IDENTIFYING AND MANAGING RISK IN MEGA-PROJECTS: THE CASE OF AUTOMOTIVE TEST CENTER PROJECT IN TURKEY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION
IN
THE DEPARTMENT OF BUSINESS ADMINISTRATION

SEPTEMBER 2019

Approval of the Graduate School of Social Sciences

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ABSTRACT

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September 2019, 106 pages

The issue of risk assessment in projects has attracted considerable attention in both practice and the literature. Although the number of studies investigating large-scale engineering projects (construction, rail system projects, power plants, etc.) has been increasing, majority of them focus on private sector. In this thesis, it is specifically focused on a current, mega-project where both governmental and private organizations participate, namely the Automotive Test Center Project carried out in Turkey. This megaproject is investigated in three steps: i) risk identification, ii) risk assessment/ measurement, and iii) risk management stages. Furthermore, due to the heterogeneity of the parties involved, risk perceptions of different stakeholders are also examined. Adopting a single case study approach, data is collected via three main sources: archival data, survey data with 47 respondents, and five detailed interviews conducted with the main governmental contractor.

Keywords: Project Management, Risk Management, Risk Identification, Risk Assessment, Risk Perception

ÖZ

MEGA PROJELERDE RİSK BELİRLENMESİ VE YÖNETİMİ:
TÜRKİYE'DEKİ OTOMOTİV TEST MERKEZİ PROJESİ ÖRNEĞİ

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Yüksek Lisans, İşletme Bölümü
Tez Yöneticisi: Dr. Öğr. Üyesi Melek Akın Ateş
Eylül 2019, 106 sayfa

Projelerde risk değerlendirmesi konusu hem uygulamada hem de literatürde büyük dikkat çeken bir konu olmuştur. Büyük ölçekli mühendislik projelerini (inşaat, raylı sistem projeleri, enerji santralleri vb.) inceleyen çalışmaların sayısı artmış olmasına rağmen, bunların çoğu özel sektöre odaklanmaktadır. Bu tez çalışmasında, özellikle kamu ve özel kuruluşların katıldığı güncel bir mega projeye, yani Türkiye'de gerçekleştirilen Otomotiv Test Merkezi Projesi'ne odaklanılmıştır. Bu kapsamda bahse konu megaproje üç adımda incelenmiştir: i) risk tanımı, ii) risk değerlendirmesi/ölçümü ve iii) risk yönetimi aşamaları. Ayrıca, projedeki ilgili tarafların heterojenliği nedeniyle, farklı paydaşların risk algıları da bu çalışma kapsamında incelenmiştir. Tek vaka çalışması yaklaşımı benimsenen çalışmada veriler; arşiv verileri, 47 katılımcı ile gerçekleştirilen anket verileri ve projenin ana kamu yüklenicisi çalışanlarıyla gerçekleştirilen ayrıntılı beş görüşme olmak üzere üç ana kaynaktan toplanmıştır.

Anahtar Kelimeler: Proje Yönetimi, Risk Yönetimi, Risk Tanımlama, Risk Değerlendirme, Risk Algısı

To My Beloved Family

ACKNOWLEDGEMENTS

Since my childhood, I always encouraged myself about achieving the most impossible things in order to have better life conditions, to have a bright career and to make my family proud of my achievements. I achieved many different things throughout my life, but I must confess that this one was the hardest challenge of my life. Now, it is time to thank all these people who facilitated this study:

First and foremost, I would like to express my gratitude to my thesis supervisor Assist. Prof. Dr. Melek Akın Ateş for her endless guidance. She provided beneficial and crucial feedbacks throughout my studies with her great experience and knowledge. Besides, she encouraged me with her great patience whenever I was lost or hopeless about my thesis.

My ex-colleagues and managers at Turkish Standards Institution deserve special thanks for their contribution to my thesis as well. They lightened my burden about this study with their great opinions, deep contributions for data collection processes and support since the beginning of my graduate studies.

I would like to thank all my friends for their patience and understanding throughout my thesis studies. Especially my dear classmates from METU MBA Class of 2018 were the witnesses of my sleepless nights at METU Library for the last two years, but now I am very happy to see that we achieved this all together with a great success.

Last but not least, my beloved parents, my sister and my girlfriend deserve the most special thanks for their endless love and support throughout my long education life. They never stopped believing in me and always encouraged me for new challenges in my life. I cannot imagine how I would achieve them all without their presence, love and support. You are my heroes forever. Thank you all, love you all!

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CHAPTER 1

INTRODUCTION

Projects, by the definition, are the temporary efforts undertaken of the groups or companies in order to create a unique product, service, or result (PMI, 2017). These unique products and/or services are managed by the group of people in the organizations as universities, public organizations and private companies. In order to create these unique products or services, this process should be managed meticulously by the owners, decision-makers as well as the project group members. The reason behind of this meticulous effort is that the projects contain within themselves the risk element. This element may occur as of the very beginning of the project, during the project, and even after the finalization of the project.

Megaprojects, which are the quite bigger scale of the regular projects contain the risk factors since they are completely different from regular projects in terms of their levels of aspiration, stakeholder involvement, lead times, complexity, and impact (Shenhar and Holzmann, 2017). Megaprojects are mostly offered for the benefit of the societies since they strike the use of large masses in the world. Therefore, the risk management of such projects become more crucial and has high level of importance to be able to function properly.

The Automotive Test Center Project is one of the megaprojects which is commissioned by the Turkish Government to Turkish Standards Institution and this megaproject has numerous stakeholders, high level of aspiration by the government and the automotive sector, very high level of complexity

by size, budget, experience and know-how and a huge impact for Turkey and the other regional countries.

There are several types of foreseeable and unforeseeable risk factors for each and every project, and unfortunately there is not any contractor that can manage all the probable major risks on a project (PMI, 2017). Therefore, risk identification, risk assessment, risk mitigation concepts become much more important for having healthier results for any type of projects.

In the case of the Automotive Test Center Project, there are various risk factors likewise the other megaprojects have. For the initial phase of this specific project, these risk factors are classified under some titles as governmental, economic, organizational, technical and social risk factors. The main contractors of the project must be aware of all these factors and try to avoid of all possible risk factors with a detailed risk management study.

1.1. Research Questions

The Automotive Test Center Project is a governmental project which is initially started in early 90s. The project had many changes including the location of the project, the managers, decision-makers, ministers and even the governments. After three decades, some efforts and decisions are made by the main contractors, but there is no specific risk management study for the project for years. Therefore, the main research question of the study is as follows:

> **"What are the significant risk factors that affect governmental mega projects?"**

After the determination of the significant risk factors for the governmental mega projects in the case of Automotive Test Center, in other words, after the risk definition; as the next step of the risk management, risk assessment approach should be applied for the projects. Thus, another research question of the study is as follows:

"To what extent risk factors affect governmental mega projects?"

Assessment of risk factors provide some inputs for dealing with risk factors of the projects. At this level of the risk management, risk mitigation methods will be developed by the main contractors by taking those risk factors into account and manage the initial phase of the project. However, at this point, in order to have better outcomes for the risk assessment, the risk perception of all stakeholders should be examined. Chapman and Ward (2003) suggest a risk management framework that includes perspective of stakeholders and other affected parties for a project. Hence, the last research question of the study is as follows:

"What is the risk perception difference between the main contractors and the stakeholders of governmental mega projects?"

1.2. Research Objectives

In this part of the study, the main objectives of the thesis will be presented in two different perspectives, which are theoretical and managerial objectives.

1.2.1. Theoretical Objectives

Project management is a very crucial topic for big organizations, for sectors and even for the governments. On the other hand, the importance of managing risk is increasing significantly day by day as well, hand in hand with the developing technologies and arising uncertainties in our everyday life. It is a fact there are many successful and unsuccessful projects realized by different organizations in different countries. Because of the scale of the megaprojects, huge amount of money is spent for their realization and undesired outcomes result in waste of money, time, effort and reputation for the organizations.

In the literature, there are some studies that focus on large engineering projects and their basic risk factors (Miller & Lessard, 2001) and the relationship management for public-private partnership (PPPs) type of projects (Zou, Kumaraswamy, Chung & Wong, 2014). However, this study focuses on megaprojects that are driven by the governmental organizations and aims to fill the gap in the project risk management literature.

Additionally, the Automotive Test Center Project has various stakeholders from public and private organizations both in national and international level. Therefore, this thesis study strives for understanding the risk perception of a megaproject's stakeholders from different countries and different levels. Thus, the gap in the literature about the relationship management for governmental organizations and the other stakeholders will be filled.

1.2.2. Managerial Objectives

The main contractors of the Automotive Test Center Project have been conducting the project with the decisions of the decision-makers, however there is no concrete risk management plan for this large-scale governmental project. This study aims to give a clue for the managers of the Automotive Test Center Project in order to prevent from potential risk factors and it will be provided by the risk definition phase of the study.

After the data collection process, in other words, after the risk assessment process, it aims to provide beneficial outcomes and raising awareness about probable risks for the decision makers. On the other hand, these results might be applicable for other governmental megaprojects and might be beneficial for the other projects managers in the world.

Additionally, stakeholders' analysis provides insight about the risk perception of the stakeholders for the Automotive Test Center Project. Most of the stakeholders are the end-user or the know-how provider of the project but different perspectives regarding to the project will give strong clues about their approach to the project.

1.3. Research Methods

In this master's thesis study, with the purpose of meeting the objectives, survey research is utilized as the research method and questionnaire was conducted for data collection. The questionnaire is prepared based on a literature review. An initial scan of the literature made by the researcher, both manually and electronically, using several predefined search terms: 'megaprojects,' 'large-scale projects,' 'risk identification,' 'complex projects,' 'risk,' 'uncertainty,' 'risk assessment' and 'risk perception'.

The data are collected from the main contractors and the stakeholders of the Automotive Test Center Project. These stakeholders are mostly the organizations that are operating in automotive sector both in national and international level, and the governmental organizations in Turkey, France, Spain and South Korea. The target group of the survey study are the employees and managers, who are/were the members of the Automotive Test Center Project. Afterwards, an interview study is performed with the members of the main contractors to be able to represent their ideas and perspectives about the results of the survey study as an anecdotal evidence.

CHAPTER 2

LITERATURE REVIEW

In this part of the study, a broad literature review is performed. The first part of the literature review consists of the main concepts of complexity and uncertainty for the project management with the explanation of their importances and effects on projects. In the second part; project risks, "black swan concept" and risk assessment processes and contributions for the decision-making processes of the projects are explained. In the last part, the concept of "mega projects" is examined and explained by utilizing the previous concepts on these special projects. Some mega project examples are analysed and "Automotive Test Center Project" is scrutinized by using the concepts complexity, uncertainty and risk.

2.1. Risk Concept

2.1.1. Project Risk in Project Management Literature

The concept that affects the success of the projects is the phenomenon called risk. Risk has very different definitions for the different areas of the life such as economic, financial, social and political aspects. However, the term risk is a common matter of fact for project management and has an important influence in all projects. The simplest and easiest definition of risk is made by (Aziz & Munir & Sufian, 2018) and the risk is essentially defined as the possibilities of forfeiture and/or uncertainty.

The Society for Risk Analysis (SRA) has made various general qualitative descriptions of risk: (a) the probability of an inopportune occurrence, (b) the potential for realization of undesirable, negative results of an event, (c) disclosure to a proposition (e.g. the occurrence of a loss) of which one is unknown, (d) the results of the activity and related uncertainties, (e) uncertainty about and severity of the results of an activity regarding something that individuals value, (f) the occurrences of some definite results of the activity and related ambiguities, (g) the deviation from a reference value and related ambiguities (SRA, 2015a).

The subject of risk currently plays a significant role in the design, advancement, operation and management of modules, systems and configurations in many types of industry. Generally, the problem of risk occurs wherever there exist a potential resource of harm or damage, for instance, a hazard (threat), to a point, e.g. individuals or the nature. Under these circumstances, safety measures are typically formulated to prevent the incidence of the harmful conditions, and protections are emplaced to protect from and alleviate its linked unwanted results. The existence of a hazard does not serve itself to identify a situation of risk; indeed, essential in the latter there is the ambiguity that the risk translates from possibility to real damage, sidestepping safety measures and protections (Aven and Zio, 2011).

Probability is thought as the main aspect for the risk, but other methods and techniques may be applied and helpful when realistic possibilities cannot simply be determined or concerted. For situations depicted by big and “profound” uncertainties, there seems to be wide recognition of the necessity for spotting beyond probability (Aven, 2016).

2.1.2. Risk Management Concept

Prior to looking into latest developments in principal risk management theories and strategies, it is useful to evaluate two well-established elements of risk management: available risk management strategies and the composition of the risk management procedure.

For the first element, three main strategies are frequently used to manage risk: risk-informed, cautionary/precautionary and discursive approaches (Renn, 2008; SRA, 2015b). Aven (2016) explains the risk-informed strategy as that implies to the treatment of risk – prevention, reduction, transfer and retention – using risk assessments in an outright or comparative way.

For the second element, the process can be broken down into the following stages (consistent with what can be found in standards related to the risk issues such as ISO 31000: Risk Management and most risk analysis textbooks: e.g. Aven, 2015a; Meyer & Reniers, 2013; Zio, 2007a):

i. Creating context, in other words, to identifying the objective of the risk management operations and specify goals and principles.
ii. Defining conditions and events that can affect the activity and objectives defined like hazards, threats or opportunities
iii. Performing cause and effect analysis for these incidents, using some quantitative analysis techniques (e.g. Bayesian networks or tree analyses).
iv. Making assessments of the probability of the incidents and their outcomes and creating a risk description or categorization.
v. Assessing risk to be able to judge the significance of the risk.
vi. Treating the risk.

According to Althaus, Bridgman, & Davis (2007) the development and operation of policies are often structured by the following stages inspired by decision theory:

i. "Problem identification—the recognition of an issue that demands further attention
ii. Generating alternatives, analysis
iii. Processing covering aspects like policy instrumentation development, consulting, deliberation and coordination
iv. Decision-making
v. Implementation
vi. Evaluation (assessing the effectiveness)"

Aziz et al. (2018) assert that assessing risk is basically the visibility of dangers to the achievement of project. There is always a possibility that future risks can reason significant issues. Aziz et al. (2018) also claim that conflicts differ according to each knowledge area and the reason behind this difference is that each knowledge field has a different type of risks.

According to Aziz et al. (2018) in risk management, there are 6 concepts:

i. Identifying: Searching and locating risks before they occur.
ii. Analyzing: Building decision making information from each and every risk, studying its effect, time frame and possibility that also includes categorization and prioritizing of risks.
iii. Planning: Converting risk information into decisions and actions, then carry out these actions.
iv. Tracking: Risk indicators are scrutinized, and reduction actions are fully monitored.
v. Controlling: Adjustments in mitigation plan are managed.
vi. Communication: This also contains information and feedback interior and exterior to the project about risk actions, present risks and emergent risks.

2.1.3. Risk Assessment Factors

In project management, risks are assured, and they are inescapable. Aziz et al. (2018) defend that the probability of risks in development projects is generally very high since there is bunch of different opinions, backgrounds and preferences which might be associated with proficiencies in project or any other factors. Nature of the risks is generally very easy to be predicted and that may occur because of differences in values, needs, supplies, attitudes, expectations and characters.

Most of the times, the success and malfunction of project depends on risk. Aziz et al. (2018) claim that whenever there is ambiguity, chances of failures always exist. With the intention of reducing the probabilities of failures and improving the possibility of success, risk assessment is made as the part of project planning. According to Aven (2016), risk assessment might be evaluated as a tool used to represent and describe knowledge and lack of knowledge, and then other criteria need to be used to evaluate reliability and validity, and whether the assessment is a scientific method. Risk assessment includes risk identification, risk analyzing and risk prioritization.

In the risk management concept, risk assessment consists of different steps and the risk factors are classified according to different elements and the topics. According to Aziz et al. (2018), the first and most critical step of risk assessment is the identification of risk or uncertainties regarding to the project. The objective here is to detect risks without assessing them at this phase. To initiate risk assessment, initially recognize the potential risks in project which are related to the project management and functions of the organization or project. The best way to define the risk accurately, management should conduct the brainstorming session with all project stakeholders as the researcher applied in this thesis study. First of all, these

factors are planned and identified in general and specified framework. Next, qualitative and/or quantitative risk assessment is performed by using different methodology and as the final step, all these risks are taken under control and monitored by the project team members. All these steps are repetitive actions and may start from the beginning when it is necessary. In mega projects, this assessment process also helps to perform cost-benefit analysis and it is quite necessary since most of the factors are real-life issues that affect the project (Diéguez, Cazorla and Luque, 2014).

After the risk identification, the next step is followed by the risk analysis. Aziz et al. (2018) defend that the risks are assessed against two dimensions: probability and impact. Probability is the aspects of chances of happening of risk. Impact is the part of risk assessment includes what the effect of risk on organization and/or project. Impact of risk are divided into three categories. High impact: project managers are obliged to stop activities as a result of catastrophic effect. Medium: project manager may carry on with that risk, but it might affect the implementation. Low: the impact of this risk would be low and might be controlled easily. After assessing the risk, risks prioritization based on probability and risk impact with the risk classification matrix. Aziz et al. (2018) defend that such analysis helped to identify the importance of risk assessment in project success and its relationship with disputes arising throughout project development.

For getting extraordinary performance and efficiency, it is very important to do risk assessment meticulously and appropriately.

In light of this information, Automotive Test Center Project is examined under five main risk factors which are the natural results of being a governmental mega project. These risks may be classified as governmental risks, partnership and organizational risks, economic risks, technical risks and social acceptability risks.

