challenged by different cultures, it is important to provide them proper tools and encourage their knowledge to identify and understand specific behaviors. Thus, a cross-cultural training can be useful to understand culture dynamics of the other parties; it might also enhance efficiency of the project, and definitely be less frustrating when encountering unfamiliar behaviors.

7. Reflections and Significance of Research

As a personal reflection, I found the combination of these two different but complementary subjects as very interesting, difficult, and undoubtedly, quite challenging. In spite of this, the current research fulfills the initial gap of knowledge initially planned as it provide recommendations on how to understand the combination and impact of cultural phenomena in the risk management of megaprojects.

The researcher is fully aware that the findings obtained from this study cannot be easily transformed in a new theory but are presented to provide a starting point for further research. It is important to recognize that the research considered a set of four different projects sharing the same level of complexity, expectations, opportunities and risks, and in most of the cases their cultural profile was in opposition with the one embedded in NACO (as purely Dutch). Therefore it would be interesting to perform the same research on projects that present greater cultural similarities to the Dutch to understand –in a more deeply way- the relationship between risk and culture.

In my perspective, there is always room to improve the present research, and moreover, to provide new and more interesting lines for further research. Some aspects of the research could have been more helpful if they have been more practical or translated in terms of the well-known iron triangle affecting any kind of project. Indeed, the recommendations provided in the present research are intended to be considered as an initial exploratory approach which opens a new interesting gap of study to quantify the impact of the use of cultural theory on the impact of risk perhaps in terms of time, money and resource use.

Certainly cultural risks are difficult to understand and even more difficult to measure, quantify and allocate contingency budget for this purpose. Nevertheless, I truly believe that they can be measured if the project management team is able to trace back all the change orders, or even better to quantify and control at an early phase of the project, all the changes originated by an organizational, social and cultural categories related as for example the time delays wasted by a difference in decision making styles or different communications process. By executing this kind of analysis we can be able to quantify, or at least, to understand in term of cost and time all the events and changes arising from cultural differences during the project.

Additionally, much of the risk analysis carried out for these kinds of megaprojects are performed from a purely economic standpoint and totally ignoring other aspects (such as social and cultural). The project manager team usually finds many difficulties at the organizational level most of which are not considered from a risk perspective from the beginning of the project, and rather are always considered and analyzed once the project is running.

Often this represents great loss of time and cost but may be inherent to this type of project could also be better controlled through better and more comprehensive risk management. This is where the cultural aspects come into play and play an important role. The importance of considering the specific characteristics of each project according to its environment, own cultural profile, and own set of risks certainly will make a difference.

When considering the profile of the project from a cultural and organizational perspective, it provides the project management team a better way of implementing and monitoring the project since its inception, helping to create better communication, contribute to the creation of best practices for decision-making, reduced adaptation times, becoming more proactive and reducing the level of stress that could be develop along the lifecycle of the project.

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Appendices

Appendix a - Risk management standards

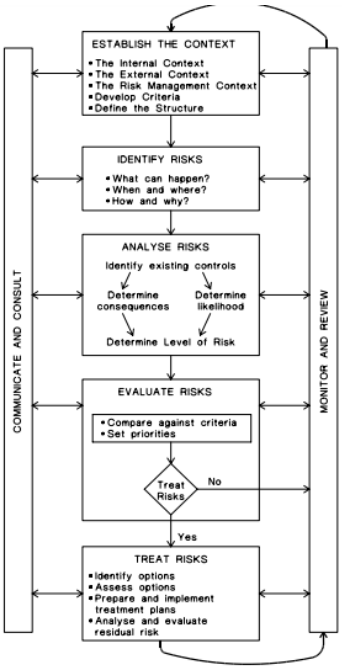


FIGURE 3.1 RISK MANAGEMENT PROCESS – IN DETAIL

Figure 53 - Risk management process AS-NZS-4360:2004

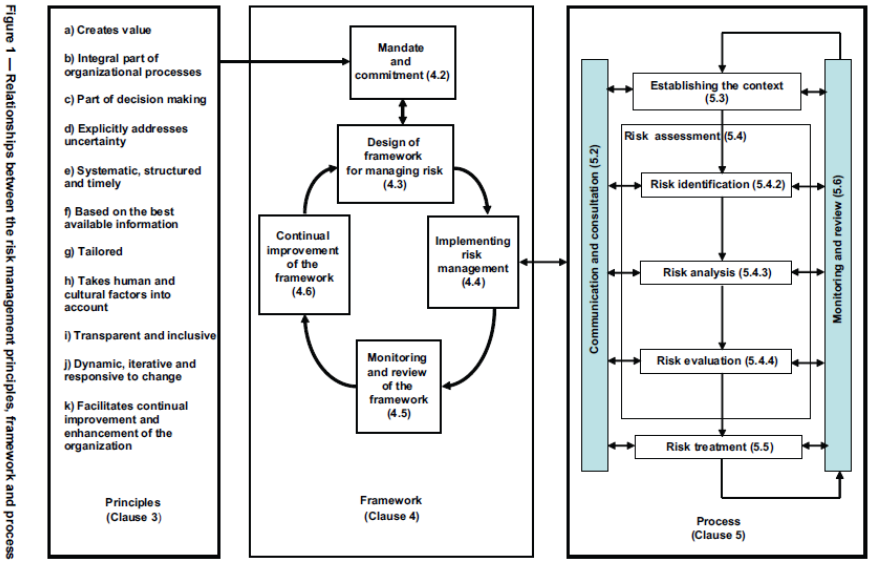


Figure 54 - Relationships between the risk management principles, framework and process according to AS/NZS ISO 31000:2009 (retrieved from OB/7, 2009)

