



Department of Management

Teaching Management of Innovation

**THE RISK OF EARLY OBSOLESCENCE OF LONG-LIVED  
ASSETS SHARED AMONG BUYER AND SUPPLIER:  
A SOLUTION FOR CITY SIGHTSEEING ROME**

SUPERVISOR:

Professor Maria Isabella Leone

CO- SUPERVISOR:

Professor Stefano Za

CANDIDATE

Eugenio Beretta  
Matr. 702981

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## MANAGEMENT SUMMARY

The on-wheel transportation industry is rapidly changing, due to the introduction of the electric engine, scheduled to progressively substitute the endothermic ones operating today. This process exposes companies, that make profits from transport related services, to several risks which could potentially have a disruptive effect on their business. In this context, it is necessary to find a way to mitigate the aforementioned risk sources, ensuring the acquiring company about the reliability of the assets they are buying.

The following case study will expose how contracts could have a beneficial effect on the subdivision of risks between buyers and suppliers, with specific regard to what will be introduced as “obsolescence risk”. The findings will also be tested to verify the impact of risk-sharing contractual clauses on the supplier selection process.

The research starts with a review of existing studies regarding the theoretical topics being investigated, then the specific case, regarding City Sightseeing Roma is introduced, reporting data collection, analysis and conclusions.

City Sightseeing Roma is a company operating in the touristic sector, founding its business on the transportation of people through the historic center of the City of Rome. The service is provided with a particular kind of buses, roofless double-deckers, today all motorized with endothermic engines. The company perceives the necessity to move to electric vehicles but, at the same time, is aware of the complexity and riskiness of the aforementioned transition process; therefore, it commissioned the following research to investigate the situation it is currently facing.

## **PREFACE**

After this study I realized how the increase of technological complexity creates challenges to business and companies on several and different aspects. The relationship between buyers and suppliers in a specific supply chain is a crucial element to be considered to manage the introduction of a major innovation in a business segment.

I want to sincerely thank my company supervisor, Mauro Braghese, for choosing me to carry out this company research, as well as my thesis supervisor, Chintan Kella, who has helped me to organize my confused ideas and has taught me how to carry out a research in an academically correct way.

This work is dedicated to all my family, who always supported me through my academic career, with an effort that cannot be put into words.

Special thanks go to Federica and Chiara, who, with me, successfully completed the challenge proposed by this study program and, without whom, I would not be writing the last word of my master thesis now

## TABLE OF CONTENETS

1 INTRODUCTION .....	1
1.1 Problem Identification .....	1
1.2 Research Questions .....	3
1.3 Problem Statement.....	4
1.4 Thesis Structure .....	4
2 CONNECTION BETWEEN DOUBLE DEGREE PROGRAMS: INNOVATIONMANAGEMENT IN SUPPLY CHAINS.....	5
2.1 Effect of Digital Transformation (DT) on Supply Chains.....	5
2.1.1 The Concept of Digital Transformation in Business .....	5
2.1.2 The Digital Supply Chain (DSC).....	8
2.1.3 Overview of DT at Business and Supply Chain Level .....	9
2.2 The New Paradigm of Collaboration in Digital Supply Chains.....	11
2.2.1 The Introduction of Innovation and the Data Sharing Between Supply Chain Partners .....	11
2.2.2 Value Co-Creation in a Digital Supply Chain .....	12
3 THEORETICAL FRAMEWORK AND LITERATURE REVIEW .....	13
3.1 Risk of Early Functional Obsolescence During the Asset Replacement Process	13
3.1.1 Strategic, Long-lived Assets .....	13
3.1.2 Asset Replacement Process.....	14
3.1.2.1 Overview of Assets’ Investment Justification .....	14
3.1.2.2 Assets’ Replacement Decision-making Process in a Context of Technological Innovation .....	15
3.1.2.3 Environmental Innovation Incentives in Durable Assets’ Replacement .....	16
3.1.3 Obsolescence Risk .....	17
3.2 Risk Sharing among Supply Chain Partners and the Role of Contractual Agreements.....	19
3.2.1 Risk Analysis and Risk Sharing among Supply Chain Partners.....	20
3.2.2 The Role of Contractual Agreements in Sharing the Risk among Supply Chain Actors.....	20
3.2.3 The Risk-revenue Sharing Contracts and the Performance-based Contracts (PBC).....	21
3.3 Suppliers’ Selection Process.....	24
3.3.1 Suppliers’ Evaluation.....	24
3.3.2 Analytic Hierarchy Process (AHP).....	24
3.4 Conceptual Model .....	26
3.4.1 Model Display.....	26

3.4.2 Model Structure and Description .....	26
4 METHODOLOGY .....	28
4.1 Research Design .....	28
4.2 Data Collection .....	29
4.2.1 Secondary Data Collection .....	29
4.2.2 Primary Data Collection .....	30
4.2.3 Sampling .....	31
4.3 Data Analysis.....	31
4.4 Rigor in Research .....	32
4.5 Research Validity .....	33
5 RESEARCH CONTEXTS: CITY SIGHTSEEING CASE STUDY .....	35
5.1 State of the Transition Process to Electric Mobility in the Case of Tourist Double-Deckers.....	35
5.2 Acquiring Company: The City Sightseeing Group .....	36
5.2.1 City Sightseeing Worldwide .....	36
5.2.2 City Sightseeing Italy.....	36
5.2.3 City Sightseeing Rome .....	36
5.2.4 City Sightseeing Milan .....	38
5.3 Suppliers .....	38
6 DATA ANALYSIS.....	40
6.1 Factors Affecting the Decision-Making Process of Assets’ Replacement.....	40
6.1.1 Asset Replacement Process.....	41
6.1.2 Economic and Strategic Factors.....	41
6.1.3 Regulatory Pressure and Incentives .....	42
6.1.4 Early Functional Obsolescence of Unstable Technologies and Other Risks Related to the Process.....	43
6.2 Risk Sharing Practices .....	46
6.2.1 Buyers’ Approach .....	46
6.2.2 Suppliers’ Approach .....	47
6.3 Contracting .....	48
6.3.1 Current Contractual Structure Chosen by City Sightseeing Roma.....	48
6.3.2 Introduction of Risk Sharing Parameters in Contracts.....	49
6.3.3 Mediation of City Sightseeing Italy in Bargaining with Suppliers.....	50
6.4 Suppliers’ Selection and Impact of Contracts .....	51
6.4.1 Current Suppliers’ Selection for Endothermic Buses .....	51
6.4.2 Suppliers’ Selection for Electric Buses and Related Impact of Risk Sharing Contracts.....	52
7 CLOSING CHAPTER.....	54

7.1 Conclusions .....	54
7.2 Implications .....	57
7.3 Limitations and Further Research .....	58
REFERENCES .....	60
APPENDICES .....	67

## 1 INTRODUCTION

This opening chapter introduces the problem object of the study, formulates the research questions and its problem statement. The last section illustrates the research structure through the different chapters.

### 1.1 Problem Identification

Asset lifecycle is the natural evolution of an asset in terms of the increase and decrease in its use and value from inception to retirement (Queensland Government Chief Information Office, 2018). Since the majority of the assets' categories have a limited time span of operating service, companies need to periodically carry out the replacement analysis, which is concerned with determining the optimal time to remove a current asset (defender) from service and selection of another asset to take its place (Hartman, 2004).

Under technological progress, decision makers may be encouraged to replace assets before their economic life in order to take advantage of technologically more advanced models (Hartman and Tan, 2014). Consequently, under technological progress, the phenomenon of functional obsolescence, defined by Stacchetti and Stoyarov, 2015, as “the condition that, with regard to a specific asset, occurs with the mere passage of time, typically because superior substitutes become available at the same price”, can result to be faster than expected, changing the projected lifecycle of the new assets.

This peculiarity is particularly relevant for the so-called long-lived assets, also known as non-current assets, long-term assets or durables, which are assets that are expected to provide economic benefits over a future period of time, typically greater than one year, (“Long-Lived Assets. CFA Institute”, 2019) and, therefore, an incorrect management of their lifecycle could have a severe impact on the owning company performance.

The scenario of early functional obsolescence of recently acquired durables could represent a risk for the acquiring company and thus needs to be mitigated.

Although it is impossible to completely eliminate risks from a supply chain, they can be reduced, or organizations can better prepare themselves to neutralize them and this can be done if there is a shared understanding among supply chain partners of the variables that could impact the risks and the mitigation strategies. (Faisal M, N, et al., 2006).

In order to mitigate the risk perceived by the acquiring company an effective risk sharing policy with its suppliers could be supposedly adopted, this means to find a way to align risks taken and revenues awarded to each partner interacting in a supply chain dynamic. This study wants to focus on the particular risk of early functional obsolescence, pointing out the role played by specific categories of contractual agreements as mediators for an efficient risk-sharing practice among supply chain partners. In fact, risk-sharing contracts have been suggested and used for handling risks in supply chains<sup>1</sup> (Wakolbinger and Cruz, 2011).