2.1.3.1. Governmental Risk Factors

Governmental risks are the risk factors that are easy to define and identify, but it is hard to control since it is independent from the project stakeholders and the project itself. These legal/political risks are defined as the risks are arisen from the changes in the governing strategy of the country where the project is implemented as the actors of decision-making mechanisms, modifications and changes in governmental regulations (Diéguez et al, 2014). According to Liu, Zhu, Wang and Huang, (2016) legitimacy and procedure risk factors are used to make sure that the project complies with the existing laws, policies and regulations not to have any legitimate suspicion. Iyer and Sagheer (2010) classify the governmental risks in a few categories as direct/indirect political risks, legal risks and permit/approval risks. Direct/indirect risks are those directly arise on the changes in law, denial or revocation of licenses and indirectly may occur by arising out of a war, riot, terrorist or military attack, boycott and manifestations etc. Legal risks appear within the environment of where the project is implemented, such as local regulations and the rules of the local constitution. Permit and approval risks are mostly arising out of the approvals from the multiple institutions and organizations of the government and also bureaucratical actions of these institutions such as the lack of the coordination between the agencies. Giezen (2012) explains the governmental risks as the changing of the political actors related to the project such as the rotation of the actors or the possibility of their changes and bureaucratical risks that is directly related to the legal procedures to be followed by the project owners in order to avoid the possible threats about implementing the project without any problem. Miller and Lessard (2001) describes the governmental risks as the regulatory risk that not obtaining the necessary permits from the government and the sovereign risk, which is the possibility of that a government decides to renegotiate the all contracts, property rights or concessions.

2.1.3.2. Organizational Risk Factors

Partnership and organizational risks are the risk factors that are caused by the stakeholders, partners, managers, project team and the employees that play a role within the project. Diéguez et al. (2014) summarize these risks as contractual risks that are caused by equivocacy and the ambiguousness in the contracts and "swapping the horses in midstream", in other words, making some radical changes in the project scope during the project. Iyer and Sagheer (2010) elucidate these risks in two different categories as partnering risk that may be defined as the lack of structure with clear functional areas and the risks caused by the insufficient performances and the contributions of the project partners and stakeholders to the project. Schedule risk, which is defined as failing to finalize the project within some specific timelines, is also another element that they put forward about partnership and organizational risks. Miller and Lessard (2001) explains the term as an operational risk that is the probability of the non-materialization of the income flows in the future. The contractor selection risk, the lack of risk management expert risk, the schedule delay risk (Park et al., 2016), the risk of poor labour productivity, contract disputes between the parties and the lack of visibility of the project (Qazi et al., 2016) are the other elements of partnership and organizational risk factors.

2.1.3.3. Economic Risk Factors

Economic risk factors have a great importance for each and every phase of the projects and it may also cause crucial advantages and disadvantages for the stakeholders of the projects. Diéguez et al. (2014) disclose financial and economical risks as the financial limitations, availableness of the funds, exchange rates and long-run interest rates for megaprojects. Liu et al. (2016) explains the concept in two different approaches that the value of

the project land and the material price would create a pressure on the local SMEs psychologically, which is called as microeconomic impacts, and also the construction phase risks that would cause problem on the interests of the local producers or the actors on the sector. Iyer and Sagheer (2010) describes economical risks for the projects under three topics. First, the disarrangement of the equity and debt balance of the project, which is called as delay in financial closure risk. Second, not managing to conclude the project within the planned budget and the increase in prices in general terms. The last potential economic risk for the projects is called financial risk that contains the inflation, rapid changes in exchange and interest rates parameters. Giezen (2012) expresses the financial risks as undervaluing the project costs where Miller and Lessard (2001) explain the same risk related to the blindness to plan a satisfactory risk-sharing arrangement between the parties when the project provides a prudential return.

2.1.3.4. Technical Risk Factors

Technical risks are mostly related to the technological, administrative and technical elements of the projects. These risk factors are directly linked to the experiences and know-how level of the project team about the project management and the project itself. Diéguez et al. (2014) categorize technical risks for megaprojects under three main concepts as operation and maintenance risk, design risk and construction risk. Design risk is described as the risk that occurs during the planning period of the project regarding to the topics as the arrangement of contracts, plan and scope control, general design of the project and the delivery issues of the project. Operation and maintenance risk is characterized with the operation capacity, service quality and risks related to the economic viability of the project. Construction risks regarding to the projects are explained as the cost and budget overruns, schedule of the project, coordination and communication problem between the stakeholders and the improper design

of the project. Liu et al. (2016) discuss the technical risks under the name of feasibility risk, which is handled from the technical point of view, that the project is undergone a comprehensive review over its potential limitations such as financial regulations, labor support, material supply and positional limits. Iyer and Sagheer (2010) also describe technical risks as design and latent effect risk and technology risk, where unclear specifications and programs, mistakes and the failures in design, incorrect geotechnical and geological examinations stand for the design and latent effect risk and old-fashioned and inappropriate usage of technology in designing and construction phases of the project define the technological risk factors. Giezen (2012) defines technological risk factors as technology and know-how risk that covers the decisions to utilize a specific technology within the project and claims that project schedule may create a big pressure on the project management. Similarly, Miller and Lessard (2001) assert that technical risks that demonstrate their difficultness of engineering and novelty and most of those risks are natal in the technology and the design used at the project. They also claim that difficulties between the stakeholders and the parties, problems that might be faced with the contractors before and during the project are defined as constructional risks.

2.1.3.5. Social Risk Factors

Social risks, also as known as social acceptability risks, are the risk factors that are linked to the environmental and social aspects of the projects. Diéguez et al. (2014) elucidate social risks as clients, society and user risks that effect on inhabitants' risk occurs when the local people of a region are the resource of the risk when they are not handled wisely. Liu et al. (2016) explains about other social risks that the local people would be encouraged to leave their farms that they used to live for decades, so that they would try to prevent the initiation of the project. Iyer and Sagheer (2010) claim

that protest of the inhabitants and the environmental protestors would be other factors of social risks. Likewise, Giezen (2012) support the idea that local people would be against to the project and small issues may lead to big problems during the project life cycle. Miller and Lessard (2001) also mention the possibility that sponsors of the project may encounter the resistance of the inhabitants and the environmentally sensitive groups at local and national level.

2.1.4. Risk Assessment and Decision-Making Relationship

Risk and uncertainty assessments should be evaluated within the framework of decision making. Various viewpoints on how to utilize risk and uncertainty assessments for decision making exist as well. Rigorous obedience to cost–benefit analysis, expected utility theory, and other associated theories would mean obvious suggestions on what is the best possible measure. Nevertheless, most risk analysts and risk researchers could see risk and uncertainty evaluations as decision support instruments, in the idea that the assessments advise the decision makers. The decision-making is risk-informed, not risk-based (Apostolakis, 2004).

Risk assessment and risk management are established as a scientific field and provide important influences in supporting decision-making in practice (Aven, 2016). Project managers need to make judgments and to act under situations of ambiguity as well as risk (Atkinson et al., 2006; Loch et al., 2006). There is substantial proof that these disputes are proving somewhat difficult, frequently leading to significant cost exceeds, postponements in completion and failure to deliver against the goals used to justify projects (Flyvbjerg, 2009).

Risk management is mostly in relation with strategy and strategy analysis for the decision makers. A strategy can be defined as a principle or plan to manage decisions and achieve desired results, and this terminology relates to international corporations, authorities, private sector corporations and groups, as well as human beings.

Risks are often characterized by multiple specialists, participants, and decision-makers who might all have radically distinct beliefs relate to future uncertain occurrences. A probabilistic analysis might be met with defiance in conditions with numerous stakeholders who oppose with the probability and outcomes assigned by selected specialists (Aven and Zio, 2011). Some research has found that specialists themselves may be uncertain to assign subjective possibilities that may be inaccurate or unreliable (Chao, Hobbs and Venkatesh, 1999).

It has been approved that risk assessment, mainly in cases of deep uncertainty, is directed within a framework of planned evaluation and managerial ruling (Aven, 2013), and that decisions regarding to the risk in question should be reflected as “risk-informed”, more than “risk-based” (Apostolakis, 2004).

Consequently, it is helpful to consider how each approach promotes to enhancing insight of the risks in a way that could assist and enlighten decision-making (Shortridge, Aven and Guikema, 2017).

Conversely, the state of understanding about the solutions of uncertainties in risk assessments used in practical decision-making settings in relation to high-value technologies, for instance, transport, nuclear, petroleum and gas etc. The initial point is the acknowledgment that even though the use of risk assessment and uncertainty study for decision making might take distinct perspectives, there is a communal and shared perception that these tools offer convenient decision support in the meaning that their consequences

inform the decision makers insofar as the technological risk side of the issue is related for the findings. (Aven, 2010)

It derives from a comprehensive procedure which merges (i) an analytic assessment of the condition (e.g. risk assessment) by severe, replicable approaches assessed under agreed protocols of an specialist community and peer-reviewed to authenticate the assumptions sustaining the analysis, and (ii) a deliberative group exercise in that both involved decision makers and stakeholders cooperatively deliberate the decision problems, look into the opinions for their support, examine the consequences of the technological and technical analysis and present all other parameters (e.g. political and social) which are not clearly involved in technical analysis. (National Research Council, 1996)

To list the recommendations for the decision makers from the literature, Aven (2016) asserts that the decision-makers of a project should to see beyond the risk evaluation; they should joint the risk information they received from other resources and topics. It is important to have the ability in order to read signals and the forerunners of critical incidents. Aven and Zio (2011) claim that the description of the knowledge accessible as input to the risk assessment in support of the decision making ought to be accurate and obvious: the techniques and models utilized had better not to add information that does not exist, nor disregard information that exist. Moreover, as Aziz et al. (2018) offers, “analyzing” step of risk management, which is defined as building decision making information from each and every risk, studying its effect, time frame and possibility that also includes categorization and prioritizing of risks, become quite important for decision makers.

2.2. Mega Project Concept

2.2.1. Definition of Mega Projects

According to PMI (2013), projects are temporary attempts that are designed to create an end result such as products or services, and they have a start and end date due to their temporary nature. Owing to the aim of creating an end result, resources and organizational structure are required while carrying out a project. If the complexity of a project gets higher and higher, the term "mega-project" is used for such projects in the project management literature. As Shenhar and Holzman (2017) emphasize in their study, megaprojects cannot be said to be elaborated versions of smaller projects. They are different in terms of levels of their long-term goals, involvement of stakeholders, project makespan, extensity, and effect.

Apart from the points made by Shenhar and Holzman, there are other points underlined in several studies. According to Park et al. (2016), megaprojects are the investments with a budget above 500 million, having multi-purpose facilities based on a single plan. Besides, they suggest that mega-projects are integrated projects that perform harmoniously with its all functions. Similarly, Li and Guo (2011) define mega projects as supersized tasks with a budget up to a billion dollars or more, necessitating resources reaching millions of hours of work, several stakeholders with a significant number of interconnections and a project makespan more than five years, and attracting high public attention. These are the factors that result in the complexities in megaprojects' performance.

Flyvbjerg, in his several studies, (2011, 2014, 2016) presented a framework within which megaprojects could be studied. In his studies, he defined megaprojects as comprehensive, complex initiatives that cost a billion US$

or more, and last long to plan and construct, involving multiple stakeholders and affect millions of people.

Mega projects are also studied and categorized by the European Cooperation in Science and Technology as they have “extreme complexity both in technical and human terms and by a long record of poor delivery” (Park et al., 2016, p. 2).

In addition to the cost and complexity, scope of megaprojects should also be examined. In this context, it is possible to suggest that in recent periods, megaprojects are not limited within the boundaries of construction sector, and there are megaprojects being carried out in other sectors and industries as well. Moreover, the rapid technological developments have made possible for us to achieve the tasks that cannot be achieved before. Yet, this also posed serious challenges to the responsible parties of the megaprojects. (Shenhar and Holzmann, 2017).

2.2.2. Complexity in Mega Projects

As Kardes et al. (2013) underlines, complexity is an inevitable concept when megaprojects are taken into consideration. In this context, it can be suggested that complexity of megaprojects is the result of several factors including the scale and the scope, long project makespan, the number of technological disciplines and technological changes, and the number of parties involved in the project (Van Marrewijk et al., 2008; Kardes et al., 2013).

While Kardes et al. (2013) discuss the complexity of megaprojects under the titles of technical and social complexities, Li and Guo (201) examine the complexities in managing mega construction projects (MCP) in particular by arguing that complexities in such projects are technical,

social, and managerial complexities. According to Kardes et al. (2013) technical complexities are the complexities arising from the scale of the projects, whereas social complexities result from the interactions between the all participants of the projects. Besides, Li and Guo (2011) underline that technical complexities of MCPs are the results of the design and technologies used during the process of design and construction, social complexities appertain to unintentional effects of megaprojects on the environment and social system, while managerial complexities are the complexities related with the business or/and governance facet of the projects.

Having made a brief introduction to the complexity of megaprojects, it can be legitimately claimed that classical project management techniques cannot be employed while dealing with such large-scale projects. Similarly, Shenhar and Holzmann (2017) also argue that it is possible to suggest that complexity is perhaps the most problematic area in understanding managerial aspects of megaprojects. Megaprojects are extremely complex endevaours involving immense amount of complexity; yet, only few organizations know how to figure out the degree of complexity and establish the ways of managing it.

Establishing the ways to manage complexity of a project, that is to say, means that management must understand certain characteristics of each project and respond to unique challenges in a proper manner by using appropriate means such as resources, equipment, organization and technology (Shenhar and Holzmann, 2017).

2.2.3. Examples of Mega Projects

In these days, megaprojects are not only limited to the construction sector and can be found in several sector and areas from engineering,

infrastructure, oil, aviation to information technology, shipping and space. In most of the cases, government agencies, state and public organizations, which have the necessary resources and opportunities carry out complicated processes and ability to bear extremely high costs, initiate mega projects (Shenhar and Holzmann, 2017).

In such a broad context it is still possible to mention some general criteria to evaluate megaprojects. Shenhar and Holzmann (2017) argues that when it comes to decide on the success or failure of a megaproject, the traditional criteria of reaching time, budget and scope aims cannot be neglected. However, it can also be claimed that even though there are some megaprojects which did not meet their objectives regarding time and cost, and their long-term affects are not ignorable. (Shenhar and Holzmann, 2017) In this context, Flyvbjerg (2016) presents an evaluation of the rate of success of megaproject focusing on a 90-year time period. He argues that nine out of ten megaprojects have cost overruns and delays are too common for megaprojects. Therefore, delays are a way of life for numerous megaprojects, as well as benefits not being recognized. According to Flyvbjerg (2016), in this interesting and very costly area of management, best practice is an outlier and average practice a disaster.

London 2012 Olympic Park: The management style employed during the completion process of the complex project was based on a layered structure of systems organization. Cautious coordination of and productive communication between multiple stakeholders that are both internal and external having different interests and priorities regarding interfaces between systems are required. (Brady & Davies, 2014; Davies & Mackenzie, 2014; Davies, 2016)

Even though the original *World Trade Center (WTC)* complex was destroyed in the 9/11 attacks, it continues to be a successful example of project management. Besides, there had been political and logistical issues

regarding the selection of the site. The level of complexity and involvement of stakeholers were well organized. From its beginning to the end, project managers employed the right approach and leadership style, creating necessary energy and motivation for the team, and a strategic, long-term perspective focused on the economic, environmental, social and political successes (Gillespie, 2002).

To illustrate, in the *Apollo Project*, NASA made incisive evaluating by understanding that going to the moon is a highly complex and a risky task. (Gisler and Sornette, 2009) Therefore, the agency benefitted from numerous mechanisms for examining every possibility beforehand. The main idea while conducting the project was: "it is unsafe to fly, unless there is proof that nothing can go wrong" (Shenhar and Holzmann, 2017).

On the contrary, definition and management of the *Los Angeles Subway Project* was considering it as an engineering design-and-build project. Even though it is designed to serve millions of passenger, during the project there was no connection or cooperation with the potential passengers. The travelers were not prepared for the new form transportation and there was not enough encouragement for using it. Although the project met its goals regarding time and efficiency, the number of people using it remained few. A better connection with the potential users would have created more desirable and profitable success for the project (Shenhar and Holzmann, 2017). This case is also valid for the Automotive Test Center Project.

CHAPTER 3

RESEARCH FRAMEWORK AND METHODOLOGY

In this part of the study, research framework and methodology are discussed. First, a brief information about the Automotive Test Center is provided, and then the research approach is discussed. Then, unit of analysis and sampling design of the study is presented. After that, the questionnaire used to identify and categorize the project risks is explained. Finally, interview questions used to assess project risk management approaches are elaborated.

3.1. Automotive Test Center Project

3.1.1. What's Automotive Test Center Project?

Automotive industry increases its importance with the developing technologies in the last decades and all the cars, trucks, buses and even military vehicles produced must be tested and approved by the competent authorities. These tests must be performed by accredited governmental or private organizations and all these approval activities are called as homologation in the automotive industry. Homologation activities are generally realized by accredited test centers all around the world.

Turkish Standards Institution (TSE); aims to establish an Automotive Test Center (ATC) that will address the testing, certification, homologation, research and development and other needs of automotive industry in

Turkey and other regional countries. The Automotive Test Center will be constructed in an area of 4,358,000 square meters in the city of Yenişehir, Bursa. The Automotive Test Center is aiming to carry out tests, experiments and R&D of new vehicle development activities for all types of vehicles and their components for EU Full Vehicle Type Approval. The center will serve as a large complex that consists of 13 different test tracks, which are also called as "proving grounds", 7 different laboratories to perform their indoor test activities and a center of excellence for the automotive industry manufacturers.