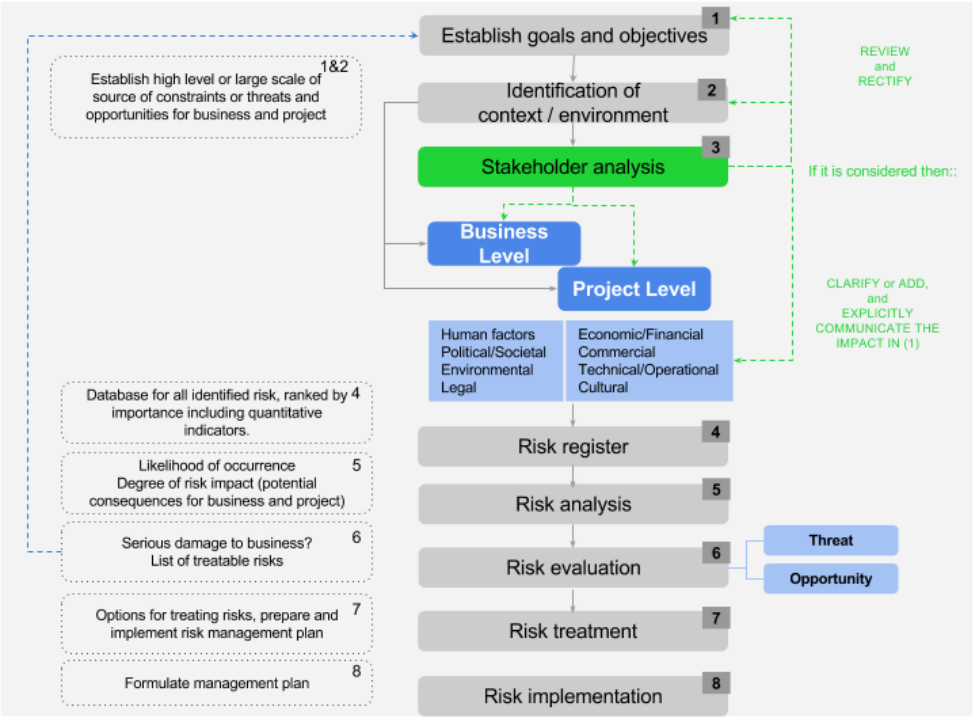


Figure 55 - Project Risk Management according to British Standard 6079-3:2000 (adapted from BSI, 2001)

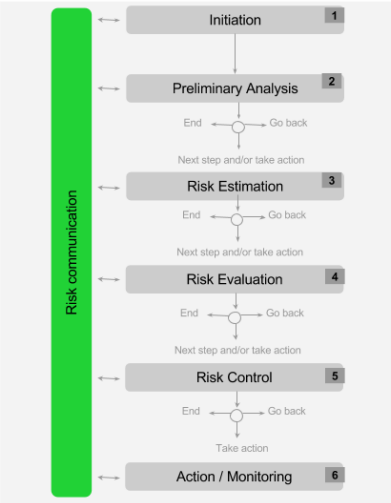


Figure 56 - Risk Management: Guideline for decision-makers according to Canadian Standard Association (adapted from CSA, 1997)

Figure 57 - Risk management process according to FERMA (retrieved from FERMA, 2002)

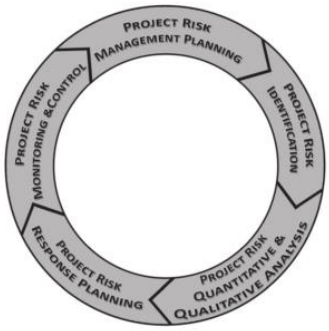


Figure 1.2. Project risk management process.

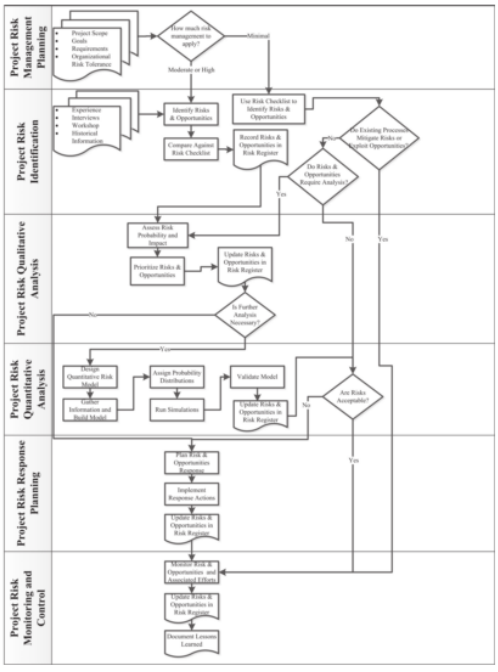


Figure 2.1. Project risk management flowchart.