City Sightseeing is the world's leading open-top bus tour operator. This study has been developed and carried out in collaboration with one of the franchisees of the group, the agency of City Sightseeing based in Rome.

City Sightseeing Rome's business is characterized by the transportation of tourists on board of double-decker buses in order to provide them with guided tours of the city's monuments. These buses represent the major investment of the company and are considerable as long-lived assets.

Today, with regard to this specific kind of equipment, the company is facing a problem during the process of asset replacement. In fact, new suppliers are offering to the

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<sup>1</sup> As presented by Li and Kouvelis (1999), Lindroth and Norrman (2001), Harland et al. (2003), Ojala and Hallikas (2006), Kouvelis et al. (2006), Krueger and Uhlig (2006) and He and Zhang (2008)



company an electric alternative to the endothermic engine buses currently employed by City Sightseeing Roma, increasing the number of variables to be considered during the aforementioned replacement procedure.

If on the one hand lawmakers are exercising their regulatory pressure, namely the action of government's agencies on firms in order to make them embrace a desired behavior (Berrone, 2012), to incentivize the adoption of electric vehicles and reduce the environmental impact of businesses, on the other hand the transition process to electric mobility involves risks for the company. Indeed, the technology on which these new goods are developed is still unstable and uncertain and it might signify that the functional obsolescence of the new durable could take place faster than for buses based on the actual, stable technology.

The study is carried out from a buyer perspective, but, at the same time, incorporates perceptions and feedbacks collected from suppliers, in order to gather a better understanding on the whole segment of supply chain interested by the introduction of this innovation.

This research wants to investigate the possibility to implement and, eventually assess the effectiveness risk-sharing contracts between City Sightseeing Roma and its suppliers.

The outcomes and findings of my work will be directly deployed by City Sightseeing Rome to adapt its strategy during the supplier selection, namely the process of selecting a supplier to acquire the necessary materials to support the outputs of organizations (Shyur and Shih 2006).

## **1.2 Research Questions**

- 1) What is the early functional obsolescence risk in relation to the asset replacement process?
- 2) How does the proper form of contracting share the risks between buyers and suppliers?

3) How does the early functional obsolescence risk affect the transition process to electric buses for City Sightseeing Roma?

4) What form of contractual agreement would enable City Sightseeing Roma to share risks with its suppliers? How?

### **1.3 Problem Statement**

How could City Sightseeing Roma mitigate the risk of early obsolescence of electric buses through the proper form of risk-sharing contract?

### **1.4 Thesis Structure**

This thesis is divided in six chapters. The first one serves as introduction and definition of the problem statement. In the second chapter, a connection between the programs object of the double degree between Tilburg University and LUISS is given. The third one is a literature review of the theoretical arguments on which the specific problem is based on; at the end of it a conceptual model is developed and exposed. The third chapter describes the research methodology of the study. The fourth chapter describes the research context and introduces the analyzed case study. The fifth chapter is dedicated to data analysis while the sixth chapter exposes conclusions, limitations and possible further extension of the research.

## **2 CONNECTION BETWEEN DOUBLE DEGREE PROGRAMS: INNOVATIONMANAGEMENT IN SUPPLY CHAINS**

### **Connection between Double Degree Programs: Innovation Management in Supply Chains**

This thesis has been firstly conducted as conclusion of a master's degree in Supply Chain Management at Tilburg University. As required by the double degree program at LUISS University, a direct link with a subject part of the master's degree in Management has been found; in fact, this chapter explains the connection between the digital transformation of business and its impact on supply chain's dynamics.

#### **2.1 Effect of Digital Transformation (DT) on Supply Chains**

The aim of this section is to introduce the concept of DT at a business level, as described by Rogers, (2016), and report the effects of this revolution on supply chain dynamics, as it is pointed out by Korpela, (2017).

##### **2.1.1 The Concept of Digital Transformation in Business**

In every industry, the spread of new digital technologies and the rise of new disruptive threats are transforming business models and processes (Rogers, 2016). For what concerns businesses founded and developed before the advent of the internet network and related ICT systems, the DT implies the fall of many of the fundamental rules and assumption on which their business models have been developed on. This scenario requires, even the largest and best-established firms, to rethink and redesign their business model and value proposition, in order to conserve their efficiency and competitive advantage.

If in the past IT systems have been considered as auxiliary tools to improve processes and reduce operational risks, today the selection and adoption of a specific IT system is a crucial managerial duty, which has a direct and consistent impact on the formulation and implementation of the business' strategy. Indeed, as stated by Rogers, (2016), "Digital transformation is not about technology, it is about strategy and new ways of thinking".

In order to support the previous statement, Rogers, (2016), describes the five domains directly affected by the DT, namely: Customers, Competition, Data, Innovation and Value.

- Customers: the DT process has brought about the end the concept of mass production and communication; customers today are constantly connecting with and influencing each other, shaping business reputation and brands (Rogers, 2016). Firms should not simplistically look at customers as targets for sales, but they should be considered as crucial focus groups to innovate and re-shape their value proposition.
- Competition: before DT competition and collaboration have been seen as mutually exclusive. On the one hand, firms operating in the same business were seen as natural competitors, with limited to no possibility to collaborate; on the other hand, collaboration was eventually expected to take place with upstream or downstream members of the same supply chain. Nowadays firms' boundaries are less defined, making it more difficult to identify the extent of independence of each individual business. After the DT, competition can now come from firms belonging to completely different industries, but, at the same time, able to deliver the same value to customers; this situation requires original competitors in the same sector to collaborate in order to deal with the mutual threat originating from outside the reference industry.
- Data: DT has dramatically increased the quantity and quality of the data available to firms; at the same time the accuracy of the tools employed to analyze databases has exponentially grown, thus the data driven decision making process has become a key success factor for the new generation of managers. Data is a vital part of how every business operates, differentiates itself in the market, and generates new value (Rogers, 2016).

The nature of the source of datasets has also changed with the DT. If in the analog age data were collected with a targeted and expensive process, originated by the firms

themselves, with the advent of digital age companies simply acquire plenty of information from every internal and external interaction process. Today the focus of big data managers is on the selection of the proper data and interpretation of the results of their analysis, rather than on their collection and storage.

- **Innovation:** Traditionally, innovation was managed with a singular focus on the finished product (Rogers, 2016). The cost impact of an eventual failure was not sustainable by firms. Today DT enables failure to be considered as a crucial stage in the process of development of innovations, part of an iterated mechanism of continuous learning based on rapid experimentation, adjustment and improvement. This process is made possible by the rapid collection and elaboration of the feedbacks collected from the prototypes experimented on the market.
- **Value:** Traditionally a firm's value proposition was seen as fairly constant (Rogers, 2016). DT has dramatically shortened the life span of technologies and the number of innovations per unit of time has exponentially increased. Today the most successful businesses are the ones which try to innovate their value proposition with large advance, basing their decisions on the forecasts of the future environment, rather than intervene when innovation in the value proposition becomes a matter of life or death for the company's business.



**Figure 1: The Five Domains of Digital Transformation, Retrieved from Rogers, 2016.**

### **2.1.2 The Digital Supply Chain (DSC)**

A supply chain can be defined as a set of three or more entities directly involved in the upstream and downstream flows of products, services, finance, and/or information from a source to a customer (Mentzer, 2001). DT has had a direct impact on supply chain dynamics and interactions among its partners. New technologies, such as cloud systems and the blockchain, have contributed to increase the level of integration, making it possible to exploit previously hidden beneficial synergies between businesses. The disruptive innovations introduced by DT has led to the creation of the so-called Digital Supply Chain (DSC), where, unlike in the traditional supply chains, value is generated by continuous and reiterated

interaction and collaboration between parts, rather than by the sum of the work carried out by each individual entity.

In fact, DSC collaboration is a multi-stakeholder environment involving different needs and goals, in which big companies are seen as hub organizations that lead the integration work, along with their main suppliers (Korpela, 2017). This new kind of organization and value creation method have been proven by Korpela, (2017), to be cost effective and advantageous to many actors in the ecosystems, including firms, suppliers, employees and customers.

### **2.1.3 Overview of DT at Business and Supply Chain Level**

The five reference domains of change introduced by DT, as stated by Rogers, (2016), are also valid to describe what happen to the DSC as a whole entity. **Table 1** proposes a comparison between analog age and digital age, both at a single business and supply chain level.