Automotive Test Center will create an infrastructure in our country for the tests that could only be carried out abroad before, and will lead to the formation of an automotive industry structure with an advanced R&D capability, while ensuring that the foreign currency paid abroad is kept in our country at the same time. On the other hand, it will provide significant added value to the country's economy with the services it will perform to the countries in the region. In addition to reaching the targeted vehicle production number in line with our country's vision of 2023, Automotive Test Center will help to create our own automobile brand by enabling the R&D, P&D and certification activities needed within the scope of the National Passenger Car Project.

3.1.2. Other Examples of ATC

There are numerous examples of Automotive Test Centers all around the world in all geographies where the automotive industry has been well-developed – especially in Europe -and when these similar examples are examined, it is observed that the majority of Automotive Test Centers are serving with their all laboratories and test tracks for the provision of required system, Moreover, these centers carry out tests for research studies for both universities and vehicle manufacturers as well as type approval

tests, and there are many field testing possibilities from material science to aerodynamics and from driving robots to autonomous vehicle development.

The most well-known test centers all around the world might be classified as Automotive Testing Papenburg (ATP) Test Center in the city of Papenburg, located in the northwest of Germany, which is known as one of the biggest test centers in the world with its area of 7.800.000 m2, and where tests for passenger cars and commercial vehicles have been carried out for over 30 years (ATP, 2019).

IDIADA was founded in 1971 under the name of "Applied Automotive Research Institute" by the University of Catalonia. In 1990, it was separated from the university and became an independent organization affiliated to Catalan Autonomous State. In 1999, 80% of the test center was privatized to the Spanish company called Applus and 20% to the Catalan Autonomous State, and since then Applus has been called IDIADA (IDIADA, 2019).

KATRI (Korea Automotive Testing and Research Institute) serves as an institute of South Korea Transportation Safety Authority in 1987 and is located in Ansan city of Gyeonggi province of South Korea in an area of 2.150.000 m2. The main services of the test center can be classified as vehicle inspection, certification (emission, noise, airbags, safety barriers, road and warning signs), NCAP passive safety and R&D testing laboratories with proving grounds for homologation services (KATRI, 2019). KATRI Testing and Research Institute is also one of the stakeholders of Automotive Test Center Project in Turkey and was responsible for preparing the general feasibility study of the project in 2018.

All these test centers are well-known with their efficient services and successful management models for many decades. The specialists of Automotive Test Center project are in contact with these test centers to get their beneficial experiences about the project.

3.1.3. Target Users of ATC

Target audience and end-users of the Automotive Test Center are the relevant ministries in charge of the EU Directives in the branch of automotive, the authorized technical services of the Ministry of Industry and Technology, most of domestic and foreign companies which are engaged in production, export and import, some private and state universities, Turkish Standards Institution and Presidency of Defence Industries.

The target areas of Automotive Test Center can be classified as Turkey, Asia, the Middle Eastern and Eastern European countries. These evaluations which are made for foreign countries have been carried out specifically for the countries that have their own automotive brands but not an automotive test center.

3.1.4. Department of ATC in Turkish Standards Institution (TSE)

Automotive Test Center Project was being performed by Project Coordinator of Automotive Test Center between the years 2009 and 2015, and there was a high turnover rate for the project coordinators and the engineers who were working for the project. As a result of these problematic turnovers, difficulties in adaptation for the new engineers and lack of knowledge and experience, the top management decided on creating more rigid structure for this special project.

Department of Automotive Test Center was founded with the decision of Board of Directors in 2016 in order to perform all the processes of the project by increasing the number of employees and the Department of Automotive Test Center was divided into 3 different directorships in order to increase the efficiency of the project. At the beginning of the year 2016, 7 mechanical engineers, 2 computer engineers, 2 industrial engineers, 1 metallurgical and materials engineer, 1 chemical engineer and 4 administrative staff were hired for the project.

3.1.5. Current Situation of ATC

After the establishment of the Department of Automotive Test Center, the employees have accomplished many critical tasks and proceeded faster than the previous attempts for the project. The concept layout design of Automotive Test Center was prepared by a Spanish company Applus IDIADA, which is the owner of another automotive test center in Tarragona, Spain. In order to start to construction of the project, the employees had numerous interviews with the representatives of the automotive sectors and OEMs (Original Equipment Manufacturers) in Turkey. As an important output of these interviews, the majority of the sector was agreed on the urgent need of a "Braking Test Track" for the tests to be performed for the Regulations of United Nations.

Top managers of Turkish Standards Institution and the managers of the Department of Automotive Test Center are also agreed on constructing the Braking Test Track and Feasibility Report of Braking Test Track was prepared by the employees of the department within 6 months and delivered to the Ministry of Development for the allocation a fund from the state budget.

In the year 2017, the Minister of National Defense, Undersecretary for Defense Industry and the Minister of Science, Industry and Technology agreed on changing the concept of Automotive Test Center and designing the center for both civilian and military purposes and Turkish Standards Institution and Undersecretariat for Defense Industry signed a co-operation protocol. The main purposes of this co-operation are preventing the duplication of the investment, efficient use of the financial resources and speeding up the processes of the Automotive Test Center Project. As a result of this co-operation, a new "Project Group" is formed by the employees of Turkish Standards Institution, Undersecretariat for Defence Industry and the main contractor of the General Feasibility Study which is called "Savunma Teknolojileri Mühendislik ve Ticaret A.Ş. (STM)"

In the year 2018, the Project Group started to perform General Feasibility Study of the Automotive Test Center Project and was in touch with other automotive test centers from all around the world and the automotive sector members. General Feasibility Study was completed and presented to the top managers of Turkish Standards Institution and Presidency of Defence Industries, as well as the President of Republic of Turkey in October 2018.

Because of the economic recession encountered in 2018, all the governmental projects were paused and in order to start the construction processes of Automotive Test Center Project, the approval of the President of Republic of Turkey, who is also the presider of Defence Industry Executive Committee, is pending.

3.1.6. Stakeholders of Automotive Test Center

Turkish Standards Institution (TSE), is the main contractor of the project and the execution of the project is performed by the Department of Automotive Test Center. TSE is the main contact point between the

stakeholders and civilian automotive sector representatives. All the information about the project is gathered by the specialists of the department. The decision makers of the project in TSE are the President, Board of Directors, Secretary General, Deputies of Secretary General and the Head of the Department of Automotive Test Center.

Presidency of Defence Industries (SSB), formerly named as Undersecretariat for Defence Industries, became the second main contractor of the project after signing a co-operation protocol for the Automotive Test Center Project in November 2017. SSB is the contact point of defense industry representatives and dealing with financial side of the project.

Ministry of Industry and Technology, formerly named as Ministry of Science, Industry and Technology, is the governmental organization that commissioned Turkish Standards Institution to realize this mega project. Directorate General for Industry of the Ministry monitors the activities of TSE about the project and reports them to the Cabinet of Ministers. Their decisions are more critical for the management of the project and capable of making changes about everything regarding to the project.

“Savunma Teknolojileri Mühendislik ve Ticaret A.Ş.” (STM), is a private company that provides technical support and engineering activities for Turkish Armed Force and Presidency of Defence Industries (STM, 2019). After the co-operation protocol was signed between TSE and SSB, STM was in charge for preparing the General Feasibility Study of the Automotive Test Center and their specialists joined to the “Project Group” of TSE and SSB. STM specialists submitted the Final Report of General Feasibility Study in October 2018.

INOVA Korea Inc. was the subcontractor for preparing the General Feasibility Project since they were managing KATRI (Korea Automotive Testing and Research Institute) and KNR Systems that are the governmental testing laboratories of South Korea. Specialists of KATRI and KNR transferred their experiences and knowledge about the test centers and testing activities and finalized the General Feasibility Study and the layout of the project by co-operating with the specialists of STM.

During the General Feasibility Study, numerous visits are paid for these sector members and throughout the feasibility study, the top managers decided to create a council to exchange views on the project. The council that was directed by TSE called as "Advisory Board" and many governmental organizations and automotive sector representatives were the members of the board. Their opinions, experiences and knowledge were discussed between all members and all this information were shared with STM and INOVA Korea in order to have healthier results for General Feasibility Study. Some of the members of Advisory Board are Automotive Manufacturers Association (OSD), Automotive Suppliers Association of Turkey (TAYSAD), General Directorate of Highways (KGM), The Union of Chambers and Commodity Exchanges of Turkey (TOBB), The Scientific and Technological Research Council of Turkey (TÜBİTAK), Presidency of Strategy and Budgetary (formerly named as Ministry of Development) etc.

On the other hand, the military side of the project, in other words, the defense industry members also decided to have a similar council to exchange views about the project. SSB and STM were the directors of "Military Advisory Board" and similarly all information about military side were shared with TSE and INOVA Korea. Some of the members of Military Advisory Board are OTOKAR Automotive and Defense Industry Inc., FNSS Defense Systems, Nurol Machinery and Industry Co. Inc., BMC Automotive Industry and Trade Inc. etc.

GPO Engineering is a world-renowned engineering company and they provide planning and consultancy, operation and maintenance, design and construction management services all around the world (GPO Group, 2019). The specialists of Headquarter Office in Barcelona were the stakeholders of the project and they provided their wide experiences and knowledge for the latest phase of General Feasibility Study of Automotive Test Center. The outputs received from GPO Engineering have shaped the final version of the General Feasibility Study of the project.

Hexagon Studio, was founded in 2006 in order to provide unique design and engineering solutions in transportation, defense industry, tractors and heavy equipment in national and international scales (Hexagon Studio, 2019). The specialists of Hexagon Studio provided their experiences about proving grounds and laboratories and contributed to the General Feasibility Study.

GGB Engineering was founded in Ankara in 2007 to provide engineering services about construction and photogrammetrical studies of the governmental institutions. (GGB Engineering, 2019) The engineers of GGB provided a detailed ground studies for the land of the Automotive Test Center and provided solutions for the layout of the proving grounds and laboratories of the project.

Lava Engineering was established by two civil engineers in Ankara in 2008 to provide highway, railway, bridge projects and also the consultancy for the construction projects (Lava Engineering, 2019). The engineers of Lava provided services on the final retouches of the layout of the project under the scope of General Feasibility Study and collaborated with GGB throughout the studies.

3.2. Research Approach

The initial purpose of the study is the intention of applying the findings of the outputs to solve specific project problems currently being encountered in an organization (Sekaran & Bougie, 2016). Therefore, this type of research is categorized as an applied research, but it may also be considered as fundamental research since it helps to find theoretical remedies for the problems in the project management literature.

This thesis study is a correlational study since it is conducted to determine the critical factors associated with the megaproject; and the study is performed in the usual environment where the events proceed naturally, that is why the study has a non-contrived setting (Sekaran & Bougie, 2016). The level of interference is minimum in order to observe the outputs of the survey and interview studies without any external influence.

This thesis adopts a single case study approach, examining a single project (i.e. Automotive Test Center project) in a detailed way. Data was gathered via several sources such as using the archival data, conducting a survey and follow-up interviews with the key stakeholders. A survey is used for gathering information from the people to determine or compare their opinions and attitudes (Sekaran & Bougie, 2016). The study is about the opinions and the risk perceptions of the stakeholders and that is why conducting a questionnaire is selected as the primary data collection method. On the other hand, in order to elaborate the data collected by the questionnaires, interview study is also conducted with the project group members. Besides, the study was cross-sectional due to time constraints.

3.3. Research Design

In this section of the chapter, the research design is explained with the unit of analysis and discussing about the sampling design of the study.

3.3.1. Unit of Analysis

Since this thesis study is a single case study, the unit of analysis of this research is the Automotive Test Center Project. Key informants are the stakeholders of the Automotive Test Center Project in Turkey and the respondents are representing their organizations from different levels with different titles. The list of 20 companies is specified for the survey and their representatives are asked for participating in the study. Questionnaires are delivered to these participants since they are actively taking part in the Automotive Test Center Project and they have the enough information about the project from beginning to the end.

3.3.2. Sampling Design

In this section of the thesis study, sampling design is expressed in detail. Selections about the participants and stakeholder organizations are described.

Project risk management is a broad topic all around the world and there are numerous studies regarding the risk factors for an organization. Risk assessment process is a crucial activity for any type of project, but the topic becomes more critical when the project size is larger, and the actors of the projects are the governmental organizations. Hence, one of the biggest governmental megaprojects in Turkey, which is Automotive Test Center Project, is chosen for this study. In order to be able to perform data

collection and statistical analysis for such a big project, the core project group and all stakeholders, who play any kind of role for the project, are selected. The data is collected from two main contractors of the project, one main subcontractor and 17 different stakeholder organizations in Turkey, Spain, France and South Korea. All stakeholders are the members of automotive sector and they are experienced and informed about the Automotive Test Center Project from beginning up to the end. Data is collected from the employees of these stakeholders from all levels with different numbers of people within 2 months (between April and June 2019). Therefore, purposive sampling is used as the sample design of this thesis study, as these people are very specific people who take part in the project can provide the necessary and key information for the study (Sekaran & Bougie, 2016). As a result of this sampling design, 68 respondents from 17 stakeholder organizations were deemed eligible to participate in this study.

3.4. Survey Design

3.4.1. Survey Questions

For the purpose of identifying and categorizing project risks observed in the Automotive Test Center Project, a survey/questionnaire was prepared. The questionnaire is made up of three sections.

The first section is related to the *demographic information* of the respondents; their relationship with the Automotive Test Center and their project experiences. The second section of the questionnaire is about their *risk impact* perception for six different risk factor categories and a five-point Likert scale is utilized with the ranges between “1-very low impact” and “5-very high impact”. The third section is almost identical with the

second section. The same exact questions are asked for understanding their *risk probability* perception for the same six risk factor categories and a five-point Likert scale is used with the ranges between "1-very unlikely" and "5-very likely".

As this study is a single-case study about the Automotive Test Center Project in Turkey, the problems arisen since the very early beginning of the project were the main points for bringing forward some ideas about the survey questions. In order to create survey questions, the core project team members of the main contractor, which the researcher is a member of this group, held a two-hour meeting for a brainstorming activity. The main problems of the project were listed by the team members and these problems were converted to the risk factor statements by the researcher. After categorizing these risk factors according to their topics and concepts, the researcher checked and searched for the examples in the project risk management literature to confirm if the same problems were existing or not. This two-step procedure was adopted in order to be not biased by existing risk classifications in the literature. In other words, literature review was used as a confirmation of the risk factors identified in the brainstorming activity.

Finally, after the confirmation of the risk factors, the questionnaire was ready to be replied by the stakeholders of the project. The items that are used in the survey study are listed in the Table 3.1:

Table 3.1 Survey Questions Table

No	Factor Type	Survey Questions	References
1	Governmental Risks	Rejection of investment decision regarding the project by the competent authorities.	Diéguez et al. (2014), Liu et al. (2016), Iyer and Sagheer (2010), Miller and Lessard (2001), self-constructed
2		Use of the budget allocated for the project for another investment / project.	
3		Change of decision makers (government, managers, etc.)	
4		Decision of conducting the project at another location for different reasons.	
5		Arise of a problem by the owners of the land, due to the fact that the project land has a dispute to be settled in court.	
6		Speeding up the project schedule to be completed before the calendar set by the top authorities.	
7	Organizational Risks	Difficulties in sharing information among the stakeholders due to various reasons (intellectual property rights, etc.)	Park et al. (2016), Iyer and Sagheer (2010), Qazi et al. (2016), self constructed
8		Reduction of the beliefs of the stakeholders about the completion of the project due to the disruptions in project processes and decrease in support for the project.	
9		Failure to realize bids and contracts related to the project with suppliers / subcontractors on time.	
10		Loss of motivation in the project team due to the prolongation of the processes during the implementation of the project.	
11		Not fulfilling the responsibilities of project stakeholders in accordance with the project schedule.	
12		Lack of adequate and qualified personnel in the project team.	
13		Failure of project management in general terms.	
14	Economic Risks	Increase in project costs due to the flow of funds to transfer know-how from abroad.	Park et al. (2016), Iyer and Sagheer (2010), Giezen (2012), self constructed
15		Increase of project costs due to the increase of exchange rates.	
16		Lack of sufficient financial resources for the project due to high project costs.	

Table 3.1 Survey Questions Table (Cont'd)

17	**Technical Risks**	The geological and geographical conditions of the project land are not suitable for the realization of the project.	Diéguez et al. (2014), Liu et al. (2016), Giezen (2012) Miller and Lessard (2001), self constructed
18		Not determining the technical necessities and requirements for the project in a realistic way.	
19		Technical insufficiency of the projects that are already prepared.	
20		Lack of technical know-how and experience of project managers to be in a decision-making position.	
21		The prepared feasibility study is incomplete, inaccurate or insufficient.	
22		The infrastructure of the land on which the project will be constructed is not suitable for the commencement of the construction.	
23		The prejudicial evaluation of the competence of the stakeholders involved in the project.	
24		Incomplete and inaccurate determination of all risks related to the project.	
25		Change of technical conditions of the project due to regulatory changes.	
26	**Social Risks**	Reduction in the belief about the realization of the project by the local public in the region where the project will be implemented.	Diéguez et al. (2014), Liu et al. (2016), Giezen (2012)
27		Suspension of the execution of the project due to the fact that environmentally sensitive NGOs being opposed to the project.	
28		Local people in the region where the project will be implemented are opposed to the construction of the project.	