Figure 58 - Project risk management process according to ACRP Report 116 (retrieved from ACRP, 2014)

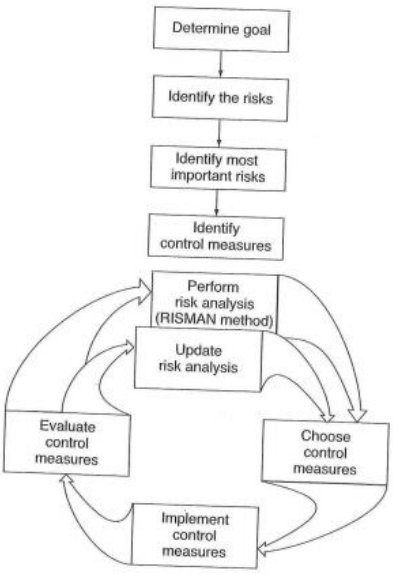


Figure 59 - RISMAN Method (Well-Stam et al., 2004)

Appendix b – Risk category general support

Row Labels	ACRP	AS/NZS 4360:1999	BS 6079-3:2000	CAN/CSA-Q850-97	FERMA	KPMG	NACO	RISMAN	Grand Total
ECONOMIC/FINANCIAL	**2**	**1**	**6**	**1**	**6**	**1**	**1**	**2**	**20**
Changes in tax or tariff structure			1						1
Credit					1				1
Exchange rate fluctuation			1						1
Failure to meet revenue targets			1						1
Financial							1		1
Foreign exchange					1				1
Funds availability	1								1
Industry changes					1				1
Inflation			1						1
Interest rate					1				1
Interest rate instability			1						1
Liquidity and cash flow					1				1
Market conditions	1								1
Shortage of working capital			1						1
LEGAL/COMMERCIAL	**10**	**1**	**12**		**4**	**1**	**2**	**1**	**31**
Collapse of contractors			1						1
Competition					1				1

Contractors	1				1
Contracts			1		1
Contractual terms and conditions	1				1
Cost-time overruns		1			1
Country (of implementation)				1	1
Failure of suppliers to meet contracts		1			1
Failure to achieve satisfactory contractual arrangements		1			1
Increased cost of revenue collection		1			1
Insolvency of promoter		1			1
Insufficient capital revenues		1			1
Legal / Contractual				1	1
Loss of intellectual property rights		1			1
Management under performance		1			1
Permitting	1				1
Procurement process	1				1
Property acquisition	1				1
Public relations	1				1
Regulations			1		1
Regulatory changes	1				1
Suppliers			1		1
Suppliers and vendors	1				1
Under performance to specifications		1			1
Unexpected regulatory controls		1			1

Unforeseen inclusion of contingent liabilities			1						1
ORGANIZATIONAL	**5**	**1**	**5**		**2**	**1**	**1**	**1**	**16**
Board composition					1				1
Customer	1								1
Inadequate authority			1						1
Individual or group interests			1						1
Interfaces	2								2
Lack of clarity over roles and responsibilities			1						1
Management competence and practices			1						1
Poor leadership			1						1
Process							1		1
Supply chain					1				1
POLITICAL	**1**	**1**	**4**			**1**		**1**	**8**
Change of government			1						1
Failure to obtain appropriate approval			1						1
Higher than anticipated compensation costs			1						1
Political	1								1
War or disorder			1						1
SAFETY & SECURITY	**8**	**1**	**1**	**1**	**6**	**1**	**1**	**1**	**20**
Country (of implementation)							1		1
Employees (as hazard to)					1				1
Environment					1				1
Environmental	1								1

Natural disasters			1					1
Natural events				1				1
Products & Services (as hazard)				1				1
Properties				1				1
Public space (as hazard)				1				1
Safety	2							2
Security	2							2
Site conditions	2							2
Weather	1							1
SCOPE	**2**			**2**	**1**	**1**		**6**
Customer changes				1				1
Customer demand				1				1
Requirements	1							1
Scope definition	1							1
Scope/Resourcing						1		1
SOCIAL		**2**	**6**	**1**	**3**	**1**	**1**	**1**	**15**
Country (of implementation)						1		1
Culture				1				1
Errors or omissions by poorly trained employees				1				1
Human behavior		1						1
Human error / incompetence			1					1
Human Resources					1			1
Individual activities		1						1

Intellectual capital					1				1
Nationalization			1						1
Perceptual errors regarding risk			1						1
Personality clashes			1						1
Poor staff selection procedures			1						1
Professional negligence			1						1
Recruitment					1				1
Social / community-related								1	1
TECNHICAL / TECHNOLOGY	**4**	**1**	**2**	**1**	**1**	**1**		**1**	**11**
Complexity	1								1
Design	1								1
Inadequate design			1						1
Performance failure			1						1
Quality	1								1
Research & Development					1				1
Grand Total	**32**	**8**	**36**	**4**	**24**	**8**	**7**	**8**	**127**