	<b>Analog Era</b>	<b>Digital Era, Single Business Perspective</b>	<b>Digital Era, Supply Chain Perspective</b>
<b>Costumers</b>	Customers as mass market; one-way value flows (Rogers, 2016)	Customers as dynamic network, communications are two-way and the value flows are reciprocal (Rogers, 2016)	Focus on value creation; final customers feedbacks reported from bottom to top of DSC.
<b>Competition</b>	Competition within defined industries; clear distinctions between partners and rivals; products with unique features and benefits; key assets are held inside the firm (Rogers, 2016)	Competition across fluid industries; blurred distinction between partners and rivals; competitors cooperate in key areas; Key assets reside in outside networks (Rogers, 2016)	Even competing companies are collaborating to pursue integration of the entire supply chain (Korpela, 2017)
<b>Innovation</b>	Testing ideas is expensive, slow, and difficult; failure is avoided at all cost (Rogers, 2016)	Testing ideas is cheap, fast, and easy; failures are learned from, early and cheaply (Rogers, 2016)	DSC integration allow concurrent engineering in substitution to sequential engineering for innovation projects (Korpela, 2017)
<b>Data</b>	Data is expensive to be generated in firms; firms make use only of structured data; data is a tool for optimizing processes (Rogers, 2016)	Data is continuously generated everywhere; unstructured data is increasingly usable and valuable; data is a key intangible asset for value creation (Rogers, 2016)	DSC is characterized by the strategic and operative exchange of information between suppliers (financial, production, design, research and/or competition) to enhance communication between actors in the chain (Chen and Paulraj, 2004)
<b>Value Proposition</b>	Value proposition defined by industry; execute your current value proposition; market success allows for complacency (Rogers, 2016)	Value proposition defined by changing customers' needs; uncover the next opportunity for customer value; judge change by how it could create your next business (Rogers, 2016)	Systematic integration and bundling of information about products and services to create additional value to customers (Mikkonen et al., 2016).

**Table 1: From Analog to Digital Era: The Domains of Change for Businesses and Supply Chains**



## **2.2 The New Paradigm of Collaboration in Digital Supply Chains**

This thesis was originally meant to find the proper contractual agreement between a buyer and a supplier. The acquiring firm operates in the touristic transportation sector and was looking to find a deal for the supply of electric busses. The aim of this section is to prove how, even though they were not originally collected for this purpose, the data included in the original interviews confirm the change in functional dynamics wrought by DT to supply chains, as reported in Section 2.0.

### **2.2.1 The Introduction of Innovation and the Data Sharing Between Supply Chain Partners**

The market segment of electric double-deckers has not result to be attractive for companies until the last two or three years. In this time span the development process of the electric bus has reached a consolidated stage of the test phase, but the product is still considerable as a prototype. Before the DT and the advent of the DSC model, it was not considerable as an opportunity by companies to introduce a not fully developed product to the market. This has been proven to be an anachronistic concept: the data collected in the interviews show the exact opposite. The prototype is already available on the market, since the direct usage by final customers represents a key stage to further develop and refine the first model launched. A crucial factor to enable this final test phase to be successful is the constant sharing of feedbacks between buyers and suppliers. The DT process has allowed this to happen; through the deployment of an efficient IT systems it is possible, for the Chinese supplier, to collect real time data from the double decker adopted by City Sightseeing Milano, analyze them and implement the necessary modifications to the final product. Through a closer collaboration between supply chain members, DT has significantly increased the quantity of data available, making it cheaper and more time efficient the sourcing and analysis of them.

### **2.2.2 Value Co-Creation in a Digital Supply Chain**

From the case study previously analyzed, it emerges clearly how establishing a close relationship with their customers is a priority for both the suppliers interviewed. M.C. stated that: “*we are trying to fulfil customers’ needs in order to create a durable relationship with them*” and L.W. confirmed it: “*we want to stay close to our customers and ensure that our product respects the idea they have*”. In this context it is clear how mass production is not an option for the suppliers of electric double-deckers. The creation of value has to be the result of an intense collaboration between parts, aimed to exploit all the potential benefits for both sides.

The findings of the case study provide the final prove of the fact that, in a supply chain affected by the DT, the customer value is co-created by the downstream and upstream parts of the DSC.

In fact, the goal of the research was initially to find the best contractual settings for the supply of electric double-deckers (goods) to a touristic service provider. In the end, it turned out how the best solution for the aforementioned environment was to create value through the implementation of a PBC for the procurement of a predefined amount of running hours of the vehicles (service) instead of the acquisition of the busses themselves (goods).

This specific case, where collaboration between buyers and suppliers was so intense to change the object through which value is created and provided to the customer, shows the terrific impact that DT has had on the supply chain dynamics. The introduction of the DSC model has reduced the degree of independency of the members of a supply network, making the accurate management of the interactions between its parts a key success factor for an efficient value creation.

### **3 THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

This chapter contains a detailed literature review of the topics of the study. It is divided in four parts. The first part regards the category of assets investigated by the research, the replacement process that periodically has to be carried out by firms and the underlying reasons; the role played by obsolescence risk in this process is discussed in depth. The second one illustrates the concept of risk sharing between supply chain partners, how it can be obtained by the formulation of a proper contractual structure, and the characteristics of Performance Based Contracts, a particular kind of agreement specifically designed to fulfill this purpose. The third part covers the supplier selection process and describes the Analytic Hierarchy Process, a particular assessment of suppliers' offers. The last part is dedicated to the display of the conceptual model built on the relations emerging from the literature study.

#### **3.1 Risk of Early Functional Obsolescence During the Asset Replacement Process**

The aim of the following section is to introduce the category of assets considered in the study with a description of the replacement process they are subject to. Characteristics and justifications of this managerial practice will be reported. In the end, the early functional obsolescence risk, which may arise from it is presented as an object of investigation.

##### **3.1.1 Strategic, Long-lived Assets**

Strategic assets have been defined as “a firm level construct referring to the set of firm Resources and Capabilities developed by managers as the basis for creating and protecting their firm's competitive advantage” (Amit and Schoemaker, 1993). The possession of this category of assets determine the capacity of a firm to gain a consistent and stable economic profit (also defined in literature as economic rent) over time, exploiting the benefit of the acquired competitive position.

This study will focus on equipment assets which play a strategic role for their owner firm over a multiple-year time span. For this reason, they can be defined as long-lived asset,

namely “assets that are expected to provide economic benefits over a future period of time, typically greater than one year”. (“Long-Lived Assets. CFA Institute”, 2019).

### **3.1.2 Asset Replacement Process**

The asset replacement process is a managerial decision whose fundamental principle is to compare gains from keeping the current asset for another time interval with the opportunity gains which could be realized from a replacement asset during the same period (Perrin, 1972). Hartman, 2004, points out how the asset replacement analysis “is concerned with determining the optimal time to remove a current asset(defender) from service and selection of another asset to take its place”.

As reported in Section 3.1.2.2, the existing managerial literature provides several quantitative models, to be used as a support in the durable’s replacement process; the limitation of these studies is that they are applicable only in a specific reference context, where the variables mentioned as hypothesis are assumed to be valid.

The aim of the following paragraphs is to better define the specific context affecting the asset replacement process presented in this case study. For the purpose of this research, only the variables considered as relevant will be analyzed in depth, considering the arguments that directly relate to the case study introduced later in the thesis.

#### ***3.1.2.1 Overview of Assets’ Investment Justification***

The replacement of productive equipment ranks among the most important strategic decisions faced by manufacturing and service firms. (Suresh and Wallace, 1992). The underneath reason is that substitution and purchase of new assets have a relevant impact on the acquiring company costs structure and have a direct effect on its ability to be profitable and maintain competitive advantage over time. Meredith and Suresh (1986) divide the assets’ investment justification methods into three basic categories, according to complexity and type of expected benefits of the new machinery: economic, analytical, and strategic justification

methods (Oeltjenbruns, et al., 1995). The aforementioned methods are briefly described in **Table2** and the full model by Meredith and Suresh is reported in **Appendix I**.

	Description	Source
<b>Economic Justification Methods</b>	Characterized by their simplicity and relative ease of data collection; usually unable to consider non-financial/strategic benefits	Meredith and Suresh, (1986); Oeltjenbruns, et al., (1995)
<b>Analytic Justification Methods</b>	More realistic than economic methods, taking more factors and subjective judgments into account; high degree of complexity and the amount of required data lead to time consuming analysis and difficulty in understanding	Meredith and Suresh, (1986); Oeltjenbruns, et al., (1995)
<b>Strategic Justification Method</b>	Less technical in terms of usage than the previous two categories; typically considered as a supplement of economic analysis, it is tied directly to the basic goals of the company, emphasizing factors such as technical importance, business objectives, competitive advantage and importance for research and development.	Meredith and Suresh, (1986); Oeltjenbruns, et al., (1995)

**Table2, Investment Justification Methods**

**3.1.2.2 Assets’ Replacement Decision-making Process in a Context of Technological Innovation**

The problem of replacing equipment under technological change has been studied extensively (Hartman and Tan, 2014), and numerous models have been developed, featured by different settings. After the first study conducted by Bellman, (1957), regarding the optimal replacement timing, several other theories have been formulated about the problem of assets’ turnover period in a context of technological innovation. Some of them (Grinyer (1973); Oakford et al. (1984); Kusaka and Suzuki (1988); Reigner et al. (2004); Hritonenko and Yatsenko (2008)) consider innovation as a continuous phenomenon while others, (Goldstein et al. (1988); Hopp and Nair (1991); Mehrez and Berman (1994); Rajagopalan et al. (1998)), refer to it as discontinuous, manifesting at cyclical intervals which result in technological breakthroughs. Finally, authors such as (Rogers and Hartman (2005); Hartman

and Rogers (2006); Yatsenko and Hritonenko (2009)) consider that innovation could be, at the same time, continuous and discontinuous and analyze the impact of these phenomena on the replacement judgment.