3.4.2. Survey Format

Most of the survey study is conducted electronically. The management of online surveys are easier to handle and analyze (Sekaran & Bougie, 2016). Since there is a time constraint and geographical obstacles for international organizations, this method has higher advantages in terms of time and expenditures.

Furthermore, some questionnaires are applied to the participants in the printed version. Especially the core project team and its managers replied to the questionnaire in this way in order to make sure that they are paying full attention to the survey study since their perspectives and opinions are crucial for the results of the study. These printed questionnaires are administered by a member of the core project team, so that the response rate for printed questionnaires is 100% with 17 respondents.

Electronic questionnaires are prepared on the internet by a survey creator application and the questionnaires are delivered to the other 51 stakeholders by e-mail. Since the sample size was very small, the respondents were also called and texted by telephone before delivering the e-mails. In the end, the response rate for online questionnaires is about 69.1% with 47 respondents out of 68 stakeholders in total, illustrating a good coverage of the sample.

3.4.3. Ethical Considerations

The Automotive Test Center Project is one of the most important and most strategic projects of Turkey and this governmental investment has vital potential for Turkish, Eastern European and Middle Eastern automotive civilian and military sector. Thus, the survey does not contain any questions about the respondents' identity for security and confidentiality reasons.

The respondents of the survey were informed about the details of questionnaire. For all respondents, the freedom of participation was provided by the researcher, in other words, if any person would feel insecure or hesitate to answer the questions, they were able to stop replying the questions without any excuses. Luckily, none of the participants withdrew from the questionnaire and all of them replied to the questions without any hesitation and contributed for data collection. Moreover, there

are no questions that are not replied by the respondents and this situation helped the researcher to have healthier results for the survey study.

Besides, METU Applied Ethics Research Center (AERC), which is a research center that conducts applied ethical research theoretical studies and develops and disseminates the results that has an ethical awareness in Turkey, works for increasing the sensitivity of ethical awareness of behaviors and decisions that are directed towards the content and social life in society by initiating a sampling approach at the university. METU AERC approved the legality of the data collected and approved that this survey study did not have any ethical issues or concerns. (See Appendix)

3.5. Interview Design

3.5.1. Interview Questions

The interview questions for the study were prepared to support the outputs of the survey results, to collect "anecdotal evidence" elaborate the findings for a significant contribution to the project risk management literature.

Interview questions are mostly related to the statistical outputs of the survey study and the respondents are asked about the results of the questionnaire. Interview questions are prepared by the researcher, who is a member of the core project group, and the questions aimed to find solutions and the mitigation methods for the potential risk factors of the Automotive Test Center Project. The interview study is conducted with five members of the core project group (one top level manager, two managers and two specialists) and their responses are evaluated according to the findings of the survey study (See Discussion section).

The interview model is structured type since it is known by the researcher what type of information is necessary (Sekaran & Bougie, 2016). It also has an introduction part, where the researcher introduces himself, gives brief information about the topic, asks for permission and ensures confidentiality, and also a set of topics for the interview in an order, which starts from easy questions to deeper questions for the interviewee (Sekaran & Bougie, 2016).

The interview questions are listed in the Table 3.2 below:

Table 3.2 Interview Questions Table

No	Interview Questions
Q1	What do you think about the overall risk distribution? Could you summarize briefly? Are the results distributed as you would expect as an active participant in the project?
Q2	What do you think about the different reactions of stakeholders to different risks?
Q3	Which of these risks are already under control? What activities are being carried out by the project team to control these risks?
Q4	What measures can be taken by project stakeholders to reduce uncontrollable risks?
Q5	Are the results specific to this project? Or do you think the distribution in general project risk management is always expected to be this way?
Q6	Are there any risk factors that could threaten the Automotive Testing Center Project, apart from the risk factors introduced?

The main objective of these interview questions is elaborating the results of the multiple-choice survey questions with the open-ended and face-to-face questions. On the other hand, after focusing on the survey study and the risk identification, it is aimed to understand the risk management

procedures of the main organization by applying an interview study. These questions are developed according to the results of the survey study. The main topics of the interview are focused on the control methods of the pre-defined risk factors by the project team, the differences between two different stakeholder groups, and other probable and effective risk factors that may threaten the Automotive Test Center Project. These questions are prepared by the researcher to gather more detailed information about the parameters above from the main contractors from three different levels in the organization to be able to represent their ideas and perspectives about the results of the survey study.

CHAPTER 4

DATA ANALYSIS

In this part of the study, first descriptive information and statistics are presented and then the other statistical tables are shown. Then, reliability and factor analyses are conducted for the data used in the study.

4.1. Sample Characteristics

47 participants from 20 different organizations filled in the questionnaire, resulting in a 78,3% response rate. Considering that there were around 60 potential participants in total (there was a small group of people who worked for the project throughout the years), the response rate is quite high.

Table 4.1 shows the distribution of the respondents in terms of gender, education, title, sector and different project experiences. Most of the respondents (85,1%) are male. Majority of the respondents are the members of the private sector (55,32%) and except one PhD graduate participant, education level of the participants is divided into two equal groups (48,94%) that they have either bachelor's or master's degree. Majority of the respondents (48,94%) are in contact with the project between 1-2 years and almost the same amount of the respondents (46,81%) have considerable experience in projects in general, as they were a part of five or more than five projects. Most of the respondents (42,55%) are the engineers and specialists, who are also representing the active group of the project, and rest of the participants are the executive managers, managers and advisors of the project. 53,19% of the participants are the members of the core group of the project from all levels and the other part (46,81%) of

the respondents are the secondary stakeholders of the Automotive Test Center Project (e.g. car manufacturers, automotive associations, other test centers etc.).

Table 4.1 General Descriptive Statistics of the Survey

Gender	Frequency	Percentage
Female	7	14,90%
Male	40	85,10%

Title	Frequency	Percentage
Core Group Members	25	53,19%
Secondary Stakeholder	22	46,81%

Sector	Frequency	Percentage
Public Sector	21	44,68%
Private Sector	26	55,32%

Project Experience	Frequency	Percentage
Never Participated	10	21,28%
1-2 Projects	11	23,40%
3-4 Projects	4	8,51%
5+ Projects	22	46,81 %

Education Level	Frequency	Percentage
Bachelor's Degree	23	48,94%
Master's Degree	23	48,94%
PhD / Postdoc.	1	2,12%

Title	Frequency	Percentage
Specialist + Engineer	20	42,55%
Manager	14	29,79%
Executive	8	17,02%
Advisor	5	10,64%

ATC Experience	Frequency	Percentage
Less Than A Year	7	14,89%
1-2 Years	23	48,94%
3-4 Years	9	19,15%
5+ Years	8	17,02%

Table 4.2 Risk Factors Table

GVN_R1	Rejection of investment decision regarding the project by the competent authorities.
GVN_R2	Use of the budget allocated for the project for another investment / project.
GVN_R3	Change of decision makers (government, managers, etc.)
GVN_R4	Decision of conducting the project at another location for different reasons.
GVN_R5	Arise of a problem by the owners of the land, due to the fact that the project land has a dispute to be settled in court.
GVN_R6	Speeding up the project schedule to be completed before the calendar set by the top authorities.
ORG_R1	Difficulties in sharing information among the stakeholders due to various reasons (intellectual property rights, etc.)
ORG_R2	Reduction of the beliefs of the stakeholders about the completion of the project due to the disruptions in project processes and decrease in support for the project.
ORG_R3	Failure to realize bids and contracts related to the project with suppliers / subcontractors on time.
ORG_R4	Loss of motivation in the project team due to the prolongation of the processes during the implementation of the project.
ORG_R5	Not fulfilling the responsibilities of project stakeholders in accordance with the project schedule.
ORG_R6	Lack of adequate and qualified personnel in the project team.
ORG_R7	Failure of project management in general terms.
ECO_R1	Increase in project costs due to the flow of funds to transfer know-how from abroad.
ECO_R2	Increase of project costs due to the increase of exchange rates.
ECO_R3	Lack of sufficient financial resources for the project due to high project costs.
TECH_R1	The geological and geographical conditions of the project land are not suitable for the realization of the project.
TECH_R2	Not determining the technical necessities and requirements for the project in a realistic way.
TECH_R3	Technical insufficiency of the projects that are already prepared.
TECH_R4	Lack of technical know-how and experience of project managers to be in a decision-making position.

Table 4.2 Risk Factors Table (Cont'd)

TECH_R5	The prepared feasibility study is incomplete, inaccurate or insufficient.
TECH_R6	The infrastructure of the land on which the project will be constructed is not suitable for the commencement of the construction.
TECH_R7	The prejudicial evaluation of the competence of the stakeholders involved in the project.
TECH_R8	Incomplete and inaccurate determination of all risks related to the project.
TECH_R9	Change of technical conditions of the project due to regulatory changes.
SOC_R1	Reduction in the belief about the realization of the project by the local public in the region where the project will be implemented.
SOC_R2	Suspension of the execution of the project due to the fact that environmentally sensitive NGOs being opposed to the project.
SOC_R3	Local people in the region where the project will be implemented are opposed to the construction of the project.

These are the notation for the specified risk factors for both impact and probability sections. For the reliability analysis tables, impact sections will be represented with "I" letter and probability elements will be represented with "P" (e.g. I_TECH_R2, P_ECO_R3 etc.)

4.2. Reliability Analyses

In order to test for the reliability of the constructs, we first perform check for unidimensionality of each risk variable, utilizing the IBM SPSS Statistics 25 Software. *Cronbach's Alpha* is a measure for reliability that varies between the range of 0 and 1. The values over 0.6 is accepted as the lower limit of acceptability (Robinson, Shaver & Wrightsman, 1991). Results of reliability analyses of each item are presented at Table 4.3 as follows:

Table 4.3 Governmental Risk Factors Reliability Analyses

Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I_GVN_R1	,524	-,020[a]	P_GVN_R1	,327	,461
I_GVN_R2	,504	-,106[a]	P_GVN_R2	,378	,433
I_GVN_R3	,082	,316	P_GVN_R3	,395	,418
I_GVN_R4	,060	,341	P_GVN_R4	,319	,468
I_GVN_R5	,118	,293	P_GVN_R5	,177	,535
I_GVN_R6	-,318	,533	P_GVN_R6	,120	,566

Cronbach's Alpha value for impact and probability factors of governmental risks are calculated as **0.316** and **0.528**, respectively. As can be seen from the analysis, especially for the impact items Cronbach's alpha is very low and the first two items seem to behave differently than the rest of the items, posing doubts about the unidimensionality. Regarding the probability items, results suggest that the last two items need to be taken out of the scale. Combining both findings, it is decided to take out R3, R4, R5, and R6 out of the scale.

Cronbach's Alpha value for probability factors of governmental risks are calculated as 0,528 and by comparing both tables, it is decided to remove R3, R4, R5 and R6 factors from the analysis in order to increase the reliability.

After the removal of those elements, the new Cronbach's Alpha value for impact factors of governmental risks is **0,817.** The same value for probability factors of governmental risks are found as **0,592.** This value is less than the lower acceptance limit of Cronbach's Alpha (0,600) but since impact factors have a strong reliability value, it is accepted as a reliable parameter for the analyses.

Table 4.4 Organizational Risk Factors Reliability Analyses

Item-Total Statistics

Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I_ORG_R1	,516	,743	P_ORG_R1	,634	,769
I_ORG_R2	,440	,759	P_ORG_R2	,544	,786
I_ORG_R3	,415	,762	P_ORG_R3	,577	,779
I_ORG_R4	,612	,724	P_ORG_R4	,500	,793
I_ORG_R5	,486	,750	P_ORG_R5	,427	,804
I_ORG_R6	,616	,720	P_ORG_R6	,569	,781
I_ORG_R7	,399	,765	P_ORG_R7	,597	,775

Cronbach's Alpha value for impact factors of organizational risks are calculated as 0,775 and the same analysis is performed for the probability factors of organizational risks.

Cronbach's Alpha value for probability factors of organizational risks are calculated as 0,809. Both values are above the lowest acceptance limits but when the factor analysis is conducted for all elements of survey, some of the organizational risk factors load with other components significantly (Shown in Table 4.9). Therefore, by comparing both tables, it is decided to remove R1, R3, R5 and R7 factors from the analysis in order to provide correct loading for factor analysis.

After the removal of those elements, the new Cronbach's Alpha value for impact factors of organizational risks is **0,669.** The same value for probability factors of organizational risks are found as **0,647.** These new values are less than the previous results, but because of the general consistency between other risk factors, these three factors for organizational risks will be used in the analyses.

Table 4.5. Economic Risk Factors Reliability Analyses

Item-Total Statistics

Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I_ECO_R1	,502	,814	P_ECO_R1	,368	,669
I_ECO_R2	,716	,565	P_ECO_R2	,632	,295
I_ECO_R3	,630	,681	P_ECO_R3	,362	,614

Cronbach's Alpha value for impact factors of economic risks are calculated as 0,773 and the same analysis is performed for the probability factors of economic risks. Cronbach's Alpha value for probability factors of economic risks are calculated as 0,622 and by comparing both tables, it is decided to remove R3 factor from the analysis in order to increase the reliability since R3 factor loads with other components in overall analysis.

After the removal of that element, the new Cronbach's Alpha value for impact factors of economic risks is **0,681.** The same value for probability factors of economic risks are found as **0,614.** These values are greater than the lower acceptance limit of Cronbach's Alpha (0,600) and these two factors for economic risks will be used in the further analyses.

Table 4.6 Technical Risk Factors Reliability Analyses

Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I_TECH_R1	,489	,865	P_TECH_R1	,400	,846
I_TECH_R2	,788	,832	P_TECH_R2	,742	,811
I_TECH_R3	,692	,840	P_TECH_R3	,773	,807
I_TECH_R4	,596	,851	P_TECH_R4	,744	,810
I_TECH_R5	,667	,844	P_TECH_R5	,781	,807
I_TECH_R6	,658	,844	P_TECH_R6	,477	,841
I_TECH_R7	,622	,849	P_TECH_R7	,533	,834
I_TECH_R8	,483	,860	P_TECH_R8	,565	,831
I_TECH_R9	,415	,865	P_TECH_R9	,140	,875

Cronbach's Alpha value for impact factors of technical risks are calculated as 0,865 and the same analysis is performed for the probability factors of technical risks.

Cronbach's Alpha value for probability factors of technical risks are calculated as 0,847 and by comparing both tables, it is decided to remove R1, R4 and R9 factors from the analysis since R1 and R4 factor loads with other components significantly and R9 factor increases the reliability value of technical risk factors.

After the removal of those three elements, the new Cronbach's Alpha value for impact factors of technical risks is **0,872.** The same value for probability factors of technical risks are found as **0,905.** These values are way greater than the lower acceptance limit of Cronbach's Alpha (0,600) and these six factors for technical risks will be utilized in the analyses.

Table 4.7 Social Risk Factors Reliability Analyses

Item-Total Statistics

Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Risk Factor	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I_SOC_R1	,476	,671	P_SOC_R1	-,060	,702
I_SOC_R2	,504	,667	P_SOC_R2	,372	-,306a
I_SOC_R3	,633	,423	P_SOC_R3	,230	,050

Cronbach's Alpha value for impact factors of social risks are calculated as 0,687 and the same analysis is performed for the probability factors of social risks. Cronbach's Alpha value for probability factors of social risks are calculated as 0,272, which is way below the acceptance limit of Cronbach's Alpha, and by comparing both tables, it is decided to remove R1 factor from the analysis in order to increase the reliability and to have healthier results for the further analyses.

After the removal of that element, the new Cronbach's Alpha value for impact factors of social risks is **0,671.** The same value for probability factors of social risks are found as **0,702.** These values are greater than the lower acceptance limit of Cronbach's Alpha (0,600) and these two factors for social risks will be used in the further analyses.

Cronbach's Alpha values for 5 components are listed in the Table 4.8 below:

Table 4.8. Cronbach's Alpha Values

Cronbach's Alpha Values		
	Impact	**Probability**
Governmental Risks	0,817	0,592
Organizational Risks	0,669	0,647
Economic Risks	0,681	0,614
Technical Risks	0,872	0,905
Social Risks	0,671	0,702

4.3. Exploratory Factor Analysis

Reliability is defined as "extent to which a variable or set of variables is consistent in what it is intended to measure" by **(Hair et al, 2014).** Factor analysis is also expressed as an interdependence technique whose first aim is to determine the underlying model among the variables in the analyses **(Hair et al, 2014)**. In order to perform the factor analysis of risk factor groups, IBM SPSS Statistics software is used and the results are presented in Table 4.9 (without any removal of risk factors):

Table 4.9. Exploratory Factor Analysis for Impact

Rotated Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
I_GVN_R1				,862			
I_GVN_R2				,778			
I_GVN_R3	,544						
I_GVN_R4		,772					
I_GVN_R5				,564	,533		
I_GVN_R6							,679
I_ORG_R1	,457						
I_ORG_R2						,701	
I_ORG_R3					,678		
I_ORG_R4						,807	
I_ORG_R5			,557			,453	
I_ORG_R6						,563	
I_ORG_R7	,816						
I_ECO_R1			,746				
I_ECO_R2			,796				
I_ECO_R3		,403	,593	,437			
I_TECH_R1		,788					
I_TECH_R2	,856						
I_TECH_R3	,700						
I_TECH_R4	,640		,493				
I_TECH_R5	,821						
I_TECH_R6		,756					
I_TECH_R7	,667						
I_TECH_R8	,589						
I_TECH_R9							,630
I_SOC_R1					,770		
I_SOC_R2		,716					
I_SOC_R3					,693		

For the impact factors, there is no homogeneous distribution between the elements. After applying the reliability analyses for each group of risks, it is expected to have smoother and homogeneous distribution between the

elements. The same procedure is applied for the probability factors and the results are demonstrated in Table 4.10 (without any removal of factors):

Table 4.10. Explotatory Factor Analysis for Probability

Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
P_GVN_R1		,770						
P_GVN_R2		,795						
P_GVN_R3				,744				
P_GVN_R4		,401					-,401	
P_GVN_R5					,471		,487	
P_GVN_R6								,700
P_ORG_R1						,736		
P_ORG_R2								
P_ORG_R3						,668		
P_ORG_R4			,677			,461		
P_ORG_R5				,805				
P_ORG_R6	,614		,518					
P_ORG_R7	,863							
P_ECO_R1			,830					
P_ECO_R2			,560					
P_ECO_R3		,595						
P_TECH_R1		,595						
P_TECH_R2	,885							
P_TECH_R3	,907							
P_TECH_R4	,793							
P_TECH_R5	,776							
P_TECH_R6		,540			,409			
P_TECH_R7	,634							
P_TECH_R8	,658							
P_TECH_R9								,822
P_SOC_R1							,784	
P_SOC_R2					,773			
P_SOC_R3					,824			

For the probability factors, there is no homogeneous distribution between the elements as well. Therefore, removing some risk factors from the analysis is beneficial for the further analysis and evaluations.