Appendix c - Supportive figures

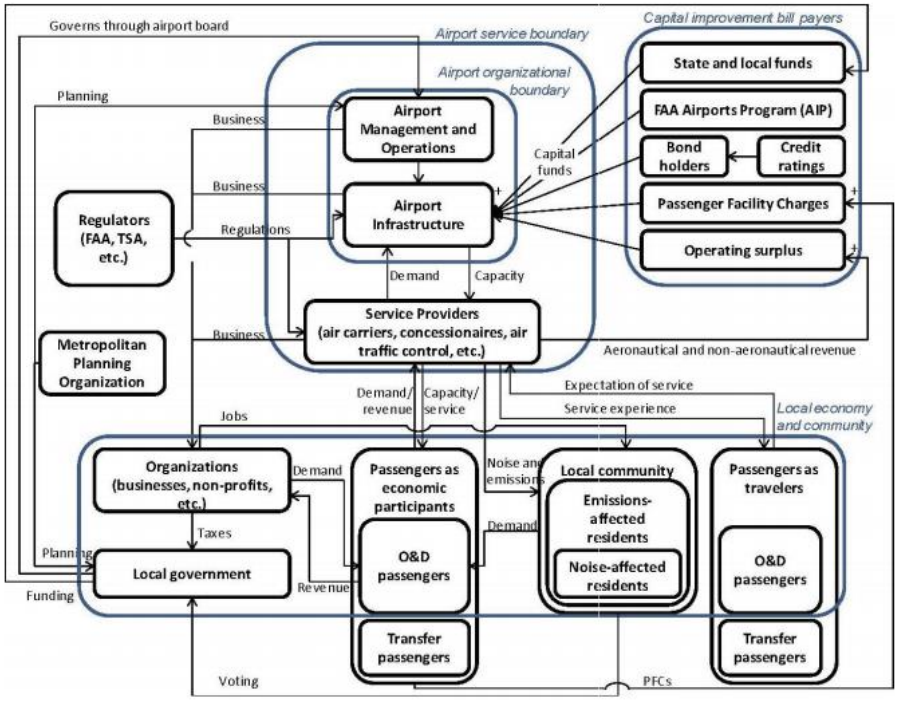


Figure 60 - Analysis of Airport Stakeholders: Financial, customer, and other relationships between airport stakeholders. (Retrieved from ACRP, 2015)

Appendix d - Interview guideline

Introduction

My name is Adriana Garcia. I'm studying Construction Management and Engineering at the Faculty of Civil Engineering at TU Delft. As part of my graduate studies I am researching the impact of cultural phenomena in the risk management process of megaprojects (specifically Terminal Airports). For this study, a sample of four case studies was selected including: China, Mexico, Taiwan, and United Arab Emirates.

The purpose of this study is to analyse the impact of cultural phenomena in the risk management process and provide recommendations that contribute to (1) understand the risk management process by using the aforementioned sample of projects; (2) understand which category (types) of risk are more important according to each project; (3) investigate if cross-cultural topics affect the risks found in that projects; and (4) investigate the applicability of cultural theory on practice and for future projects.

Preconditions

1. The interview takes about 45min – 1 hour.
2. The interview consists of both open and closed questions.
3. Use of data: the information obtained during the interview will be treated as confidential and anonymous. All personal information, such as names of interviewees, will not appear in any publications.
4. To prevent valuable answers lost the interviews will be audio recorded. The researcher is the only person with authorized access to the recordings, after transcription the sound will be destroyed.

Interview sections

This interview consists of five sections: general context, risk management, risk identification, cultural phenomena, and -if time allows- model usefulness check.

Context (5 -10min)

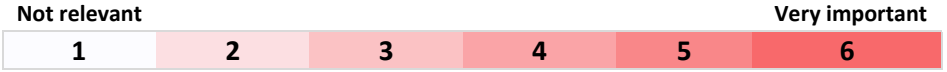
First, I will ask you some general questions about your background, your role within NACO (as organization), and the project.

1. What is your role within NACO organization?
2. What is your role in the project?
3. How long have you been involved in NACO organization and in the project?
4. Questions related to general aspects of the project. Please explain briefly the following:
    - Organizational structure of the project: relationships, nationalities, official language of the project.
    - To whom does NACO is directly reporting to? (main client)
    - Can you mention other main relationships within the project? (other interesting relationships and stakeholders)

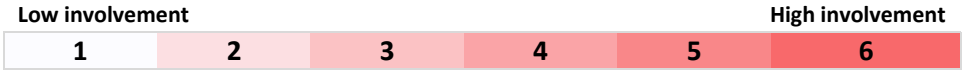
We now continue to the second part of the interview. In this part we are going to discuss topics related to Risk Management, with a special focus on "Risk Identification" (threats and opportunities).

RISK MANAGEMENT PROCESS IN GENERAL (10 min)

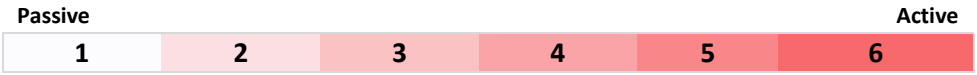
5. At what stage of the project do you think the risks are higher?
6. On a scale from 1 to 6 (with 1 being not relevant and 6 for very important), how do you consider the importance of using a risk management process during the phase where the risks are higher?