The general concept of all these models is to determine the best replacement policy that minimizes expected cost or maximizes expected net present value (Hartman and Tan, 2014). Unfortunately, uncertainty in matter of costs' structure computation, assets' utilization span, structure and timing of technological progress reduce the generalizability and applicability of such models in real case scenarios. Furthermore, the optimal policy depends on the risk profile of the decision maker, which could differ for different individuals (Hartman and Tan, 2014) reducing even further the possibility to directly and simply adopt the mathematical formulas elaborated by the aforementioned researches.

### ***3.1.2.3 Environmental Innovation Incentives in Durable Assets' Replacement***

As stated by Brunnermeier and Cohen, (2003), and reported by Berrone et al., (2012), “environmental innovation is the development of products, processes, and services aimed at reducing environmental harm by using new methods for treating emissions, recycling or reusing waste, finding cleaner energy sources, and so on.” The adoption of this kind of innovations by firms results in questioning by decision-maker managers regarding the economical attractiveness of such choices. In fact, green investments often cannot be financially justified, at least in the short term. (Berrone et al., 2012; Bansal, 2005; Bansal and Clelland, 2004; Hoffman, 1999, 2000).

To foster this mechanism, lawmakers apply the so-called regulatory pressure<sup>2</sup> which has proven to have a positive effect on the embracement of environmental innovation (Berrone et al., 2012); the same research shows how the greater is the specificity of a firm's assets the higher the probability of the adoption of a green technology under regulatory and normative pressure<sup>3</sup>. The reason behind the latter finding is that the specificity of resources involves investments in durable, specialized assets that cannot be easily redeployed from existing uses and users except at a significant loss of productive value or at a deep discount (Dierickx and Cool, 1989; Berrone, 2012). Therefore, firms owning investments in specific, idiosyncratic assets are potentially more exposed to the risk represented by regulatory pressure and thus are more prone to undertake the actions required by lawmakers.

### **3.1.3 Obsolescence Risk**

When new and more efficient products are developed and introduced to the market, or when their purchase become cheaper to potential customers due to a sensible reduction in their production cost, driven by improvements in the manufacturing process, existing goods of the same category suffer a depreciation. The first mechanism is mentioned in literature as obsolescence, in fact Stacchetti and Stolyarov, (2015) state: "Obsolescence of a durable occurs with mere passage of time, typically because superior substitutes become available at the same price".

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<sup>2</sup> Regulatory pressure is described by Berrone, (2012) as the action of government's agencies on firms in order to make them embrace a desired behaviour.

<sup>3</sup> Normative pressure is described by Berrone, (2012) as the action of non-governmental organizations on firm in order to make them embrace a desired behaviour.

Previous studies (Mansfield and Pinder, 2008, Stacchetti and Stolyarov, 2015) underline the fundamental differences between functional or economic obsolescence (known also simply as obsolescence) and physical deterioration (also cited as physical obsolescence), both causes of durable assets' depreciation. Their characteristics and differentiation aspects can be summarized as follows:

- The physical deterioration (P.D.) level of an asset is directly correlated with the utilization rate at which it is employed in the duty it has been designed for, and with the physical decay due to its aging process. For this reason, P.D. affects differently each individual good of the same category, on the basis of its usage records.
- Conversely, functional obsolescence (F.O.) refers to the occurred inadequacy of a certain kind of product due to the development and market distribution of a more efficient substitute. This phenomenon directly affects the whole asset category, without any kind of consideration regarding the usage of each single piece of equipment.
- Rates of P.D. can be managed by equipment's officers to a certain extent, firstly by ensuring the initial level of quality of the assets at the time of purchase, secondly by imposing rigid standards and procedures in the periodic and extraordinary maintenance program. Once major developments of a product occur, there is no managerial practice that can prevent the F.O.
- The P.D. effect acts on a continuous time period while F.O. strikes just at precise times, creating intervals in which it is not concretely perceivable. The closer the moment when F.O. hits an asset category, related to the historical time of its purchase, the higher the negative effect suffered by the organization it is owned by.
- Rates of P.D. can normally be forecasted with a reasonable degree of accuracy by the use of historic records (Mansfield and Pinder, 2008). Even though technological events that cause obsolescence may be predicted, especially when the introduction of a new product



is periodic, (Stacchetti and Stolyarov, 2015) any attempt to forecast rates of obsolescence is extremely difficult as it is a function of unknown future change (Mansfield and Pinder, 2008).

Today's economy is characterized by faster innovation and technological development rates, which cause F.O. to hit more often, leaving the technologic paradigm stable for shorter intervals of time. Some products are even released before the completeness of their development process.

Given the aforementioned conditions and the definition of the Royal Society, (1992), which identifies risk as “The probability that a particular adverse event occurs during a stated period of time, or results from a particular challenge”, it becomes clear how F.O. represents a major risk for both sellers and buyers of goods exposed to it. Sellers, on the one hand, may incur consistent losses derived from scrapped inventory costs associated with the obsolescence of their stocks of semi-finished and finished goods. On the other hand, buyers of long-lived assets find themselves in an even more complex situation. What may appear to be a good equipment purchase can soon become obsolete (Suresh and Wallace, 1992) and the buyers have usually limited access to insights regarding the state of R&D processes undertaken by their suppliers. The specific phenomenon of P.O. can be defined as a subcategory of the risk defined by Simmons, (1999), as asset impairment risk, which “reduces the utilization of an asset and can arise when the ability of the asset to generate income is reduced”.

This study will focus on buyers of durable assets, analyzing the reasons to purchase them and the way to select the supplier that better ensures against the F.O. risk.

### **3.2 Risk Sharing among Supply Chain Partners and the Role of Contractual Agreements**

This section explains the relevance of risk sharing practices among supply chain partners and underlines the role of contractual agreements in such practices.

### **3.2.1 Risk Analysis and Risk Sharing among Supply Chain Partners**

The trend of increasing product, service and process technology has led to a substantial complication of the supply chains structures. This caused the level of uncertainty to rise and exposed the firms to a new and more frequent set of risks. Risk can be broadly defined as a chance of danger, damage, loss, injury or any other undesired consequences (Harland et al., 2003). Managers need to identify and manage risks from a more diverse range of sources and contexts (Clemons, 2000). To assess supply chain risk exposures, the company must identify not only direct risks to its operations, but also the potential causes or sources of those risks at every significant link along the supply chain (Norman and Jansson, 2004). After the identification of the type of risk and the associated loss in case of manifestation<sup>4</sup> the following step of the analysis is the assessment of the probability of occurrence and the estimation of the harm caused by the undesired event.

In this new context of complexity, a supply chain works well if the incentives of its member companies are aligned which requires the risks, costs, and rewards of doing business are distributed fairly across the network (Narayanam and Raman, 2004). In order to achieve this goal, according to Mentzer et al. (2001), a key component for supply chain management is sharing both risks and rewards between the members of the supply chain. To do so, a major role is played by contractual agreements between the involved parts.

### **3.2.2 The Role of Contractual Agreements in Sharing the Risk among Supply Chain Actors**

To induce supply chain partners to behave in ways that are best for everyone, companies have to create or modify monetary incentives (Faisal et al., 2006). The incentives

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<sup>4</sup> In Appendix 4 is reported a classification of risk types by Harland, (2003) and the type of losses by Brenchley, (2000).

let the risks and the revenues (which arise from different sources of uncertainty and from channel coordination, respectively) be shared among all the supply chain actors (Giannoccaro and Pontrandolfo, 2004). According to Tsay et al., (1999) supply chain contracts allow the goal mentioned above to be achieved by increasing the total profit of the supply chain and sharing the risks among the supply chain partners (i.e. risk sharing). The key goal while structuring a supply chain contract is to obtain the so called “win-win situation” where all the parties involved benefit from the stipulated agreements, resulting in a fairer distribution of risks and yields than without any sort of contract.