When these two tables are examined in detail, it is discovered that there is another risk factor group that consists of GVN_R4, TECH_R1 and TECH_R6. Applying reliability analysis for these risk elements for both impact and probability scales, the results are shown below:

Cronbach's Alpha value for impact factors of the new risk is **0,801.** The same value for probability factors of the new risk is found as **0,672.** These values are greater than the lower acceptance limit of Cronbach's Alpha (0,600). These three factors are related with the locational issues of a megaproject (See Table 3.1) and these elements are hereinafter referred to as **locational risks** for the further analyses.

Therefore, the updated Cronbach's Alpha values for 6 components are:

4.11 Updated Cronbach's Alpha Values

Cronbach's Alpha Values (Updated)		
	Impact	**Probability**
Governmental Risks	0,817	0,592
Organizational Risks	0,669	0,647
Economic Risks	0,681	0,614
Technical Risks	0,872	0,905
Social Risks	0,671	0,702
Locational Risks	0,801	0,672

After removing the not well-performing risk elements from the analysis for both impact and probability scales, the new factor analyses are presented in Table 4.12:

Table 4.12. Final Exploratory Factor Analysis for Impact

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
I_GVN_R1				,889		
I_GVN_R2				,855		
I_LOC_R1		,822				
I_LOC_R2		,771				
I_LOC_R3		,702				
I_ORG_R2			,767			
I_ORG_R4			,829			
I_ORG_R6			,594			
I_ECO_R1					,847	
I_ECO_R2					,756	
I_TECH_R2	,861					
I_TECH_R3	,677					
I_TECH_R4	,547				,483	
I_TECH_R5	,876					
I_TECH_R7	,615					,534
I_TECH_R8	,714					
I_SOC_R2		,714				,446
I_SOC_R3						,791

Governmental, locational, organizational, economic, technical and social risk factors are distributed almost homogeneously. For the impact scale, only problematic risk factor seems the social ones, but it is supported by the probability scale of the social risk factors. Therefore, this table shows that these parameters are acceptable for the future analyses and evaluations.

For the probability scale, Table 4.13 does not seem as homogeneous as the impact scale, but it does not differ a lot from the impact scale as well. Organizational and economic risk factors are loaded together but since there is a pure differentiation between these two factors in the impact scale, this problem is neglected and assumed as they are loaded in different components.

Table 4.13. Final Exploratory Factor Analysis for Probability

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
P_GVN_R1		,821				
P_GVN_R2		,652				
P_LOC_R1					,887	
P_LOC_R2		,569			,546	
P_LOC_R3		,649				
P_ORG_R2						,636
P_ORG_R4			,435			,729
P_ORG_R6	,605		,506			
P_ECO_R1			,887			
P_ECO_R2			,657			
P_TECH_R2	,884					
P_TECH_R3	,929					
P_TECH_R4	,810					
P_TECH_R5	,808					
P_TECH_R7	,532				,485	
P_TECH_R8	,695					
P_SOC_R2				,805		
P_SOC_R3				,845		

Therefore, those 18 out of 28 different risk elements for 6 different components will be used for the analyses. Then, descriptive statistics are presented below according to 6 different risk factors for both scales:

Table 4.14. Descriptive Statistics for Impact Scale

Descriptive Statistics (Impact Scale)						
	Governmental	**Locational**	**Organizational**	**Economic**	**Technical**	**Social**
Sample Size	47	47	47	47	47	47
Mean	3,694	3,461	3,584	3,929	2,766	2,376
Median	3,800	3,667	3,571	4,000	2,571	2,333
Std. Deviation	0,531	1,039	0,640	0,783	0,789	0,847
Skewness	-,809	-,270	-,049	-1,582	,938	-,041
Kurtosis	,311	-,972	-,917	4,108	,224	-1,094

Table 4.15 Descriptive Statistics for Probability Scale

Descriptive Statistics (Probability Scale)						
	Governmental	Locational	Organizational	Economic	Technical	Social
Sample Size	47	47	47	47	47	47
Mean	2,961	2,326	3,125	4,043	2,707	2,085
Median	3,000	2,333	3,143	4,333	2,667	2,000
Std. Deviation	0,607	0,812	0,712	0,779	0,732	0,672
Skewness	,061	,714	,235	-1,292	,839	,732
Kurtosis	-,579	-,025	-,665	1,615	,021	,776

When these parameters above are examined, general tendency of the respondents of the survey is represented with the mean values. In terms of impact scales, the respondents assert that the economic risk factors would have the highest impact for the project and also it is most likely to encounter economical risks throughout the project. Governmental and organizational risk factors follow the economic risk factors with the highest second and third impact and probability scales. The respondents think that locational risk factors have the medium-level risk impact and possibility for the megaprojects and these factors are placed in the middle of the mean values. Technical risks factors have the second lowest risk mean value among other risk factors, and also the medium probability value that makes them likely for the project. Social risk factors have the lowest impact and probability value according to the respondents and they are placed in the low risk group. The detailed comments about these values take place in Results and Discussion Chapter of the study.

Organizational, technical and social risk factors for impact scale and technical and social risk factors for probability scale seem right-skewed (mean > median) while governmental, locational and economic risk factors for impact scale and governmental, locational, economic and organizational risk factors seem left-skewed (mean < median).

4.4. Risk Assessment and Analysis Table

As a result of the survey study and statistical analysis, all risk factors are classified in a table according to their mean values as it is stated in the descriptive analysis part. As it is utilized in the risk management literature, risk assessment matrices are developed for evaluation of risks and mitigation methods are presented in order to prevent the potential risk factors.

Risk assessment matrices are derived for military purpose and developed a military standard "MIL-STD 882" for the initial phases of risk assessment in order to analyze the relationship between two variables and the cause and effect relationship. This method, which is also called as "L-Type Matrix" (DoD, 2012), is commonly used in risk management processes and adopted by everyone for the assessment phase of the risks of a project. However, this adoption created different versions and models of risk assessment matrices. The original version of the matrix in the standard is defined as a 5x5 matrix and the risks are evaluated by the multiplication of the probability and impact values. Nevertheless, each and every organization or the risk analysts of the projects may change the form of the matrices according to their risk criteria. Therefore, for Automotive Test Center Project, the most suitable risk matrix is selected to be used in the analyses and the it is presented below as follow:

Table 4.16 L-Type Risk Matrix Table

	Impact				
Probability	**Low Risk**	**Moderate Risk**	**High Risk**	**Extreme Risk**	**Extreme Risk**
	Minimum Risk	**Low Risk**	**Moderate Risk**	**High Risk**	**Extreme Risk**
	Minimum Risk	**Low Risk**	**Moderate Risk**	**High Risk**	**High Risk**
	Minimum Risk	**Low Risk**	**Low Risk**	**Moderate Risk**	**High Risk**
	Minimum Risk	**Minimum Risk**	**Low Risk**	**Moderate Risk**	**High Risk**

"L-Type Matrix" shows the risk levels for the projects and the mean values of each risk factors will be examined according to this matrix.

Table 4.17. Overall Risk Measurement Table

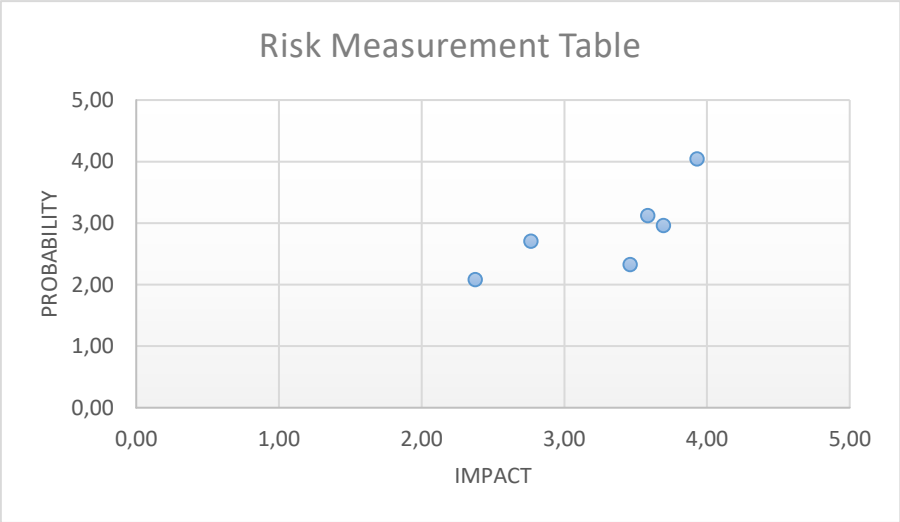


Table 4.17 shows the mean values of all risk factors on the L-Type risk matrix. The riskiest factor on the graph belongs to the economic risk factors and they are the only factors that are located in the extreme risk area. The second riskiest factor on the graph belongs to the organizational risks and the third one belongs to the governmental risk factors with a small difference. Locational risks are ranked in the 4th place in terms of riskiness and all these three risk factors are in the high-risk area. The other two factors, which are technical and social risks, are observed as the least risky two factors in the analysis and they are placed in moderate risk area.

For the extreme risk area, the serious precautions should be taken by the decision makers of the project, especially since the public funding will be used for such governmental projects, the sensitivity of the economic issues have higher importance. Organizational, governmental and locational risks are placed in the high-risk area and these risks may not cause catastrophic results for the project, but still the necessary attention should be paid for them. Technical and social risks seem easier to be handled by the decision

makers and they are not so urgent and critical for the life-span of the project, yet these factors should not be ignored or underestimated since they are in the moderate risk area and still may cause problems for the project.

4.4.1. Stakeholder Analysis

In this thesis study, assessment of risk is also conducted according to the perspectives of the project stakeholders. In a megaproject, there are numerous layers that create the project stakeholders with the different roles and positions. In this analysis, there are 20 different stakeholders who responded to the survey questions and their perceptions vary from one to another.

In order to present their perceptions and perspectives, the respondents are divided into two main different groups. First group is the core project members who take an active role for the all activities of the Automotive Test Center Project. The main contractors of the project, which are Turkish Standards Institution (TSE) and Presidency of Defence Industries (SSB), and the main subcontractor of the project, which is STM, are the members of the first group. The rest of the respondents from 17 different stakeholders are assumed as the second group for the analysis. As there are multiple respondents from the same stakeholder in some cases, final number of cases in both groups are 25 and 22, respectively.

“Independent Samples T Test” is conducted for the stakeholder analysis by using the IBM SPSS Statistics software. The comparison of the mean values for both groups and the significance values are presented on the Table 4.17.

Table 4.18 Mean Comparison and Significance Table

Construct	Mean (Group 1)	Mean (Group 2)	Significance
Government (I)	4.660	3.795	0,003
Locational (I)	3,800	3,075	0,015
Organizational (I)	3,613	3,439	0,477
Economic (I)	3,700	3,772	0,777
Technical (I)	3,746	3,348	0,098
Social (I)	2,920	2,386	0,083
Government (P)	3,700	3,136	0,025
Locational (P)	2,440	2,197	0,311
Organizational (P)	3,506	3,030	0,029
Economic (P)	4,160	3,909	0,346
Technical (P)	2,833	2,606	0,381
Social (P)	1,600	1,795	0,433

Table 4.18 simply shows the mean differences for both impact and probability factors between two groups of project stakeholders. Some of the mean values are close to each other whilst there are big differences between some risk factors. In order to understand and comment on these differences, a further “Independent Samples T-Test” is conducted, which is a type of analysis used for comparing independent groups statistically.

For “Independent Samples T-Test”, the significance rule is applied for the value of 0.05 and if the significance value is less or greater than 0.05, 2-tailed significance column is checked for understanding the significance of independent groups.

4.4.1.1. Independent Samples T-Test

In order to conduct Independent Samples T-Test, six different risk factor groups are classified in both impact and probability perspectives. Outputs of statistical data for Levene's Test for equality of variances and t-test for equality of means are shown in Appendix A.

For governmental risk factors, significance of Levene's test is 0,04 and since this value is less than 0,05 according to the $p < 0,05$ rule, equal variances are not assumed. Therefore, 2-tailed significance table is checked and since 0,004 value is less than 0,05, it can be stated that "the mean differences between two groups for governmental impacts are statistically significant." For locational risk factors, significance of Levene's test is 0,935 and since this value is greater than 0.05, equal variances are assumed, so that 2-tailed significance table is controlled and since $0,015 < 0,05$, it might be asserted that the mean differences are statistically significant as well. For the other four risk factors, all 2-tailed significance values are greater than 0,05 and that is why, all these four mean differences are not statistically significant. In other words, these mean differences between two groups are not so different from each other and will be evaluated accordingly.

Similarly, for the probability cases of the six risk factors, the same analysis is conducted. For governmental risk factors, both Levene's significance value and t-test's 2-tailed significance value are less than 0,05 and thus, governmental mean differences are statistically significant. For locational risk factors, Levene's significance value is quite less than 0,05 but 2-tailed significance value $0,296 > 0,05$. Therefore, locational mean differences between two groups are not statistically significant. On the contrary, organizational risks have bigger Levene's test value but their significance according to 2-tailed significance value is presented as $0,029 < 0.05$, which

make organizational risk factors statistically significant. The rest of the risk factors; which are economic, technical and social, all 2-tailed significance values are greater than 0,05. So, these results show that these three mean differences between two groups are not statistically significant.

Table 4.19 Risk Perception Graph of Group 1

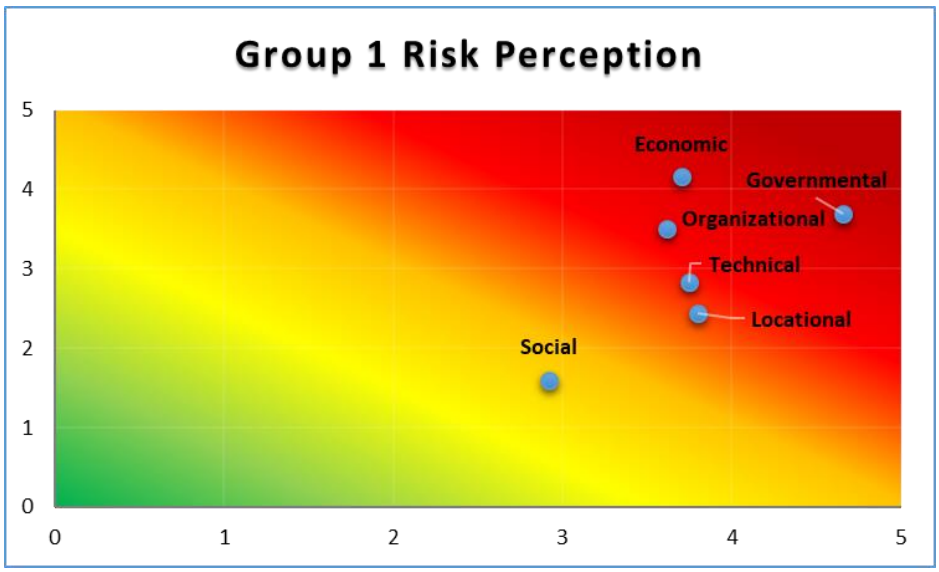


Table 4.19 represents the risk perception of the first group, who are the members of the main contractors and they work actively in the project. Their risk perception seems more critical than the second group and both governmental and economic risks may lead to catastrophic results for the project. Especially, the governmental risks are very probable for the project and economic risks would have the highest impact on the project. The other three risk factors are also in high risk categories and it is obvious that the first group members are cautious about the potential risks regarding to the project. Interestingly, the second most effective risk factor for the first group is the locational risks, since there are some actual problems related to the location of the project and they are aware of this problem. They evaluated the social risks as a low risk factor, and with these results it is easy to assert that they argue that the social risks are less likely to be

happened and they would cause damages that are easy to handle by the project team.