7. Are you familiar to the Project Risk Log (PRL) used in the company? Yes/No (If yes continue to question 8, if not go to question 9).
8. On a scale from 1 to 6 (with 1 being low involvement and 6 high involvement) how were you involved in the process to develop the Project Risk Log (PRL)?



9. On a scale from 1 to 6 (with 1 being passive and 6 for active) how do you consider your awareness to identify risks in the project?



a. Do you make a clear evidence of them ("flag the risks")? Who to inform? What to do?

10. Are there any other mechanisms or processes that have been adopted in the project for dealing with risks? When they were used? By whom? Please explain further.

Now we are going to move on to the risk identification analysis. According to a previous literature research, the following risk categories and subcategories were found. In this section of the interview, we would like to understand the ranking of each category ***according to each project.***

RISK IDENTIFICATION (15 min)

11. Considering the following table containing eight categories of risk, please rank them from 1-8 according to which categories **appear so far in the project** (with 1 being the most important and 8 the less important).

No.	Main Risk Category	Ranking (1-8)
A	ECONOMIC/FINANCIAL Macro and micro economic factors (Exchange rate fluctuation, inflation rates, interest rates, market conditions).	
B	LEGAL/COMMERCIAL Contractual terms and conditions, Procurement processes, Regulatory systems.	
C	ORGANIZATIONAL Stakeholder management, interface management, Lack of clarity over roles and responsibilities (leadership and management).	
D	POLITICAL Political conditions in the country, project subject to strong political approval and backing, periodic funding approvals.	
E	SAFETY & SECURITY Related to the environment and possible health losses, significant risks to personnel and property.	
F	SCOPE Project scope defined adequately in sufficiently detail.	
G	SOCIAL Related to human behaviors and human resources (competences & staff selection procedures).	
H	TECNHICAL / TECHNOLOGICAL Maturity of technology and adequacy of design according to the project, level of complexity.	

12. Considering the following sub category of risks, please determine on a scale of 1-6 how important are **they for your project** (with 1 being not relevant for the project and 6 very important)

			Not relevant					Very important
No.	Main Category	Subcategory	1	2	3	4	5	6
A	ECONOMIC / FINANCIAL	· Macroeconomic factors: foreign exchange, inflation, taxes						
		· Interest rate instability, Liquidity and cash flow						
B	LEGAL / COMMERCIAL	· Contractual terms and conditions (Failure to achieve satisfactory contractual arrangements)						
		· Procurement process (competition)						
		· Regulatory changes and controls						
C	ORGANIZATIONAL	· Strong interface management process (Individual or group interests)						
		· Management competence and practices (Lack of clarity over roles and responsibilities)						
		· Poor leadership: Board composition, Inadequate authority						
D	POLITICAL	· Change of government						
		· Failure to obtain appropiate approval						
		· Periodic funding approvals						
E	SAFETY & SECURITY	· Employees safety & security (integrity)						
		· Hazard environment -Site conditions-						
F	SCOPE	· Scope definition: adequately in sufficient detail						
		· Customer changes, demand and requirements						
G	SOCIAL	· Human Resources: Poor staff selection procedures, poorly trained employees.						
		· Human behaviour: Personality clashes, Perceptual errors regarding risk						
H	TECNHICAL / TECHNOLOGY	· Level of complexity						
		· Maturity or technology						
		· Inadequate design						
			1	2	3	4	5	6
			Not relevant					Very important

After analysing the main risks (threats and opportunities), we are going to start with the cultural analysis. The interviewer will start the analysis with the following question:

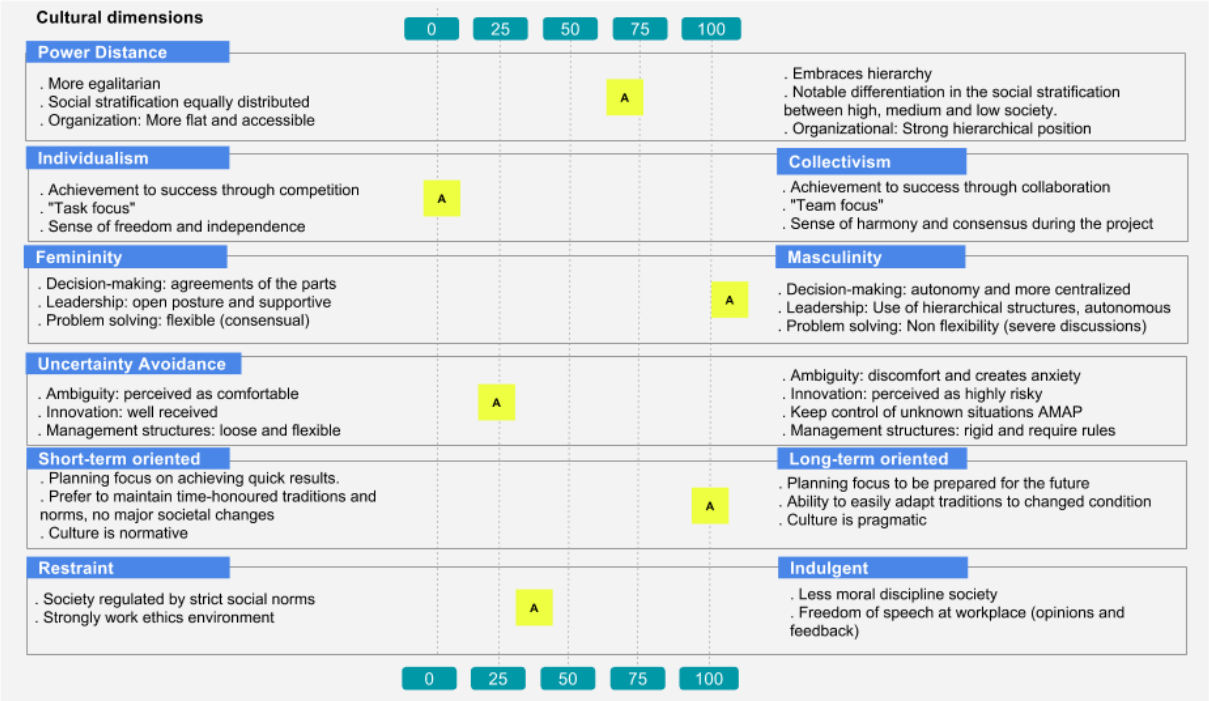
13. Do you believe this project would have been as successful or complex, if it had been developed in the Netherlands in cooperation with Dutch companies only?