Contractual clauses, most of which are based on quantity, quality time and price, characterize each individual contract and determine its broader category of appurtenance. In particular, the clauses define the way in which the risk arising from different sources of uncertainty (mainly time, demand and price) is shared among the supply chain actors (Giannoccaro and Pontrandolfo, 2004). The managerial literature proposes several reviews of contracts’ categorization in the supply chain<sup>5</sup>. After an accurate study of the existing works, it results clear how, for the aim of this study, a deeper understanding of the functioning of risk-revenue sharing contracts is required.

### **3.2.3 The Risk-revenue Sharing Contracts and the Performance-based Contracts (PBC)**

Revenue sharing is kind of supply chain contract that makes it possible to share risks among supply chain partners (Tsay, 1999). They are employed in a context of uncertainty, in fact they specify who incurs in costs in the circumstance of adverse event and establish the mechanism of revenue subdivision among partners. Risk-sharing contracts have been

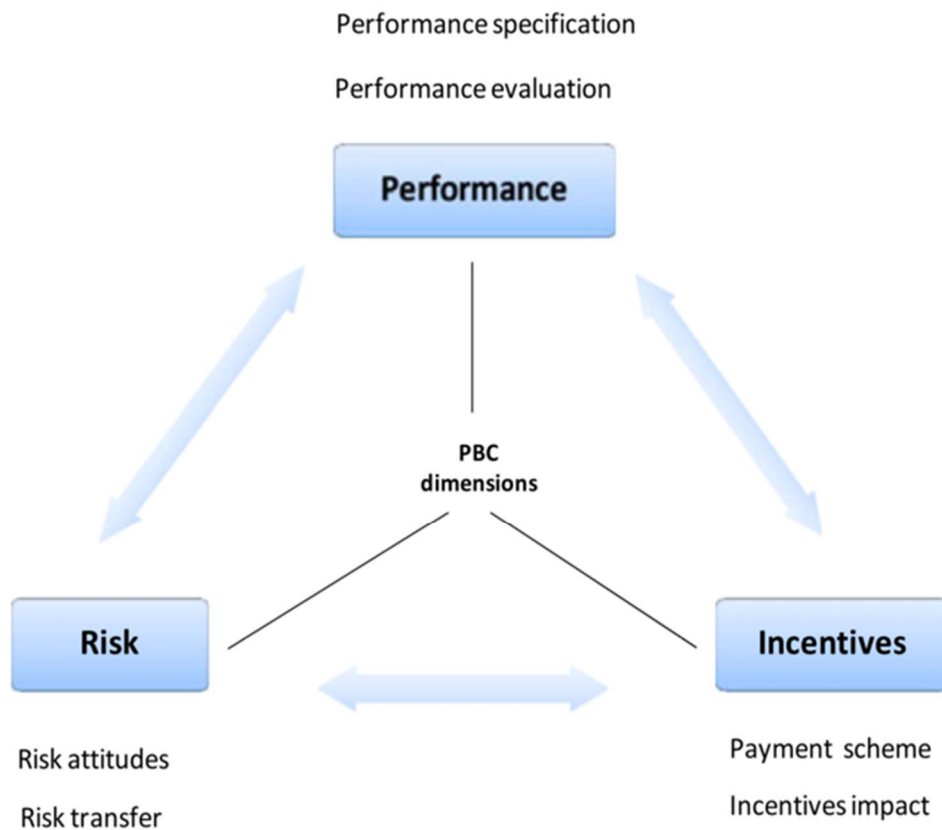
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<sup>5</sup> Notable among them are: Giannoccaro and Pontrandolfo, (2004); He and Zang (2008).

suggested and used for handling risks in supply chains (Wakolbinger and Cruz, 2011), and, with a specific link to the relationship between buyer and supplier, as reported by Li and Kouvedis (1999) risk sharing has been incorporated in the contract terms of the purchase price that the firm eventually pays to a supplier.

A specific kind of risk-revenue sharing contract is the Performance Based Contract (PBC), known also as Pay for Performance. They can be briefly defined as the contractual approach of tying at least a portion of supplier payment to performance (Selviaridis and Wynstra, 2015) As stated in the previous section, the first step to share risks and revenues is to align the partners incentives; indeed, this typology of contract, as reported by Selviaridis and Wynstra (2015), facilitate supply chain coordination and collaboration to realize end customer outcomes by aligning incentives among supply chain actors. (Randall et al 2010; Tarakci et al., 2006). In addition, PBCs entails increased risk and rewards for the supplier as performance achievement translates into financial bonuses and/or penalties (Simab et al.,2012; Carlson et al., 2010; Forsberg et al., 2000, 2001). **Figure2** illustrates the aforementioned conceptual principles and relations.

*International Journal of Production Research*



**Figure2: A Stylized Model of PBC (retrieved from Selviaridis and Wynstra, 2015)**

PBCs differ from traditional contracts since their focus point are outputs and outcomes rather than inputs and processes. This kind of agreements set a specific level of performance to be provided instead of describing the process through which this performance should be achieved. They are stipulated when there is substantial goal incongruence between buyer and supplier (Elisenhardt, 1989) because they mitigate agency problems in the relation between buyers and suppliers since there is no need for buyers to overview suppliers' behavior. On the other hand, as stated by Elisenhardt (1989), it is necessary to determine a clear and univocal way to identify and measure the desired outcome.

### **3.3 Suppliers' Selection Process**

In this section the process of suppliers' evaluation and selection is described, presenting the Analytic Hierarchy Process, diffuse procedure in this kind of assessment.

#### **3.3.1 Suppliers' Evaluation**

After that the decision of durable assets' replacement has been taken, firms need to evaluate and select the proper supplier. Choosing the right supplier involves much more than scanning a series of price list, and choices will depend on a wide range of factors (Ho, et al., 2009). As shown by an extensive literature review conducted by Ho, et al., 2009, traditional supplier evaluation methods are not adequate any more since they consider costs as single factor of the analysis. According to this study, in the modern economical context the most used approach for the suppliers' evaluation and selection process is the AHP (Analytic Hierarchy Process) and its derived variants<sup>6</sup>. Further evidence supporting the suggestion that AHP is the most applied method is given by Bruno et al., (2012) who state "AHP appears to be the most utilized methodology to cope with the supplier selection problem".

#### **3.3.2 Analytic Hierarchy Process (AHP)**

The AHP is a general theory of measurements that depends on the values and judgments of individuals and groups (Bruno et al., 2012). It uses a combination of weighted

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<sup>6</sup> The variants of AHP often represent a combination of it with an other method or its integration in an other kind of evaluation process. Ho, et al., (2009) report the integration of AHP with Data Envelopment Analysis, Bi-Negotiation, Artificial Neural Network, Goal Programming, Grey Relational Analysis, Mixed Integer Non-Linear Programming, Multi-Objective Programming, Fuzzy Set Theory, Cluster Analysis.

attributes to rank the attractiveness of suppliers' offers. The methodology is usually articulated in the following phases (Bruno et al., 2012; Saaty, 1980, 1994):

- Structuring the problem into a hierarchy: the attributes are chosen on the base of their influence on the property selected as target. The most popular criterion is quality, followed by delivery, price/cost, manufacturing capability, service, management, technology, research and development, finance, flexibility, relationship, risk, and safety and environment (Ho et al., 2009)
- Comparative judgments: the attributes are compared in order to obtain a rank of them on the basis of their relative relevance on the property selected as goal of the method.
- Calculation of the attribute weights: starting from the rank obtained in the previous step, weights will be assigned to the attributes to give them also an absolute judgment in addition to the relative one assigned in the previous step
- Calculation of the global score: measures related to the selected attributes are multiplied by the assigned weights and the final score of each supplier's proposal is computed

The AHP method is particularly flexible, in fact each application of it differs from the others on the base of the specific context and goals for which it is deployed. The clarity of the evaluation process applied by this methodology improves the communication and justification of purchasing decisions and pushes both the suppliers and the customers to achieve a better performance (Bruno et al., 2012). If on the one hand suppliers can focus on the attributes which are more relevant for the evaluation of their proposals, on the other hand this situation might lead to opportunistic behavior when they deliberately decide to take advantage of the fact that they know how they will be judged by their customers' AHP. Furthermore, in some cases, as detected by Bruno et al., (2012), "firms are not likely to use these tools because they are often too distant from the reality of the corporate world. In fact, most firms approaching the supplier selection problem simply adopt a qualitative