Table 4.20. Risk Perception Graph of Group 2

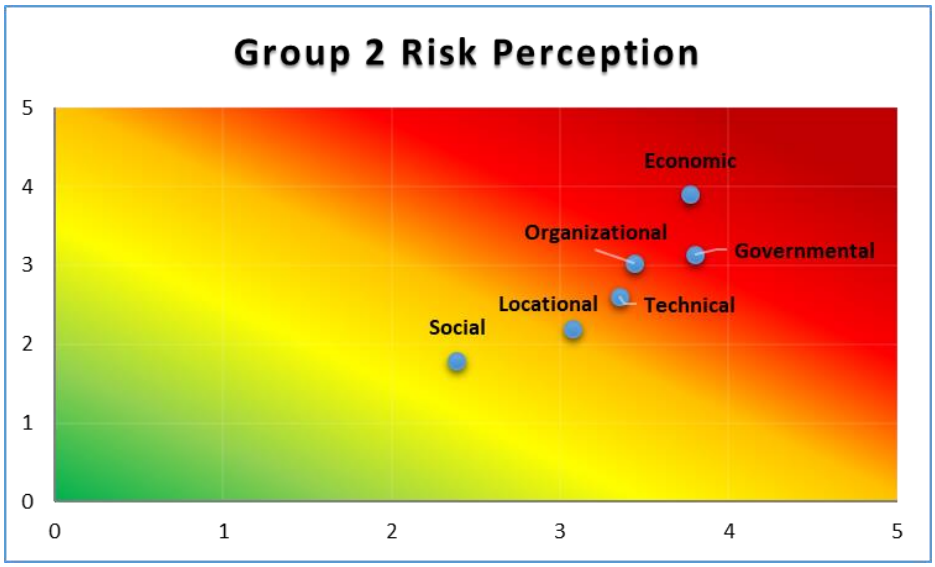
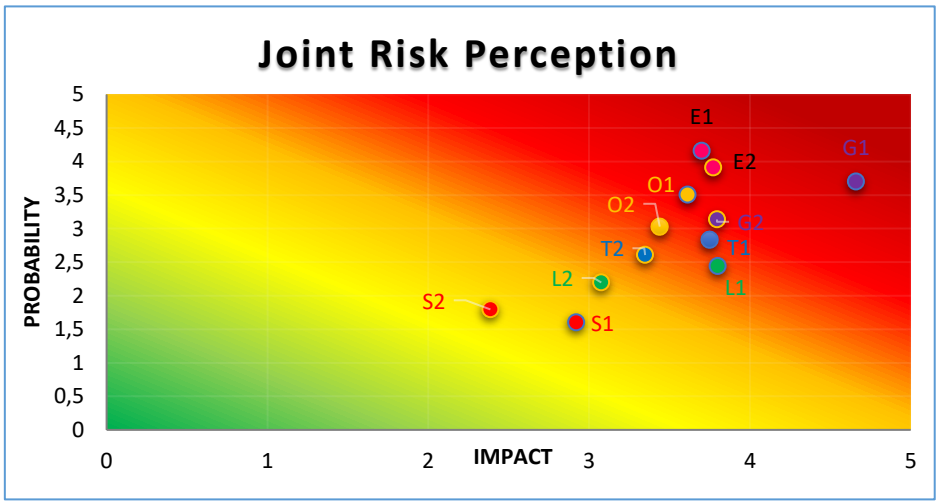


Table 4.20 demonstrates the risk perception of the second group, who take part in the project but not in the main project group such as the sector representatives, advisors etc... Their risk perception seems softer with respect to the first group, and they do not foresee any extreme risk factors for the project but their results show that the majority of the risk factors are quite risky and they should be under control in order to have healthier outcomes for the project. Similar to the first group, their top two risk factors are economic and governmental risk factors and both groups defend the idea that governmental and economic risk factors are quite critical for Automotive Test Center Project. Other three risk factors; which are organizational, technical and locational, have similar reactions from the both parties. Finally, the social risks even have less risk impact and probability comparing to the first group and the second group also evaluates them as low risk factors for the project.

Table 4.21 presents the joint risk perception of both groups and some differences between the risk factors. One of the reasons for the differences

between the mean values of two different groups might be their perspectives about the project since they are taking part in the different levels of the project. Another reason may be the fact that the project team is more conscious about the processes and stages of the project while the second group members are being informed about the project very seldom. On the other hand, second group members might have answered the questions more objectively while the first group members replied the questions specifically for this project.

Table 4.21 Joint Risk Perception Graph



CHAPTER 5

FINDINGS AND DISCUSSION

5.1. Survey Findings

According to the results of the survey study, the top five risk factors with the highest impact and probability are listed in the Table 5.1 as follow:

Table 5.1 Top 5 Risks for Impact and Probability

No	Risk Definition (Impact)	Mean
1	Rejection of investment decision regarding the project by the competent authorities.	4,51
2	Increase of project costs due to the increase of exchange rates.	4,21
3	Lack of adequate and qualified personnel in the project team.	4,02
4	Use of the budget allocated for the project for another investment / project.	4
5	Not determining the technical necessities and requirements for the project in a realistic way.	3,81
6	Lack of technical know-how and experience of project managers to be in a decision-making position.	3,81
No	**Risk Definition (Probability)**	**Mean**
1	Increase of project costs due to the increase of exchange rates.	4,49
2	Rejection of investment decision regarding the project by the competent authorities.	3,62
3	Increase in project costs due to the flow of funds to transfer know-how from abroad.	3,6
4	Lack of adequate and qualified personnel in the project team.	3,43
5	Loss of motivation in the project team due to the prolongation of the processes during the implementation of the project.	3,43
6	Use of the budget allocated for the project for another investment / project.	3,26

The stakeholders of the project have a strong idea on the impact of governmental risk of "rejection of investment decision regarding the project by the competent authorities". The common belief of the respondents on this risk factor is that the government is the biggest and the most direct authority on a governmental project and their sudden decision in cancellation of the project would cause the most catastrophic impact on the project. Haynes (2002) and Stoddart-Stones (1988) state that politics play a vital role in the activities of the project team and Georgieva (2012) alleges that bureaucratic problems as occurred in "Egypt – Saudi Arabia Bridge" and lack of political support are the key challenges of mega projects in developing countries.

The most probable risk factor for the all stakeholders is the escalation of the project costs due to the increasing exchange rates. Because of the fluctuant economy of Turkey in the last decades, the respondents foresee the potential risk of currency for the project. This risk factor is also evaluated by the respondents as the second highest impact on the project. Akarsu and Dilbaz Alacahan claim that exchange rate risk has different reasons and sources and is not easily predictable and affects directly the investment decisions of the countries (2019). Therefore, a specific attention should be paid on this specific factor and managed carefully.

The members of the project team also play crucial role according to the respondents of the survey. Number of the project team, their professions and expertise on the project topic occur as some of the most important elements on a project. Lack of adequate and qualified personnel in the project team may result in unexpected outcomes throughout the project. Lack of furnishing and directing high-qualified human resources (Georgieva, 2012; Baloyi and Bekker, 2011) and lack of skilled personnel - as occurred in 2010 FIFA World Cup Stadia in South Africa - are one of the important challenges in mega construction projects (Othman, 2013).

Therefore, the existence of professional team members and the enough personnel in the project are one of the riskiest elements for the projects.

Financial risks are the inevitable facts of a project cycle and these costs also should be managed meticulously by the managers of a project. However, the lack of knowledge, in other words, the lack of "know-how" on a specific topic or project results in the necessity of the knowledge transfer from the experts of the issue. This transfer process might be very costly for the firms and may cause financial problems. Deputy (2011) and Georgieva (2012) assert that lack of experience regarding to the megaprojects and high-level design knowledge would result in with unexpected outcomes as occurred in Toshka Project in Egypt. Specific to Automotive Test Center Project, since there is no past application in this field, know-how transfer from abroad becomes essential and it results in increase in project costs in foreign currencies. Respondents of the survey believe that this issue is also very likely for such large engineering projects.

Besides all these risk factors; the respondents argue that the utilization of the budget allocated for the project for another investment / project would cause serious problems for the project because of the high costs and not being so profitable in the short term for the governmental contractors of the project. Not determining the technical necessities and requirements for the project in a realistic way would bring serious problems along, not for the initial phases but for the future phases of such large engineering mega projects. Likewise, the respondents assert that the knowledge and experiences of the project managers or the decision-makers of the project play a vital role for carrying out a mega project. The lack of necessary experience and knowledge might have important impacts on the project, and that is why the project managers should have the necessary knowledge and experience about the project as well as the managerial skills for running mega projects.

Additionally, the respondents foresee the organizational risk factor that the loss of motivation in the project team due to the prolongation of the processes during the implementation of the project. The previous attempts for realization of the project were not successful for various reasons and the members of the project team might be anxious about the progress of the project. Lack of motivation and ambition in the project team may end up with undesired outcomes for the important steps of decision making and/or design processes of the project.

5.2. Interview Analysis

Apart from the survey study; the researcher, who is one of the project members of the main contractor, conducted an interview study with 5 people from different levels of hierarchy in the main contractor organization. 2 specialists, 2 managers and a senior manager responded 6 verbal questions. For the confidentiality, the interviewees are given numbers and their responses are exposed by using these numbers.

The first question was related to the risk distribution according to the responses of the survey respondents and they are asked about the ranking of the risk factors. All interviewees agreed on the rank of the economic risk factors as the riskiest factor of the whole project and the majority of the interviewees asserts that governmental risks play more critical role than organizational risks for the projects. For the economic risk factors, Interviewee 2 stated that *"The riskiest factor is the economic risk factors because of the latest fluctuations in Turkish economy and the currency rates."* For the governmental risk factors, Interviewee 4 mentioned that *"Since it is a governmental project, bureaucratical procedures play crucial role and all these risk factors naturally occurs in such projects."* It is also stated that the locational risks would be equal for each and every location in the world and they should be the least risk factors for the project.

The second question was regarding to the risk perspectives of the different groups for the risk factors. Interviewees claim that the differences between two groups are quite natural since their risk perception and contribution for the project would not be the same at all. The respondents think that since the majority of the second group members are the private sector representatives and they do not provide any financial contribution for the project; they are not aware of the bureaucratic procedures and the risk potentials for the project. Interviewee 4 stated that *"Private sector representatives just suggest ideas for the implementation, but they do not see what is actually happening."* Interviewee 5 asserted that *"The core project members should be pessimistic for the potential risks and be more aware of the real issues of the project."* Therefore, the different results between two groups seem very likely.

Third question was about the risk factors that are already under control by the project team. Interviewees declare that locational risks are being controlled successfully by the project team with continuous applications on the land of the Automotive Test Center Project. Besides, social risks are controlled by the main contractors and local municipalities with their big efforts. All interviewees assert that economic and governmental risks are quite hard to be under control since they have nothing to intervene to the economic and political situation of Turkey. Interviewee 2 declared that *"I do not feel secure in terms of organizational risks, since there are some negative approaches for the project within the main contractors."* Furthermore, most of the interviewees believe that the technical – especially technological - risk factors are the greatest risks that cannot be controlled and may harm the project life cycle at the highest level.

The fourth question was related to the prevention ways for the potential risk factors of the project by the stakeholders. The common idea of the interviewees is that the automotive sector representatives may convince the governmental organizations since they are in need of such a test center and

they spend a lot of money for performing these tests on abroad. Therefore, governmental risks would be prevented, and the process would be faster. Besides, these representatives may provide necessary information about the technical and technological development in automotive sector and facilitate handling the technical risks of the project for the future applications. Furthermore, the interviewees put forward an opinion about the economic risk factors that the representatives may provide financial contribution as well for some sections and phases of the Automotive Test Center Project.

The fifth question was regarding to the ranking of the risk factors if they would be the same for all governmental projects or if they are specific to the Automotive Test Center Project or not. For this question, there is a significant divergency between the interviewees. Specialists of the project team believe that the ranking of the risk factors would be the same for such governmental megaprojects since they would face with the same risk factors in a similar order. They allege that especially for economic and governmental risk factors, there would not be any change in terms of ranking, but their magnitude would vary while the rest of the ranking might differ slightly. In contrast with these opinions, the managers of the project team state that the results would be very different since the governments would have different approaches for different projects according to their priorities or strategic importance. Therefore, they believe that even economic and governmental risk factors would not cause any problem for some governmental projects.

The sixth and the last question was about their opinion regarding to the other potential risk factors that are not mentioned in this study and all interviewees have different opinions about other potential risk factors of the project. First, it is stated that the time would cause many problems for the validity of the feasibility project and technological developments and is believed that wasting time would worsen the other risk parameters as well. Second, the attitude of the partner organizations would be problematic

for realizing the project since most of the defense industry companies started to set up their own testing substructure. Therefore, they would not need such a test center and the need for Automotive Test Center would be questionable for the military stakeholders. Third, they assert that the personal competition between the organizations, their managers and the stakeholders would result in with serious issues for the correctness of the project. Finally, it is claimed that other political issues would change the priority of the defense industry and they would lose their interest and excitement for the Automotive Test Center Project.

5.3. Discussion

5.3.1. Theoretical Implications for the Literature

As it is stated in Chapter 2, most of the studies focus on the general risk management theories and methods. All these studies focus on public-private partnerships (PPPs) with large engineering projects basis. Most of the articles develop and argue different risk identification models, risk assessment methodologies and risk mitigation strategies for the organizations. This thesis study basically focuses on the initial phase of a pure governmental megaproject that has private and public, national and international stakeholders.

For the risk identification process, real-life experiences and the literature review were the main sources for the researcher. In this case, the opinions and experiences on the project of the core team members led the way of a successful risk identification. It is obvious that some of the risk factors might be missing because of the “vocational blindness” of the members, but the observations and experiences of the project members, partners and stakeholders would take part for the risk definition process.

For the risk assessment process, stakeholders play crucial for the evaluation of potential risks for such megaprojects since they mostly have the necessary information about the all dimensions of the project. However, the stakeholder analysis shows that the risk perceptions of the core project team might be quite different from the secondary stakeholders of megaprojects. The contribution of this study for the literature is that, risk assessment process shall not be underrated for the risk management applications, and while assessing the risks, different perspectives should be taken into the consideration. Moreover, in order to have healthier results for such assessment and mitigation processes, different type of stakeholder analysis might be applied by the decision makers of the projects.

In the literature, it is observed that the reason behind most of the unsuccessful projects are the negligence of the end users' and/or stakeholders'opinions and expectations. Megaprojects that are planned to serve for masses of people are needed to have a risk management plan and while preparing this plan, each and every stakeholder should be informed about potential risk factors. Regardless of the financial conditions, governmental support and the highest technology, all megaprojects are exposed to the potential risk factors. All these risk factors should be defined, assessed and mitigated by the professional and experienced managers and/or decision makers of the megaprojects.

5.3.2. Practical Implications for Managers

Managers or the decision makers for such megaprojects should be aware of all potential risk factors that would affect the performance of a megaproject from the beginning to the end. That is why, it is expected that they would have the necessary knowledge about each and every stages of a huge project. For instance, the initial design of the project, project team and the qualifications of the members, partners, stakeholders, suppliers, financial

conditions and budget, the location, infrastructure etc. All these parameters should be planned carefully and meticulously by the decision makers of the project. In order to be able to plan these parameters, the steps of risk assessment process should be applied precisely from the beginning. General risk management plan of a project is usually underestimated or ignored by the decision makers or it is transferred to the lower level personnel in the organizations who are not well-qualified about the project risk management. Experienced people about the projects should make their evaluations by considering all the possible risk factors and take actions accordingly.

As it is stated before, governmental and economic risk factors play crucial role for the successful projects both in practice and in the literature. Although these risk factors are not totally dependent to the managers and may vary from country to country, prevention methods for these risk factors should be applied since the early beginning and the projects should be managed with frequent controls about these parameters. Moreover, as the project members revealed during their interview sessions, some factors are quite hard to control, but also some of them may be solved easily with the "devoted efforts of the stakeholders and the main contractors". On the other hand, successful applications all around the world should be examined and adapted by the experienced project managers and the group members.

5.4. Limitations of the Thesis

This study about Automotive Test Center Project was limited by some parameters and these parameters should be considered.

First, this study has very small sample size since all the participants are the stakeholders of Automotive Test Center Project and the number of the people who worked/have been working for the project is very limited. The

study would have been conducted with a larger amount of people for another project and the results would be more precise than this specific case study. In order to develop and elaborate the results of the survey study, also some interviews are carried out with the project team members and the managers. In this sense, this interview study would be carried out with more people and the other stakeholders of the project in order to provide better contribution for the results of stakeholders' analyses.

Another limitation for this thesis is that the data collection process is conducted at a single point in time. Since the perceptions of the people may vary over larger time periods, longitudinal researches might result in accurately. The time spent for the project differ from person to person and this difference would provide more precise results if all the parties had larger experiences on this specific project.

5.5. Recommendations for Future Research

First of all, project management and risk management are two different topics which has many dimensions to be examined and investigated. The combination of these topics, which is called "project risk management", has also its own sub-dimensions to be researched and the topic is a living subject in the literature. Further researches would have beneficial findings for minimizing the risks in any kind of projects and it is thrilling to see the next advancements and contributions for the literature.

The focus of this study was the governmental megaprojects, and this was a single case study for a specific project that is being conducted in Turkey. In this study there would be more than one megaproject in Turkey, or also some megaprojects from other countries would be the part of this study. Therefore, different mega projects from different sectors would provide different findings as well. On the other hand, by adding more projects into

the study, it would have larger number of participants, so that the exploratory factor analysis would give healthier results for the same risk factors.

Number and the type of potential risk factors are restricted in this study since the questions of questionnaire were created with the findings from the literature and the brainstorming activity of the core project team. There might be numerous risk factors for a megaproject in real life applications, but there might be some vocational blindness and biases while creating the survey questions. Therefore, a larger study for various risk factors may be conducted in the further studies by researchers and practitioners.