CULTURAL PHENOMENA (25-30 min)

"Culture only exists by comparison"

In this section, the interviewer will introduce the cultural dimensions theory. By providing extreme examples of one (or more) cultural dimensions comparing -for example- Netherlands and the project that it's being analyzed.

Provide a brief introduction to the theory (see figure below).



Based on what has been explained in the figure above:

14. Do you consider important the cultural differences among parties? Yes/No, and why?
15. Which cultural dimension do you consider the most important for the project analysed?
16. Do you think that those cultural differences have an impact on the risks that can appear during the project?

17. On a scale from 1 to 6 (with 1 being not relevant and 6 for very important), could you please identify which cultural dimension do you find **more relevant to the risk identification process**? And why?

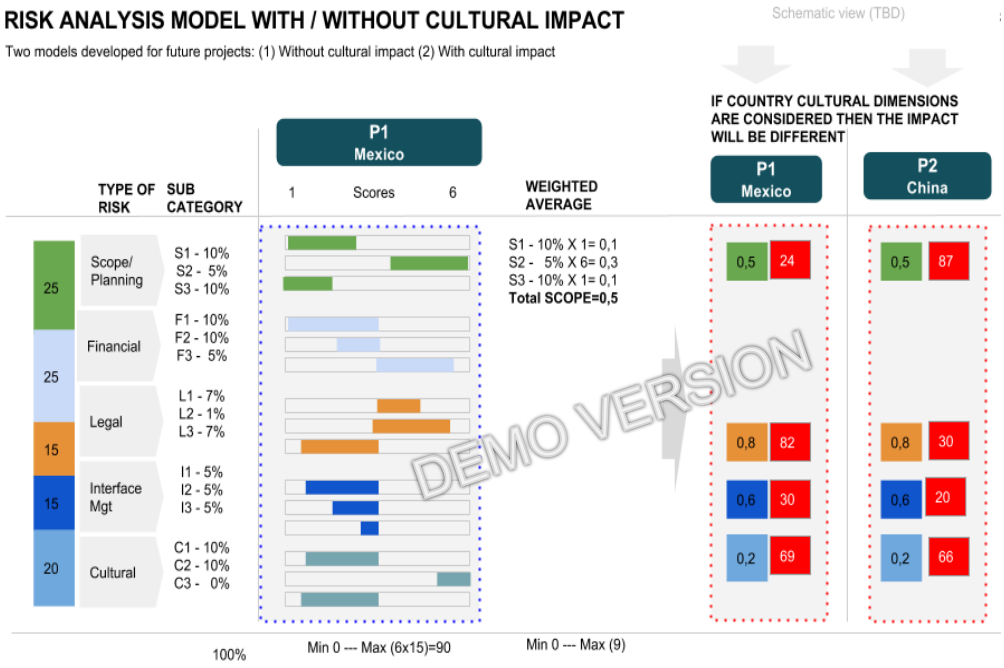
	Not relevant					Very important
Cultural dimension	**1**	**2**	**3**	**4**	**5**	**6**
Power Distance						
Individualism / Collectivism						
Masculinity / Femininity						
Uncertainty Avoidance						
Long / Short-term Orientation						
Indulgence / Restraint						

18. Could you mention some example from your experience within the project in which the cultural differences were important to identify risks?
19. Would you consider relevant to use the cultural differences (dimensions) in the identification of risks in future projects? Yes/No, and why?
20. Going back to question 11, if you could add culture (cultural aspects) as a risk category, in which position within the main risk category would you rank it?

MODEL USEFULNESS CHECK

If time allows it, the researcher will show, and briefly explain, the conceptual cross cultural risk management model to the interviewee. My proposal is to create a Project risk category that considers the impact of cultural differences.