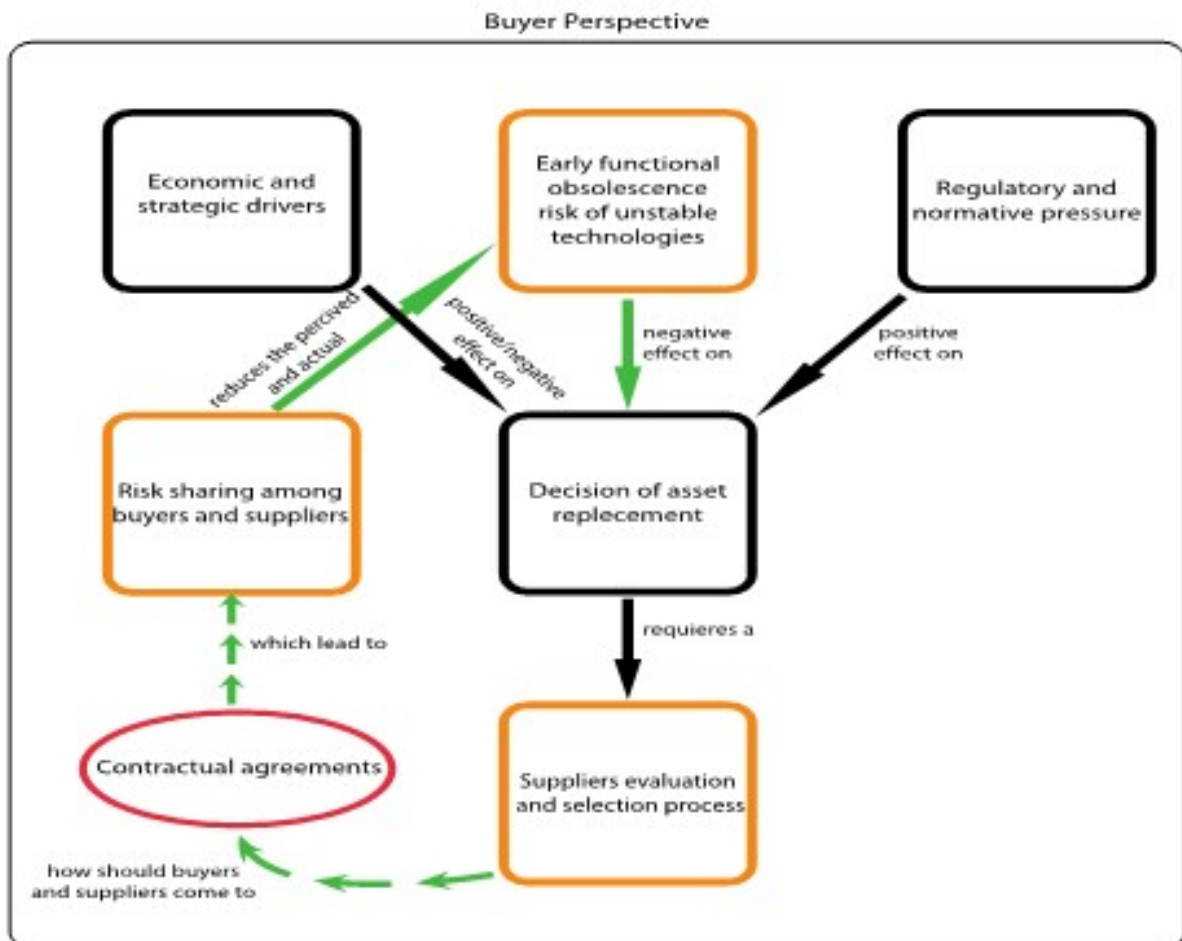
methodology on judgment from some experts”. (de Boer and van der Wegen, 2003; Esposito and Passaro 2007).

In conclusion it appears straightforward that AHP methodology is useful and adaptable to different decision-making processes but, at the same time, not immediately implementable or always feasible.

### 3.4 Conceptual Model

This section summarizes what has emerged from the literature review and shows the key concepts and relations in the model displayed below.

#### 3.4.1 Model Display



**Figure3: Conceptual Model**

#### 3.4.2 Model Structure and Description

The flow diagram displayed in **Figure 3** reports the summary of what has emerged from the literature review proposed in this chapter and can be considered as a representation



of the conceptual model proposed by the study. The research elements, reported in the black boxes, provide the description of the context of the study and increase the understanding of the causal relations of the overall model. Analogously, the black arrows underline relations which are supposed to exist between them, completing the reference framework of the case study analyzed.

Elements in the orange boxes, even though they have already been analyzed in this chapter, will be the target of the research introduced in the next section, as well as the relations indicated by the solid green arrows, which, after the literature review, will be object of further investigation.

The main focus of the study will be on the relations displayed by the discontinuous green arrows, and the role played by contractual agreements (drawn in the red circle). A specifically customized design of such element and derived relations will be the final goal of this research, taking into consideration literature knowledge and features that will emerge from the specific case study.

## 4 METHODOLOGY

This chapter illustrates the research methodology followed in the study and gives a theoretical justification of its employment.

### 4.1 Research Design

The final goal of this study is to provide City Sightseeing Rome with a solution for the transition process from thermic engine buses to electric ones. The answer will be deployed as a starting point to conduct the supplier selection process and stipulate the related agreement.

This study is definable as an inductive study since the aim is to generate a new theory based on the data (Gabriel, 2013) which will be used as guideline for the supplier selection process.

The research is carried out as a qualitative research because the data take the form of words rather than numbers (Frey, et al., 1992). The approach is exploratory, therefore the existing theory will demonstrate only a little part of the information provided, even though it will be the starting point of the analysis. This is acceptable since, as stated by Stebbins (2001): “In an exploratory research... an open-ended approach to data collection is therefore justified”. The logical reasoning behind this statement is that the all the study is based on the assumption that a mediating role is played by contracting in sharing the risk of early assets’ obsolescence due to a rapid evolution in the technological paradigm. Since this assumption has not been directly analyzed for this specific kind of risk yet, the only way to investigate this alleged risk is with an exploratory approach.

The strategy adopted is the case study. The motivation behind this choice is that by using the case study approach, it is possible to identify the reasons why certain decision were made, how they were implemented and with what result, can be identified (Chetty, 1996). Thus, the outcome of the study will be presented to the firm in a clear and detailed way, allowing a fast and deep understanding of the proposed solution.

Traditionally, case studies were considered appropriate for exploratory research only (Chetty, 1996) but Eisenhardt (1989) identifies other uses for the case study method. One of them, pointed out by Gersick (1988) is to generate new theory, therefore this study might have the possibility to fill a gap in the existing managerial literature, in addition to its main purpose, or rather to provide a solution for a real and actual business issue.

## **4.2 Data Collection**

For the purpose of this research both primary and secondary data have been collected and subsequently analyzed

### **4.2.1 Secondary Data Collection**

Secondary data are data collected earlier by other researches for other purpose than research, such as official statistics, administrative records, or other accounts kept routinely by organizations (Hox and Boeije, 2005). The majority of them have been collected in the qualitative form; even though some quantitative ones are present in the research as well, their purpose is limited to creating a better understanding of the research context in which the case study is analyzed. Since this research is based on a case study, the first step has been the collection of on-site observations which allow for the study of the dynamics of a situation, frequency counts of target behaviors, or other behaviors as indicated by the needs of the valuation (“Data Collection Techniques”, 2015). Analogously, company’s documents and records have been retrieved, examining existing data in the form of databases, meeting minutes, reports, financial records and newsletters (“Data Collection Techniques”, 2015). On the basis of these first results, a study of existing literature has been carried out, using Tilburg University library databases. Its purpose is to create a theoretical framework which serves as an anchor for the study and is referred at the stage of data interpretation (Baxter and Jack, 2008).

#### **4.2.2 Primary Data Collection**

Primary data are data that are collected for the specific research problem at hand, using procedures that fit the research problem best (Hox and Boeije, 2005). The designed procedure for this research is the semi-structured interview. The reason behind this choice is that semi-structured interviews are often used when the researcher wants to delve deeply into a topic and to understand thoroughly the answers provided (Harrell and Bradley, 2009). In this way the topics targeted by the interviewer are defined but a certain degree of freedom has been given to the interviewees leaving space to possible developments not considered during the definition of the interview's questions. Interviews have been conducted face-to-face when possible, otherwise conference calls have been scheduled and conducted. In **Appendix III** to **Appendix VI**, four different interview guides are reported. The first three, really similar to each other's, investigate the case from the buyer's perspective, the last one is customized for suppliers. The necessity of diversification of the first three guides is given by the particular structure of the company object of the case study and the different role organization's identities play in the case study, as will be described in Chapter **5**.

### 4.2.3 Sampling

**Table3** provides a display of the interviewees, reporting the division they belong to, their role in the company and the general purpose of the interview.