Stakeholder analysis in the study is just conducted by dividing the respondents into two different groups as the core project team and other stakeholders of the project. However, during the data collection process by the questionnaire, the respondents are asked about their gender, educational backgrounds, titles, sectors and past experiences. Stakeholders may be divided into different groups according to their perspectives in terms of their gender, educational backgrounds, titles etc. Therefore, with a more comprehensive study, the risk perceptions of the groups would be presented.

Finally, this study is conducted for the megaprojects that have governmental main contractors. The majority of the megaprojects in the world are the products of public-private partnerships (PPPs) and because of this “mixture” in the contractors’ side, different risk factors may occur and thanks to the flexibility of the private sector members, some of the risk factors in this study would be omitted or would not be considered at all. Thus, the further researches may focus on different types of partnerships for the risk assessment of the megaprojects in the world.

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APPENDICES

A. STATISTICAL TABLES

Mean Differences of Groups and Statistical Data

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Governmental (I)	1	25	4,6600	,82563	,16513
	2	22	3,7955	1,06524	,22711
Locational (I)	1	25	3,8000	1,00922	,20184
	2	22	3,0758	,95359	,20331
Organizational (I)	1	25	3,6133	,67823	,13565
	2	22	3,4394	,93936	,20027
Economic (I)	1	25	3,7000	1,08012	,21602
	2	22	3,7727	,55048	,11736
Technical (I)	1	25	3,7467	,74554	,14911
	2	22	3,3485	,85280	,18182
Social (I)	1	25	2,9200	1,08666	,21733
	2	22	2,3864	,97507	,20789
Governmental (P)	1	25	3,7000	,94648	,18930
	2	22	3,1364	,67580	,14408
Locational (P)	1	25	2,4400	,97998	,19600
	2	22	2,1970	,56023	,11944
Organizational (P)	1	25	3,5067	,70789	,14158
	2	22	3,0303	,73398	,15648
Economic (P)	1	25	4,1600	,96523	,19305
	2	22	3,9091	,84002	,17909
Technical (P)	1	25	2,8333	,93045	,18609
	2	22	2,6061	,83182	,17734
Social (P)	1	25	1,6000	,81650	,16330
	2	22	1,7955	,86821	,18510

Independent Samples T-Test for Impact

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	Sig. (2-tailed)	Mean Difference
Governmental	4,466	,040	,003 ,004	,86455 ,86455
Locational	,007	,935	,015 ,015	,72424 ,72424
Organizational	2,331	,134	,467 ,477	,17394 ,17394
Economic	5,686	,021	,777 ,769	-,07273 -,07273
Technical	,331	,568	,094 ,098	,39818 ,39818
Social	1,079	,304	,085 ,083	,53364 ,53364

Independent Samples T-Test for Probability

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	Sig. (2-tailed)	Mean Difference
Governmental	6,068	,018	,025 ,022	,56364 ,56364
Locational	9,842	,003	,311 ,296	,24303 ,24303
Organizational	,052	,821	,029 ,029	,47636 ,47636
Economic	,076	,784	,350 ,346	,25091 ,25091
Technical	,083	,775	,385 ,381	,22727 ,22727
Social	,260	,613	,431 ,433	-,19545 -,19545

B. ETHICS APPR OVAL DOCUMENT

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09 Nisan 2019

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Melek Akın ATEŞ

Danışmanlığını yaptığınız **Buğra AYVAZOĞLU'nun "Devlet Eliyle Yürütülen Büyük Ölçekli (Mega) Projelerin Risk Faktörlerinin Değerlendirmesi: Otomotiv Test Merkezi Projesi Üzerine Vaka Çalışması"** başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüş ve **194-ODTÜ-2019** protokol numarası ile onaylanmıştır.

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C. TURKISH SUMMARY / TÜRKÇE ÖZET

Giriş

Projeler, tanım gereği, grupların veya şirketlerin, benzersiz bir ürün, hizmet veya sonuç oluşturmak için yürüttükleri geçici çabalardır (PMI, 2017). Bu benzersiz ürünler ve/veya hizmetler, kuruluşlardaki insanlar tarafından üniversiteler, kamu kuruluşları ve özel şirketler tarafından yönetilir. Bu benzersiz ürün veya hizmetleri oluşturmak için, bu süreç proje sahipleri ve karar vericiler ile proje grubu üyeleri tarafından titizlikle yönetilmelidir. Bu titiz çabanın ardındaki sebep, projelerin kendi içinde risk unsuru içermesidir. Bu risk unsurları, projenin başlangıcından itibaren, proje sırasında ve hatta projenin tamamlanmasından sonra dahi ortaya çıkabilir.

Normal projelerin daha büyük bir ölçeği olan megaprojeler, elde edilmeye çalışan hedef düzeyleri, paydaş katılımı, teslim süreleri, karmaşıklık ve etki bakımından düzenli projelerden tamamen farklı olduklarından normal projelerden farklı risk faktörlerini içerir (Shenhar ve Holzmann, 2017). Dünyada büyük kitlelerin kullanım alanına girdikleri için megaprojeler çoğunlukla toplumların yararına sunulmaktadır. Bu nedenle, bu tür projelerin risk yönetimi daha önemli hale gelir ve düzgün yürütülebilmesi amacıyla yüksek öneme haizdir.

Otomotiv Test Merkezi Projesi, Türk Hükümeti tarafından Türk Standardları Enstitüsü'nün görevlendirildiği projelerden biridir ve bu megaproje, hükümetin ve otomotiv sektörünün hayata geçirebilmek amacıyla yüksek düzeyde istek duyduğu, büyüklüğü, bütçesi bakımından çok yüksek düzeyde karmaşıklık seviyesine sahiptir. Ayrıca Türkiye ve bölgedeki diğer ülkeler için tecrübe ve bilgi birikimi açısından büyük etkisinin olması beklenmektedir.

Her proje için öngörülebilen ve öngörülemeyen risk faktörleri mevcuttur, ancak ne yazık ki bir projedeki muhtemel büyük/küçük bütün riskleri yönetebilecek herhangi bir yüklenici yoktur (PMI, 2017). Bu nedenle risk tespiti/tanımı, risk değerlendirmesi, risk azaltma kavramları, her türlü proje için daha sağlıklı sonuçlar almak amacıyla çok daha önemli hale gelir.

Otomotiv Test Merkezi Projesi'nde de diğer megaprojelerde olduğu gibi çeşitli risk faktörleri mevcuttur. Bu özel projenin ilk aşamasında, bu risk faktörleri devlet, ekonomik, örgütsel, teknik ve sosyal risk faktörleri olarak bazı başlıklar altında sınıflandırılmaktadır. Projenin ana yüklenicileri, tüm bu faktörlerin farkında olmalı ve ayrıntılı bir risk yönetimi çalışmasıyla olası tüm risk faktörlerinden kaçınmaya çalışmalıdır.

Araştırma Hedefleri

Çalışmanın bu bölümünde, tezin temel amaçları teorik ve yönetsel hedefler olan iki farklı perspektifte sunulacaktır.

Teorik Hedefler

Proje yönetimi büyük kuruluşlar, sektörler ve hatta hükümetler için çok önemli bir konudur. Öte yandan, risk yönetiminin önemi günden güne önemli ölçüde artmakta, gelişen teknolojiler ile birlikte gündelik hayatımızda da bazı belirsizlikler ortaya çıkmaktadır. Farklı ülkelerde farklı kuruluşlar tarafından gerçekleştirilen birçok başarılı ve başarısız proje olduğu bir gerçektir. Megaprojelerin ölçeği nedeniyle, gerçekleştirilmeleri için büyük miktarda para harcanmakta ve istenmeyen sonuçlar, kurumlar için para, zaman, çaba ve itibar kaybı ile sonuçlanmaktadır.

Literatürde, büyük mühendislik projelerine ve temel risk faktörlerine (Miller ve Lessard, 2001) ve kamu-özel ortaklık (PPP'ler) tipi projelere ağırlıklı olarak yer verilmektedir. (Zou, Kumaraswamy, Chung & Wong, 2014). Bununla birlikte, bu çalışma kamu kuruluşları tarafından, bir başka deyişle devlet eliyle yürütülen megaprojelere odaklanmakta ve proje risk yönetimi literatüründeki boşluğu doldurmayı amaçlamaktadır.

Ek olarak, Otomotiv Test Merkezi Projesi hem ulusal hem de uluslararası düzeyde kamu ve özel kuruluşlardan çeşitli paydaşlara sahiptir. Bu nedenle, bu tez çalışması, bir megaprojenin paydaşlarının farklı ülkelerden ve farklı seviyelerden risk algılarını ortaya koyabilmeyi amaçlamaktadır. Böylece bu çalışmayla kamu kurum/kuruluşları ile diğer paydaşlar için ilişki yönetimi konusunda literatürdeki boşluğun doldurulması hedeflenmektedir.

Yönetimsel Hedefler

Otomotiv Test Merkezi Projesi'nin ana yüklenicileri, projeyi karar vericilerin kararları ile yürütmektedir, ancak bu derece büyük ölçekli bir devlet projesi için somut bir risk yönetimi planı bulunmamaktadır. Bu çalışma, potansiyel risk faktörlerinden korunmak için Otomotiv Test Merkezi Projesi yöneticileri için ipucu vermeyi amaçlamaktadır ve bu ipuçları çalışmanın risk tanımlama/belirleme aşaması aracılığıyla sağlanacaktır.

Bu tez çalışması; veri toplama sürecinden sonra, başka bir deyişle, risk değerlendirme sürecinden sonra, karar vericiler için olası riskler hakkında faydalı sonuçlar elde etme ve konuyla ilgili yöneticiler ve paydaşlar için bilinçlendirme hedefi taşımaktadır. Öte yandan, bu sonuçlar diğer devlet eliyle yürütülen megaprojeler için uygulanabilir ve dünyadaki diğer proje yöneticileri için faydalı olabilir.

Ek olarak, paydaşlar için gerçekleştirilen risk analizi, Otomotiv Test Merkezi Projesi için paydaşların risk algısı hakkında fikir vermektedir. Paydaşların çoğu, projenin son kullanıcısı veya know-how sağlayıcısı olup projeyle ilgili farklı bakış açıları, bu paydaşların projeye yaklaşımları hakkında güçlü ipuçları verecektir.

Araştırma Soruları

Otomotiv Test Merkezi Projesi, 90'lı yılların ortalarında yapımına karar verilen ve yürütülmeye başlatılan bir devlet projesidir. Bu süreçte projenin yerinin, yöneticilerinin, karar vericilerinin, ilgili bakanların ve hatta hükümetlerin bile değişikliğinin gerçekleştiği birçok gelişmeye şahit olunmuştur. Projenin başlangıcından yaklaşık 20 yıl sonra, ana yükleniciler tarafından bazı adımlar atılarak kararlar alınmış durumda olunmasına rağmen proje için belirli bir risk yönetimi çalışması bulunmamaktadır. Bu nedenle çalışmanın ana araştırma sorusu şöyledir:

"Devlet eliyle yürütülen mega projeleri etkileyen önemli risk faktörleri nelerdir?"

Otomotiv Test Merkezi özelinde devlet mega projeleri için önemli risk faktörlerinin belirlenmesinden, başka bir deyişle, risk tanımından sonra; Risk yönetiminin bir sonraki adımı olarak, projeler için risk değerlendirme yaklaşımı uygulanmalıdır. Dolayısıyla, çalışmanın diğer bir araştırma sorusu ise şöyledir:

"Risk faktörleri ne ölçüde devlet eliyle yürütülen mega projelerini etkiliyor?"

Risk faktörlerinin değerlendirilmesi süreci, projelerin risk faktörlerinin yönetilmesi için belli girdiler sağlar. Bu risk yönetimi seviyesinde, ana

yükleniciler tarafından bu risk faktörleri göz önünde bulundurularak ve projenin başlangıç aşamasını yöneterek risk azaltma yöntemleri geliştirilebilecektir. Ancak, bu noktada, risk değerlendirmesi için daha iyi sonuçlara sahip olmak için, tüm paydaşların risk algısı da incelenmelidir. Chapman ve Ward, bir proje için paydaşların bakış açılarını ve diğer etkilenen tarafları içeren bir risk yönetimi çerçevesi önermektedir. Dolayısıyla, bu tez çalışmasının son araştırma sorusu şu şekildedir:

"Ana yükleniciler ile hükümet mega projelerinin paydaşları arasındaki risk algı farkı nedir?"

Risk Değerlendirme Faktörleri

Risk yönetimi kavramında risk değerlendirmesi farklı adımlardan oluşmakta ve risk faktörleri farklı unsurlara ve konulara göre sınıflandırılmaktadır. Her şeyden önce, bu faktörler genel olarak ve belirlenmiş çerçevede planlanır ve tanımlanır. Daha sonra, nitel ve/veya nicel risk değerlendirmesi farklı metotlar kullanılarak yapılır ve son adım olarak tüm bu riskler proje ekibi üyeleri tarafından kontrol altına alınarak izlenir. Tüm bu adımlar tekrar eden eylemlerdir ve gerektiğinde en başından başlayabilir. Mega projelerde bu değerlendirme süreci aynı zamanda maliyet-fayda analizinin yapılmasına da yardımcı olur ve bu faktörlerin çoğu projeyi etkileyen gerçek konular olduğundan oldukça önemli ve göz önünde bulundurulması gereken faktörlerdir (Diéguez, Cazorla ve Luque, 2014).

Otomotiv Test Merkezi Projesi, bir devlet mega projesi olmanın doğal sonuçları olan beş ana risk faktörü altında incelenmiştir. Bu riskler devlet riskleri, örgütsel/organizasyonel riskler, ekonomik riskler, teknik riskler ve sosyal riskler olarak sınıflandırılabilir.

Devlet Riskleri / Devlet Kaynaklı Riskler

Devlet riskleri tanımlanması ve tanımlanması kolay risk faktörleridir, ancak proje paydaşlarından ve projenin kendisinden bağımsız olduğu için kontrol edilmesi zordur. Bu yasal / politik riskler, risklerin, projenin karar alma mekanizmaları, hükümet düzenlemelerinde değişiklik ve değişikliklerin aktörleri olarak uygulandığı ülkenin yönetim stratejisindeki değişikliklerden kaynaklandığı şeklinde tanımlanmaktadır (Diéguez ve diğ., 2014). Liu, ve diğ., (2016) göre, meşruiyet ve prosedür riski faktörleri, projenin meşru bir şüphe çekmemesi için mevcut yasalara, politikalara ve düzenlemelere uymasını sağlamak için kullanılır. Iyer ve Sagheer (2010), devlet risklerini doğrudan / dolaylı politik riskler, yasal riskler ve izin / onay riskleri olarak birkaç kategoride sınıflandırmaktadır. Doğrudan / dolaylı riskler, doğrudan yasalardaki değişiklikler, ruhsatların reddedilmesi veya iptal edilmesi ile ortaya çıkan risklerdir ve dolaylı olarak bir savaş, isyan, terörist veya askeri saldırı, boykot ve tezahürler vb. nedeniyle de ortaya çıkabilir. Proje, yerel düzenlemeler ve yerel anayasanın kuralları çerçevesinde uygulanmaktadır. İzin ve onay riskleri çoğunlukla, hükümetin çok sayıda kurum ve kuruluşunun onayından ve ayrıca kurumlar arasındaki koordinasyon eksikliği gibi bürokratik eylemlerden kaynaklanmaktadır. Giezen (2012), devlet risklerini, projenin aktörlerinin rotasyonu veya projenin sahiplerinin takip edeceği yasal prosedürlerle doğrudan ilgili olan bürokratik işlemlerin değişmesi ve projeye ilişkin bürokratik riskler olarak açıklamaktadır. Ancak, projenin sorunsuz bir şekilde uygulanmasıyla ilgili muhtemel tehditlerden kaçınmak için bu riskler daima göz önünde bulundurulmalıdır. Miller ve Lessard (2001), devlet risklerini, hükümetten gerekli izinleri alamama ve hükümetin tüm sözleşmeleri, mülkiyet haklarını veya imtiyazlarını yeniden müzakere etmeye karar vermesi olasılığını belirleyen düzenleyici risk olarak tanımlamaktadır.

Örgütsel Riskler

Ortaklık bazlı riskler ve örgütsel riskler, paydaşların, ortakların, yöneticilerin, proje ekibinin ve projede rol oynayan çalışanların neden olduğu risk faktörleridir. Diéguez ve diğ. (2014) bu riskleri, eşitlik ve sözleşmelerdeki belirsizliğin neden olduğu sözleşmeli riskler ve "nehir ortasında at değiştirmek", yani projede belirli bir ilerleme kaydedildikten sonra proje yöneticileri ve/veya karar vericileri tarafından proje kapsamında yapılan köklü değişiklikler olarak özetlemektedir. Iyer ve Sagheer (2010), bu riskleri, açık fonksiyonel alanlara sahip yapı eksikliği ile yetersiz performansın ve proje ortaklarının ve paydaşlarının projeye katkısı nedeniyle ortaya çıkan riskler olarak tanımlanabilecek olan ortak risk olarak iki farklı kategoride ifade etmektedir. Projeyi belirli zaman çizelgelerinde sonlandırmayı başaramamak olarak ifade edilen zamanlama riski ise ortaklık bazlı ve örgütsel riskler için öne sürdükleri başka bir unsurdur. Miller ve Lessard (2001) terimi, gelecekteki gelir akışının gerçekleşmemesi ihtimali olan operasyonel risk olarak açıklamaktadır. Yüklenici seçimi riski, risk yönetimi uzman eksikliği riski, program gecikme riski (Park ve diğ., 2016), işgücü verimliliğinin düşüklüğü riski, taraflar arasındaki sözleşme anlaşmazlıkları ve projenin görünürlüğünün olmaması (Qazi ve diğ., 2016) ortaklıktan kaynaklı ve örgütsel diğer risk faktörleri olarak literatürde yer verilen faktörleridir.