21. Would you consider this kind of model useful? And why?
22. Do you have any advice to improve it based on your experience?



END OF THE INTERVIEW

Finally, is there any questions you had expected, but I have not asked during the interview? Do you have any other final comment? As previously mentioned, the results of this interview will be processed as anonymous. If you are interested in the result, I can send you the final report.

Thank you for your participation.

Appendix e - Interviews analysis supportive excel tables

Table 7 - Support data for Figure 34 – Main categories of risks according to interviews

Row Labels	Sum of CHINA	Sum of MEXICO	Sum of TAIWAN	Sum of UAE	Sum of Total
SCOPE	18%	16%	13%	22%	17%
ORGANIZATIONAL	16%	18%	18%	13%	16%
LEGAL / COMMERCIAL	16%	13%	20%	12%	15%
POLITICAL	14%	10%	13%	11%	12%
TECNHICAL / TECHNOLOGICAL	13%	11%	8%	16%	12%
ECONOMIC / FINANCIAL	15%	13%	7%	14%	12%
SOCIAL	5%	14%	14%	5%	10%
SAFETY & SECURITY	5%	6%	6%	7%	6%
Grand Total	**100%**	**100%**	**100%**	**100%**	**100%**

Table 8 - Support data Figure 35 – Breakdown of categories of risks according to its weighted score

Row Labels	Sum of China	Sum of Mexico	Sum of Taiwan	Sum of UAE	Sum of Total
EC/FIN	**15%**	**13%**	**7%**	**14%**	**12%**
Interest rate instability, Liquidity and cash flow	5%	7%	5%	8%	6%
Macroeconomic factors: foreign exchange, inflation, taxes	10%	6%	2%	6%	5%
LEG/COMM	**16%**	**13%**	**20%**	**12%**	**15%**
Contractual terms and conditions (Failure to achieve satisfactory contractual arrangements)	5%	5%	8%	4%	6%
Procurement process (competition)	7%	3%	6%	3%	5%
Regulatory changes and controls	4%	4%	6%	4%	5%
ORG	**16%**	**18%**	**18%**	**13%**	**16%**
Management competence and practices (Lack of clarity over roles and responsibilities)	6%	6%	7%	4%	6%
Poor leadership: Board composition, Inadequate authority	4%	6%	5%	4%	5%
Strong interface management process (Individual or group interests)	6%	6%	6%	4%	6%
POL	**14%**	**10%**	**13%**	**11%**	**12%**
Change of government	3%	4%	4%	4%	4%
Failure to obtain appropriate approval	7%	3%	5%	4%	4%
Periodic funding approvals	4%	4%	5%	4%	4%
S&S	**5%**	**6%**	**6%**	**7%**	**6%**
Employees safety & security (integrity)	2%	4%	3%	4%	3%
Hazard environment -Site conditions-	3%	3%	3%	4%	3%
SCP	**18%**	**16%**	**13%**	**22%**	**17%**
Customer changes, demand and requirements	8%	8%	7%	12%	8%
Scope definition: adequately in sufficient detail	10%	8%	7%	10%	9%
SOC	**5%**	**14%**	**14%**	**5%**	**10%**
Human behavior: Personality clashes, Perceptual errors regarding risk	2%	7%	7%	2%	5%
Human Resources: Poor staff selection procedures, poorly trained employees.	2%	7%	7%	2%	5%
TECH&TECH	**13%**	**11%**	**8%**	**16%**	**12%**
Inadequate design	3%	3%	3%	5%	4%
Level of complexity	6%	5%	3%	6%	5%
Maturity of technology	4%	3%	2%	5%	3%
Grand Total	**100%**	**100%**	**100%**	**100%**	**100%**

Table 9 - Support data Figure 36 - Top subcategory of risks per project

Row Labels	China avg	Mexico avg	Taiwan avg	UAE avg	Total avg
EC/FIN	**8,0**	**7,5**	**8,5**	**8,0**	**8,0**
Interest rate instability, Liquidity and cash flow	2,7	4,0	5,8	4,7	4,4
Macroeconomic factors: foreign exchange, inflation, taxes	5,3	3,5	2,8	3,3	3,6
LEG/COMM	**10,3**	**10,5**	**14,0**	**11,7**	**11,7**
Contractual terms and conditions (Failure to achieve satisfactory contractual arrangements)	3,3	4,5	5,5	4,0	4,4
Procurement process (competition)	4,7	2,8	4,0	3,3	3,6
Regulatory changes and controls	2,3	3,3	4,5	4,3	3,7
ORG	**13,3**	**14,0**	**13,0**	**14,0**	**13,6**
Management competence and practices (Lack of clarity over roles and responsibilities)	4,7	4,8	5,3	4,7	4,8
Poor leadership: Board composition, Inadequate authority	3,3	4,5	3,8	4,7	4,1
Strong interface management process (Individual or group interests)	5,3	4,8	4,0	4,7	4,6
POL	**6,0**	**8,3**	**14,0**	**13,7**	**10,8**
Change of government	1,3	3,0	3,8	4,3	3,2
Failure to obtain appropriate approval	3,0	2,3	5,3	4,3	3,8
Periodic funding approvals	1,7	3,0	5,0	5,0	3,8
S&S	**6,7**	**4,0**	**5,5**	**6,3**	**5,6**
Employees safety & security (integrity)	3,0	2,3	3,0	3,0	2,8
Hazard environment -Site conditions-	3,7	1,8	2,5	3,3	2,8
SCP	**7,7**	**9,3**	**9,5**	**11,3**	**9,6**
Customer changes, demand and requirements	3,3	4,5	4,8	6,0	4,7
Scope definition: adequately in sufficient detail	4,3	4,8	4,8	5,3	4,8
SOC	**7,3**	**8,8**	**8,3**	**7,0**	**7,9**
Human behavior: Personality clashes, Perceptual errors regarding risk	3,7	4,5	4,0	3,3	3,9
Human Resources: Poor staff selection procedures, poorly trained employees.	3,7	4,3	4,3	3,7	4,0
TECH&TECH	**10,3**	**11,8**	**12,0**	**15,7**	**12,6**
Inadequate design	2,7	3,5	4,5	5,0	4,0
Level of complexity	4,7	5,0	4,3	5,7	4,9
Maturity of technology	3,0	3,3	3,3	5,0	3,7
Grand Total	**69,7**	**74,0**	**84,8**	**87,7**	**79,7**