<b>Interviewee Identity</b>	<b>Company of Appurtenance</b>	<b>Role in the Company</b>	<b>General Purpose of the Interview</b>
<b>Giuseppe Cilia</b>	City Sightseeing Roma	President and board member of City Sightseeing Italy	Understand the needs of the company which required a solution for its problem
<b>Mauro Braghese</b>	City Sightseeing Roma	Purchasing Manager	Understand the needs of the company which required a solution for its problem
<b>Fabrizio Maddii</b>	City Sightseeing Italy	Vice President	Gather the general vision and approach to the problem by the company's headquarters
<b>Franco Maddii</b>	City Sightseeing Italy	President	Gather the general vision and approach to the problem by the company's headquarters
<b>Andrea Astori</b>	City Sightseeing Milano	Operation Manager	Acquire knowledge regarding an eventual, possible solution to the problem already implemented
<b>Claudio Astori</b>	City Sightseeing Milano	President and board member of City Sightseeing Italy	Acquire knowledge regarding an eventual, possible solution to the problem already implemented
<b>L.W.</b>	Supplier1	Sales Manager for the European Region	Understand the counterpart's needs and requirements
<b>M.C.</b>	Supplier2	Sales and Operation Manager	Understand the counterpart's needs and requirements

**Table3, Research Sampling**

### 4.3 Data Analysis

The first step of the data analysis has been the creation and display of the conceptual model proposed in section **3.4**. It is based on the on-site observation, collected during the first approach to the company-based case study, and integrated with a detailed and scientifically accurate review of the existing literature regarding the topics of interest of the investigation.

After the creation of the aforementioned conceptual model, interviews have been employed to analyze and prove the relations proposed by it, with the final goal of answering

the problem statement: “How should the contracting between buyers and suppliers be arranged in order to share the risk of early obsolescence of long-lived assets?”. The main topics of the interview were: obsolescence risk, risk sharing, contracting and supplier selection. On the basis of them labels have been created, as part of a coding scheme, to classify the different pieces of data. **Appendix VIII** reports the coding scheme used for the data analysis, where data from acquiring and selling company are reported in order to gain a holistic view of the supply chain members’ approach to matter object of the study. As stated by Chamaz, (2001) and reported by Saldaña, (2013) coding is the critical link between data collection and their explanation of meaning. This scheme follows the aforementioned conceptual model in order to prove each empirical finding with elements supported by existing, reliable studies and it has been shaped and adjusted in order to fit with any other relevant insight brought to light during the interviews.

#### **4.4 Rigor in Research**

Reliability is often perceived as the standard measure of research quality (Kolbe and Burnett, 1991). It is ensured by the replicability of the research; if carried out again with the same methods, in the same context, it should lead to the same findings. In order to increase the reliability of the research, interviewee and interviewer bias have been reduced as much as possible by conducting interrogations in the most rigorous way possible (interviews have been scheduled head of time, respondents were questioned individually in their own office, any kind of external distraction has been avoided, and records of the discussions has been taped and literally translated right after the meetings).

The data collection has continued until saturation of the evidence has been achieved. Data saturation is reached when there is enough information to replicate the study (O’Reily and Parker, 2012; Walker, 2012; Fusch and Ness, 2015), when the ability to obtain additional new information has been attained (Guest et al., 2006; Fusch and Ness, 2015), and when

further coding is no longer feasible (Guest et al., 2006; Fusch and Ness, 2015). To do so, data triangulation has been employed. It consists in acquiring information from multiple data sources and is a method to get to data saturation (Fusch and Ness, 2015); several company records and documents have been considered and eight different people have been questioned.

#### **4.5 Research Validity**

Academic studies' validity presents three forms, known as construct, internal and external validity.

Construct validity refers to the alignment and support of the data collected empirically with the theoretical arguments provided by previous studies conducted about analogous and/or related topics. Key success factor to achieve construct validity is the proper interpretation of the collected data since human error might be easily committed, leading the researcher to draw unappropriated conclusions.

Internal validity of an experiment refers to the ability to draw confident causal conclusion from the research (Leowenstain, 1999), it therefore represents the level of confidence with which the proposed solution can be considered appropriate for the specific problem analyzed. An internal valid design will yield results that are robust and replicable (Schram, 2005). To fully respect this condition, multiple individuals involved in the case has been separately interviewed and their answers had been transcribed ([Appendix VII](#)) to allow other researcher to repeat the same analysis and compare their conclusions.

External validity refers to the possibility of generalizing the conclusions to situations similar to the one that prompted the research (Schram, 2005). This means that the findings of a specific study result to be relevant and applicable in similar research contexts, being considered as a reliable theoretical background to refer to. For what concerns this specific work, even though it studies in detail the peculiar risks faced by a singular company in a meticulously defined process, it can be easily adapted to any research context where long-

lived assets, based on a developing and unstable technology, have to be acquired by a subject because of case-specific contingencies. To the extent of my knowledge, this research can be considered, up to today, the first of its kind and therefore become a reference work for future similar studies.



## **5 RESEARCH CONTEXTS: CITY SIGHTSEEING CASE STUDY**

In this chapter the actual situation of the transition process to electric mobility is introduced, providing an overview and description of the acquiring company (for the aim of this study only City Sightseeing is described; to the extent of the knowledge of the company's managers, all the relevant competitors are facing an analogous condition with consideration of the aforementioned process), and the suppliers currently available for the reference market.

### **5.1 State of the Transition Process to Electric Mobility in the Case of Tourist Double-Deckers.**

Only in recent years significant investments in the technology needed to project and develop electric double-deckers have been made. The reason behind this is that this specific market segment represents a niche of the electric mobility, with idiosyncratic technical requirements, which has been economical unattractive for suppliers until the last three to five years. The regulatory pressure enforced by governments and/or monetary incentives awarded to companies in order to increase their environmental sustainability, has fostered the adoption of this kind of vehicles, making their utilization more attractive from an economical point of view. The creation of a consistent market demand for this kind of assets has pushed potential suppliers to invest in research and development, leading to a rapid technological development. In this way, a positive feedback loop has been created, where suppliers' investments in research and development, pushed by growing market demand, make the assets provided more attractive, further increasing the volumes potentially ordered by the acquiring companies.

Today an advance stage of the test phase has been completed. As will be analyzed later, two suppliers are already able to sell a tested product, while others are finalizing the testing process on their prototypes and will be soon available on the market.

## **5.2 Acquiring Company: The City Sightseeing Group**

### **5.2.1 City Sightseeing Worldwide**

City Sightseeing, whose headquarters are in Worcestershire, (UK), is the world leader in touristic buses tours with the hop-on, hop-off system, operating in 110 locations spread in five continents and with approximately 800 vehicles

The company is structured as a franchising, this allows the local operators to have the flexibility to introduce the right infrastructures to suit their locality whilst, with full support and coordination of the worldwide company. This kind of governance aims to leave entrepreneurial freedom to the single franchisees, while at the same time, creating a well-established and recognizable brand and standard of service.

### **5.2.2 City Sightseeing Italy**

City Sightseeing Italy is the company that owns the authorization for the use and grant of the City Sightseeing brand in the Italian peninsula, actually present in 16 different location with about 100 double decker buses operating on sites.

It owns direct participations in each of the subsidiaries part of its network. Its duties are to establish the regional strategy of the company, to oversee its implementation and to coordinate the relations with suppliers and institutions.

### **5.2.3 City Sightseeing Rome**

City Sightseeing Rome, at the time of this study, is operating in the city of Rome with 18 buses, representing the leader in the reference market segment for what concerns the Italian capital, (market share and competition is shown in **Appendix II**). Currently the buses are bought by the company with a simple acquisition contract, (except for two of them that are object of a leasing agreement). Recent memoranda from the European Union and local Authorities have announced that, in approximately 3 to 5 years, the transition from fossil fuels engines to electric ones will be required by law. This, in addition to CSR issues,

convinced City Sightseeing Rome to evaluate the early replacement of their buses fleet, and start a supplier selection process since the actual suppliers do not own the know-how for electric mobility. Concerns regarding this operation rose from the fact that buses represent the 76% of the total assets of the company and that, on average, a 72 seats electric-driven double decker bus costs about 2.5 times as much as a traditional one. Furthermore, the electric mobility is an unstable sector, and therefore, the company has worries regarding the lifetime of the new acquired durables. Now buses serve for an average of twelve years, (six of them are two years old, the other twelve range from four to eight years of service). With regard to electric buses, disruptive change in technology could make them become obsolete earlier than expected, reducing sensibly the value of the firm's investments. This thought is upheld by a study conducted by Stacchetti and Stolyarov, (2015) who report, with a focus on electric mobility, the disruptive effect that consistent improvements in battery technology could have on the owners of durables manufactured before the innovation coming. Another aspect regards the deterioration rate of the capacity of the battery over time, since there are no previous records regarding usability over time. This underlines possible complication for what regards both, the physical deterioration rate and the early obsolescence of the buses acquired.

Given this situation, City Sightseeing is looking forward to finding the right supplier and stipulate together a contractual agreement that would grant them the possibility to keep their business away from service disruption and, at the same time, mitigate the obsolescence risk described above. A previous study, by Keles et al., (2004) already analyzed the problem of a bus fleet replacement. It did not consider major changes in mobility technology paradigm and the possible role played by contract in risk sharing; therefore, a new and updated study is required.