Ekonomik Risk Faktörleri

Ekonomik risk faktörleri, projelerin her aşaması için büyük öneme sahiptir ve ayrıca projelerin paydaşları için çok önemli avantaj ve dezavantajlara neden olabilir. Diéguez ve diğ. (2014) finansal ve ekonomik riskleri, finansal sınırlamalar, fonların uygunluğu, döviz kurları ve megaprojeler için uzun vadeli faiz oranları olarak açıklamaktadır. Liu ve diğ. (2016) ise kavramı, proje arazisinin değerinin ve malzeme fiyatının, mikroekonomik

etkiler olarak adlandırılan, yerel KOBİ'ler üzerinde psikolojik olarak baskı yaratacağı ve aynı zamanda yerel üreticiler veya sektördeki aktörlerin projenin çıkarları üzerinde sorun oluşturabilecek riskleri yaratacağı şeklinde iki farklı yaklaşımla açıklar. Iyer ve Sagheer (2010) projeler için ekonomik riskleri üç başlık altında açıklamaktadır. Birincisi, finansal kapanma riskinde gecikme olarak adlandırılan projenin özkaynak ve borç dengesindeki dengesizlik, ikincisi, projeyi planlanan bütçe dahilinde sonuçlandırmayı ve genel olarak fiyat artışını yönetememek. Projeler için son potansiyel ekonomik riske enflasyonu, döviz kurundaki ve faiz oranlarındaki parametrelerin hızlı değişimini içeren finansal risk denir. Giezen (2012), finansal riskleri, Miller ve Lessard'ın (2001), proje ihtiyatlı bir getiri sağladığında taraflar arasında tatmin edici bir risk paylaşımı düzenlemesi planlamak için körlükle ilgili aynı riski açıkladığı durumlarda, proje maliyetlerini düşürmekte olduğu anlamına gelir.

Teknik Risk Faktörleri

Teknik riskler çoğunlukla projelerin teknolojik, idari ve teknik unsurları ile ilgilidir. Bu risk faktörleri, proje ekibinin proje yönetimi ve projenin kendisi hakkındaki deneyimleri ve know-how seviyesi ile doğrudan bağlantılıdır. Diéguez ve diğ. (2014) megaproje teknik risklerini işletme ve bakım riski, tasarım riski ve inşaat riski olmak üzere üç ana kavram altında sınıflandırmaktadır. Tasarım riski, sözleşmelerin düzenlenmesi, plan ve kapsam kontrolü, projenin genel tasarımı ve projenin teslim edilmesi gibi konularla ilgili olarak projenin planlama döneminde ortaya çıkan risk olarak tanımlanmaktadır. İşletme ve bakım riski, işletme kapasitesi, hizmet kalitesi ve projenin ekonomik uygulanabilirliği ile ilgili risklerle karakterize edilir. Projelere ilişkin inşaat riskleri, maliyet ve bütçe aşımları, projenin zamanlaması, paydaşlar arasında koordinasyon ve iletişim sorunu ile projenin uygunsuz tasarımı olarak açıklanmaktadır. Liu ve diğ. (2016) teknik riskleri, teknik bakış açısıyla ele alınan fizibilite riski adı altında ele

alarak, projenin finansal düzenlemeler, işgücü desteği, malzeme temini ve konumlandırma limitleri gibi potansiyel sınırlamaları üzerinde kapsamlı bir gözden geçirme işleminden geçtiğini tartışmaktadır. Iyer ve Sagheer (2010) aynı zamanda teknik riskleri tasarım ve gizli etki riski ve teknoloji riski olarak tanımlamaktadır. Ayrıca belirsiz şartnameler ve programlar, hatalar ve tasarımdaki başarısızlıklar, yanlış jeoteknik ve jeolojik incelemelerin tasarım ve gizli etki riski olduğunu ifade etmiş ve projenin tasarım ve yapım aşamalarında teknolojinin uygunsuz kullanımını da teknik birer risk faktörü olarak tanımlamıştır. Giezen (2012), teknolojik risk faktörlerini, proje içerisinde belirli bir teknolojiyi kullanma kararlarını kapsayan teknoloji ve know-how riski olarak tanımlamaktadır ve proje zamanlamasının proje yönetimi üzerinde büyük bir baskı oluşturabileceğini iddia etmektedir. Benzer şekilde Miller ve Lessard (2001), mühendislik ve yenilik zorluğunu gösteren teknik risklerin ve bu risklerin çoğunun teknoloji ve projede kullanılan tasarımda önemli olduğunu iddia etmektedir. Ayrıca, paydaşlarla taraflar arasındaki zorlukların, yüklenicilerin proje öncesi ve sırasında karşılaşabilecekleri sorunların yapısal birer risk olarak tanımlandığını da öne sürmüştür.

Sosyal Risk Faktörleri

Sosyal kabul edilebilirlik riskleri olarak da bilinen sosyal riskler, projelerin çevresel ve sosyal yönleriyle bağlantılı risk faktörleridir. Diéguez ve diğ. (2014), sosyal riskleri müşterilerin, toplumun ve bölge sakinlerinin risk algısını etkileyen kullanıcı risklerinin, bir bölgenin yerel halkının görüşlerinin göz önünde bulundurulmayarak ele alınmadığı durumlarda halkın riskin kaynağı olduğu durumlar olarak tanımlamaktadır. Liu ve diğ. (2016), yerel halkın onlarca yıl boyunca yaşadıkları çiftliklerini terk etmeleri ve böylece projenin başlatılmasını önlemeye çalışmaları için teşvik edilmesini sosyal risklerden biri olarak açıklamaktadır. Iyer ve Sagheer (2010) sakinleri ve çevre protestocularının protesto faaliyetlerinin

diğer bir sosyal risk faktörü olduğu fikrini savunmaktadır. Aynı şekilde, Giezen (2012) yerel halkın projeye karşı olacağı fikrini ve buna benzer küçük sorunların proje yaşam döngüsü boyunca büyük sorunlara yol açabileceğini iddia etmektedir. Miller ve Lessard (2001) ise sosyal riskleri tanımlarken projenin sponsorlarının bölge halkının ve çevreye duyarlı grupların yerel ve ulusal düzeyde direnişiyle karşı karşıya gelme ihtimalinden bahsetmektedir.

Araştırma Yaklaşımı

Çalışmanın ilk amacı, çıktıların bulgularını bir organizasyonda halen karşılaşılan spesifik proje sorunlarını çözmek için uygulamaktır (Sekaran ve Bougie, 2016). Bu nedenle, bu tür bir araştırma uygulamalı bir araştırma olarak sınıflandırılmıştır, ancak proje yönetimi literatüründeki problemler için teorik çözümler de bulmaya yardımcı olduğu için temel bir araştırma olarak da düşünülebilir.

Bu tez çalışması korelasyonel bir çalışmadır çünkü megaproje ile ilgili kritik faktörleri belirlemek için yapılmış olup söz konusu çalışma, olayların doğal olarak sürdüğü olağan bir ortamda gerçekleştirilir, bu nedenle çalışmanın kararsız bir ortamı vardır (Sekaran ve Bougie, 2016). Anketin çıktılarını gözlemlemek ve herhangi bir dış etkiye maruz kalmadan mülakat çalışmalarını gözlemlemek için müdahale seviyesi minimumdur.

Bu tez çalışması, tek bir projeyi, Otomotiv Test Merkezi projesini detaylı bir şekilde inceleyerek tek bir vaka çalışması yaklaşımı benimsemiştir. Veriler, arşiv verilerinin kullanılması, anket yapılması ve kilit paydaşlarla ikili görüşmeler gerçekleştirilmesi gibi çeşitli kaynaklar aracılığıyla toplanmıştır. İnsanlardan fikir ve tutumlarını belirlemek veya karşılaştırmak amacıyla bilgi toplamak için genellikle anket çalışmasına yer verilir (Sekaran ve Bougie, 2016). Çalışma, paydaşların görüşleri ve

risk algıları ile ilgili olup anket oluşturmanın birincil veri toplama yöntemi olarak seçilmesinin nedeni budur. Diğer taraftan anketler tarafından toplanan verilerin detaylandırılması için proje grubu üyeleri ile sözlü mülakat çalışması da gerçekleştirilmiştir. Ayrıca, çalışma zaman kısıtlamaları yönüyle enlemesine (kesitsel) bir çalışma olarak değerlendirilmektedir.

Araştırma Tasarımı

Analiz Birimi

Bu tez çalışması tek bir vaka çalışması olduğundan, bu araştırmanın analiz birimi Otomotiv Test Merkezi Projesidir. Kilit bilgi kaynakları, Türkiye'deki Otomotiv Test Merkezi Projesi'nin paydaşlarıdır ve katılımcılar kuruluşlarını farklı seviyelerden farklı unvanlarla temsil etmektedir. Anket için 20 kurum, kuruluş ve şirket listesi belirtilmiş olup temsilcilerinin araştırmaya katılmaları istenmiştir. Anket çalışması söz konusu katılımcılara aktif olarak Otomotiv Test Merkezi Projesinde yer aldıkları ve proje hakkında baştan sona yeterli bilgi sahibi oldukları için iletilmiştir.

Örneklem Tasarımı

Tez çalışmasının bu bölümünde örneklem tasarımı ayrıntılı bir şekilde ifade edilerek katılımcılar ve paydaş kuruluşları ile ilgili seçimlere yer verilmektedir.

Proje risk yönetimi tüm dünyada geniş bir konudur ve bir kuruluş için risk faktörleriyle ilgili çok sayıda çalışma vardır. Risk değerlendirme süreci, herhangi bir proje türü için çok önemli bir faaliyettir, ancak proje büyüklüğü arttıkça ve projelerin aktörleri devlet kuruluşları olduğunda

konu daha kritik hale gelir. Bu nedenle, bu çalışma için Türkiye'nin en büyük devlet megaprojelerinden biri olan Otomotiv Test Merkezi Projesi seçilmiştir. Böylesine büyük bir projede kullanılmak üzere veri toplayabilmek ve istatistiksel analiz yapabilmek için, çekirdek proje grubu ve projede farklı roller üstlenen tüm paydaşlar seçilmiştir. Veriler, projenin iki ana yüklenicisinden, bir ana altyükleniciden ve Türkiye, İspanya, Fransa ve Güney Kore'deki 17 farklı paydaş kuruluştan derlenmiştir. Tüm paydaşlar otomotiv sektörünün üyeleridir ve baştan sona Otomotiv Test Merkezi Projesi hakkında deneyimli ve bilgi sahibi olan kişilerden müteşekkildir. Bu veriler farklı seviyelerde ve farklı unvanlarda görevlerini sürdüren paydaşların çalışanlarından toplanmaktadır. Bu nedenle, bu örneklem çalışmasında örneklem olarak amaçlı örnekleme kullanılmıştır, çünkü bu insanlar projede yer alan çok özel kişilerdir ve bu çalışma için gerekli ve kilit bilgileri sağlayabilirler (Sekaran ve Bougie, 2016). Bu örnekleme tasarımı sonucunda, 17 paydaş kuruluştan 68 katılımcı bu çalışmaya katılmaya uygun görülmüştür.

Bulgular

Projenin paydaşları, devletin “projeye ilişkin yatırım kararının yetkili makamlarca reddedilmesi” riskinin etkisi konusunda güçlü bir fikre sahipler. Ankete katılanların bu risk faktörü üzerindeki ortak inancı, hükümetlerin devlet eliyle yürütülen projelerde en büyük ve en doğrudan otorite olduğu ve projenin iptali konusundaki ani kararlarının proje üzerinde oldukça büyük bir etkiye neden olacağı yönündedir. Haynes (2002) ve Stoddart-Stones (1988), proje ekibinin faaliyetlerinde siyasetin hayati bir rol oynadığını, Georgieva (2012) da mega projelerin gelişmekte olan ülkelerdeki temel zorluklarına örnek olarak “Mısır-Suudi Arabistan Köprüsü”nde meydana gelen bürokratik sorunların ve siyasi destek eksikliğinin projeyi büyük ölçüde etkilediği fikrini savunmaktadır.

Tüm paydaşlar için en muhtemel risk faktörü, artan döviz kurlarından dolayı proje maliyetlerinin artmasıdır. Türkiye'nin son yıllardaki dalgalı ekonomisi nedeniyle, katılımcılar proje için potansiyel para riski öngörmektedirler. Bu risk faktörü, katılımcılar tarafından da projenin ikinci en büyük etkisi olarak değerlendirilmektedir. Akarsu ve Dilbaz Alacahan (2019), döviz kuru riskinin farklı sebep ve kaynaklara sahip olduğunu, kolay öngörülebilir olmadığını ve ülkelerin yatırım kararlarını doğrudan etkilediği düşüncesini savunmaktadır. Bu nedenle, bu özel faktöre özel bir dikkat gösterilmeli ve dikkatle yönetilmelidir.

Ankete katılımcılarına göre proje ekibinin üyeleri de proje üzerinde çok önemli bir rol oynamaktadır. Proje ekibindeki personel sayısı, personelin meslekleri ve proje konusundaki uzmanlığı bir projedeki en önemli unsurlar olarak değerlendirilmektedir. Proje ekibinde yeterli ve nitelikli personel bulunmaması, proje döngüsü boyunca beklenmeyen sonuçlara neden olabilir. Nitelikli insan kaynağını sağlama ve yönetme eksikliği (Georgieva, 2012; Baloyi ve Bekker, 2011) ve vasıflı personel eksikliği - Güney Afrika'daki 2010 FIFA Dünya Kupası Stadyumu'nda olduğu gibi - mega inşaat projelerinde önemli zorluklardan biri olarak değerlendirilmektedir (Othman, 2013). Bu nedenle, profesyonel ekip üyelerinin varlığı ve projedeki yeterli personel, projeler için insan kaynaklı risk faktörlerinin azalmasına yardımcı olmaktadır.

Finansal riskler, bir proje döngüsünün kaçınılmaz gerçekleridir ve bu maliyetler de proje yöneticileri tarafından titizlikle yönetilmelidir. Bununla birlikte bilgi eksikliği, başka bir deyişle, belirli bir konuda veya projede “know-how” eksikliği, konunun uzmanlarından bilgi transferinin gerekliliği ile sonuçlanır. Bu bilgi transferi işlemi firmalar için çok maliyetli olabilir ve firmalar için finansal sorunlara neden olabilir. Deputy (2011) ve Georgieva (2012), megaprojelere ve üst düzey tasarım bilgisine ilişkin deneyim eksikliğinin, Mısır'daki Toshka Projesi'nde beklenmeyen sonuçlara yol açtığını öne sürmektedirler. Otomotiv Test Merkezi

Projesi'ne özgü olarak, Türkiye'de bu alanda geçmiş bir uygulama mevcut olmadığından, yurtdışından know-how transferi elzem olup yabancı para birimlerinde yapılan ödemeler neticesinde proje maliyetlerinde artışa neden olur. Ankete katılanlar, bu sorunun bu tür büyük mühendislik projeleri için de muhtemel olduğuna inanmaktadır.

Tüm bu risk faktörlerinin yanı sıra; katılımcılar, proje için tahsis edilen bütçenin başka bir yatırım / proje için kullanılmasının, yüksek maliyetler nedeniyle proje için ciddi sorunlara yol açacağını ve projenin devlet temelli ana yüklenicileri için kısa vadede çok kârlı olmayacağını savunmaktadırlar. Proje için teknik gereklilikleri ve şartları gerçekçi bir şekilde belirlemek, ilk aşamalar için değil, bu büyük mühendislik mega projelerinin gelecekteki aşamaları için ciddi sorunlar doğuracaktır. Aynı şekilde, katılımcılar, proje yöneticilerinin veya projenin karar vericilerin bilgi ve deneyimlerinin bir mega projenin yürütülmesinde hayati bir rol oynadığını iddia etmektedir. Gerekli deneyim ve bilgi eksikliğinin proje üzerinde önemli etkileri olabilir ve bu nedenle proje yöneticilerinin mega projeleri yürütmek için yönetsel becerilerin yanı sıra proje hakkında gerekli bilgi ve deneyime sahip olmaları gerekir.

Ayrıca, katılımcılar, proje ekibindeki motivasyon kaybının, projenin uygulanması sırasındaki süreçlerin uzaması nedeniyle örgütsel risk faktörünü tetikleyebileceğini öngörmektedir. Projenin hayata geçirilebilmesi adına geçmişte yapılan girişimler çeşitli nedenlerden dolayı başarılı olamadığından proje ekibi üyeleri projenin ilerleyişi konusunda endişeli bir tutum sergileyebilmektedirler. Proje ekibinde motivasyon ve hırs eksikliği, projenin karar verme ve / veya tasarım süreçlerinin önemli aşamaları için istenmeyen sonuçlar doğurabilir.

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TEZİN ADI / TITLE OF THE THESIS (**İngilizce** / English) : Identifying and Managing Risk in Mega-Projects: The Case of Automotive Test Center Project in Turkey

TEZİN TÜRÜ / DEGREE**:** **Yüksek Lisans** / Master ☐ **Doktora** / PhD ☐

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