Table 10 - Support data Figure 36 - Top subcategory of risks per project

Row Labels	CHINA	MEXICO	TAIWAN	UAE	Grand Total
EC/FIN	**5,3**		**5,8**		**11,1**
Interest rate instability, Liquidity and cash flow			5,8		5,8
Macroeconomic factors: foreign exchange, inflation, taxes	5,3				5,3
LEG/COMM	**4,7**		**5,5**		**10,2**
Procurement process (competition)	4,7				4,7
Contractual terms and conditions			5,5		5,5
ORG	**10,0**	**9,5**			**19,5**
Strong interface management process	5,3	4,8			10,1
Management competence and practices	4,7	4,8			9,4
SCP		**4,8**		**6,0**	**10,8**
Customer changes, demand and requirements				6,0	6,0
Scope definition		4,8			4,8
TECH&TECH	**4,7**	**5,0**		**5,7**	**15,3**
Level of complexity	4,7	5,0		5,7	15,3
Grand Total	**24,7**	**19,3**	**11,3**	**11,7**	**66,8**

Table 11 - Support data Figure 39 – Impact of cultural differences

Impact on	%
Decision making process	24%
How people work together	18%
Understanding and respect each other	15%
Communication process	15%
Knowing the client better	12%
Problem solving process	9%
Making the risks clear for all	6%
Leadership style	3%

Table 12 - Support data Figure 40

Values	Decision making process	How people work together	Communication process	Knowing the client better	Making the risks clear for all	Leadership style	Problem solving process	Understanding and respect each other	Grand Total
China	0%	0%	20%	40%	20%	0%	20%	0%	100%
Mexico	30%	20%	10%	0%	0%	10%	10%	20%	100%
Taiwan	30%	10%	30%	10%	10%	0%	0%	10%	100%
UAE	22%	33%	0%	11%	0%	0%	11%	22%	100%

Table 13 - Support data Figure 41 - Most important cultural dimension per project

Cultural dimension	China	Mexico	Taiwan	UAE
PDI	67%	100%	43%	33%
MAS	0%	0%	14%	67%
IND	0%	0%	29%	0%
UAI	33%	0%	0%	0%
LTO	0%	0%	14%	0%
IDG	0%	0%	0%	0%

Table 14 - Support data Figure 43 - Breakdown cultural dimension influence on risk identification process

Cultural dimension	China	Mexico	Taiwan	UAE
PDI	21%	21%	21%	20%
IND	18%	19%	14%	18%
MAS	21%	13%	14%	23%
UAI	19%	18%	18%	11%
LTO	12%	19%	21%	17%
IDG	10%	10%	13%	12%

Table 15 - Support data Figure 44 - Importance of using cultural theory to the identification of risks in future projects

Factors	CHN	MEX	TWN	UAE	Total
Create awareness	14%	40%	25%	10%	20%
Adaptation process could be easier	14%	20%	25%	10%	17%
Knowing better the client	29%	20%	0%	10%	13%
Improve communication	14%	0%	0%	20%	10%
Help profiling the risk	14%	0%	13%	10%	10%
Helpful for the contracts	0%	0%	13%	20%	10%
Proactive attitude towards work	14%	20%	13%	0%	10%
Impact on how decision should be taken	0%	0%	13%	10%	7%
Effect on future proposals	0%	0%	0%	10%	3%

Table 16 - Support data Figure 45 – Risk categories after cultural analysis

Risk category	Original ranking	Final ranking
SCOPE	17%	15%
ORGANIZATIONAL	16%	15%
LEGAL / COMMERCIAL	15%	13%
CULTURAL	0%	11%
ECONOMIC / FINANCIAL	12%	11%
POLITICAL	12%	10%
TECNHICAL / TECHNOLOGICAL	12%	10%
SOCIAL	10%	9%
SAFETY & SECURITY	6%	5%