The eventual contractual agreement with the new suppliers might be adopted as protocol by the worldwide company and shared with the other franchisees of the group which face similar regulatory pressure and uncertainty.

#### **5.2.4 City Sightseeing Milan**

Taking the position of first movers, they introduced the second electric grand tourism bus in Europe in November 2018 (first of the company worldwide). They selected a Chinese company as supplier. As part of the City Sightseeing Italy network, they manifested their willingness to share with City Sightseeing Rome data regarding the test phase of their electric bus. Their experience can be used by City Sightseeing Rome in order to further increase the knowledge of the company by learning from the empirical evidence and data collected on field.

#### **5.3 Suppliers**

City Sightseeing Rome is currently evaluating a possible global base of suppliers. To the extent of the company knowledge, up to today, there is a limited number of suppliers which own the required know-how to manufacture the vehicles required (touristic double-deckers with at least 72 seats). **Table 4** reports a complete list of the available suppliers City Sightseeing Italy is aware of. For confidentiality reasons the names are omitted, and the provenience is indicated just with a generic macro region.

Supplier	Location	Stage of Product Development
Supplier1	China	Buses ready for sale, operating on a stable base after last test phase
Supplier2	Western Europe	It assembles parts manufactured by other companies; products ready to be sold by July 2019.
Supplier3	Western Europe	Second test phase, not ready for market sales
Supplier4	Western Europe	Second test phase after major disruptions in the first one, not ready for market sales
Supplier5	Eastern Europe	First test phase
Supplier6	Western Europe	Announced beginning of first test phase
Supplier7	Western Europe	Announced intention of product development

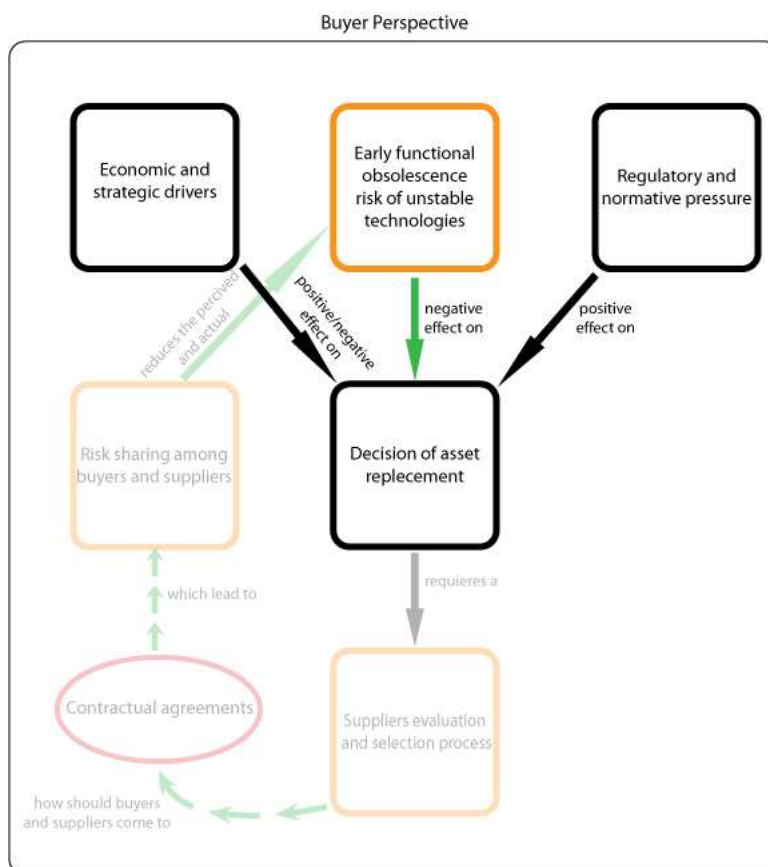
**Table4, Suppliers of 72 Seats Electric Double-Deckers**

As reported by **Table4** only Supplier1 and Supplier2 are ready today to sell a final product and therefore their representatives in the sales and contracting areas have been interviewed. Nevertheless, it is important to take into consideration the fact that Supplier3 and Supplier4 should be ready for market sale in the next six months (while there is no precise guess on the availability of products from the remaining mentioned manufactures yet), thus their imminent presence as potential suppliers of alternative assets shall be taken into account during the evaluation process.

## 6 DATA ANALYSIS

In this chapter the results of the data collection are displayed, and an extensive analysis of the findings is provided. As mentioned in section 4.3, in order to classify, display and evaluate the empirical data collected by the interviews, a coding scheme has been created and reported in Appendix VIII. The structure of the chapter recalls to the different elements present in the theoretical conceptual model (3.4), and the topics investigated by the interviews (3.2; 3.3). Each of the following section will take into consideration part of the elements and relations presented in the flow diagram of figure 3. At the beginning of each of them, the scheme of the conceptual model will be reported, highlighting the part of it that will be discuss in the following subsections.

### 6.1 Factors Affecting the Decision-Making Process of Assets' Replacement.



**Figure4: Factors Affecting the Decision-Making Process of Assets' Replacement**

### **6.1.1 Asset Replacement Process**

With an average working life of ten to twelve years, endothermic double-deckers are considered as long-lived assets by the City Sightseeing group. At the end of their service period, the replacement process of the existing vehicles has been pretty simple for the company, in fact the technological paradigm of the endothermic mobility has been substantially stable since the foundation of the company itself<sup>7</sup>.

Today, when a new vehicle has to be acquired, two options are available on the market: electric and endothermic engines, making the asset replacement process more complex and strategically relevant.

The former kind of power unit is more expensive (2.5 times) and it is based on a developing and uncertain technology, with a higher level of associated risks<sup>8</sup>, the latter is cheaper and simpler but might prove inadequate in the near future, making the company incur an economic loss due to the forced substitution of the working assets, years before the end of their expected operating period.

### **6.1.2 Economic and Strategic Factors**

As introduced in the previous paragraph, the decision of asset replacement now plays a crucial strategic role for City Sightseeing. The transition process to electric mobility seems to be an unavoidable event; what is still uncertain and needs to be considered is its timing. An anticipated substitution of endothermic engines, in favor of electric ones, might result in the acquisition of assets which will turn out to be obsolete and sub-efficient before the prospected

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<sup>7</sup> Only minor technological improvements have been made, as reported in section 5.1.3, not representing a disruptive technological change.

<sup>8</sup> As discussed in section 5.1.4

end of their working life, due to the rapid technology development and appearance of superior and/or cheaper products. At the same time, the acquisition of buses with an endothermic propulsion might be potentially harmful for the firm, locking the company into a situation where it will own assets that will no longer be employable due to the reasons explained in section 6.1.3.

In this context, *“it is crucial for us, as acquiring company, to remember that this product (electric bus) is developing a lot and really fast. It is necessary to find the equilibrium point between being the first at entering the market, and so be more reactive to change than competitors, and not to expose the company too much” (Fr.M.)*.

Another strategic aspect that influence the transition to electric mobility is the company’s reputation in terms of Corporate Social Responsibility, which is positively affected by the adoption of zero-emissions vehicles, with no impact on the level of air pollution of the inner cities. This has turned out to be a crucial factor in the adoption of the first electric double-decker in Milan; in fact, as stated by A.A. *“We have invested in a campaign to improve the company reputation to the public, being able to promote ourselves as the first adopters of the electric double-decker. This also had a benefit on the interaction with the lawmakers, pointing out our willingness to comply with their environmentally friendly policies”*.

### **6.1.3 Regulatory Pressure and Incentives**

As described in the previous paragraph, the public interest over the environmental impact of businesses has risen sharply in the recent years. City Sightseeing Rome has already experienced this kind of pressure but with less implications than today, indeed, as reported by M.B., *“The approach to electric change is similar to the one we experienced with the Euro6 normative, which required us to buy and register only buses that respect certain gas mileage and emission standards. Now the requirements and threat to our company is way higher; the*



*local administration declared that endothermic engines might be banned in a few years, without giving us enough time to complete the service life of the buses which are operating today”.*

Local regulations have been an incentive also for City Sightseeing Milano in the introduction of the first electric bus of the group, as stated by A.A., *“we were helped in the decision of purchase of our electric double-decker by the fact that, in Milan, there is a regional law which requires diesel vehicles to operate for a maximum of six years. This is basically half of the regular service life of an endothermic bus, so the electric alternative resulted to be relatively more competitive for us from an economic standpoint.*

#### **6.1.4 Early Functional Obsolescence of Unstable Technologies and Other Risks Related to the Process**

From the first part of this section it has emerged how timing the substitution of endothermic buses, in favor of electric ones, represents a key success factor for City Sightseeing Roma. The risk of early F.O. of the new assets, potentially arising from an incorrect timing in asset replacement, has been supposed to be the major source of threat to the business stability. From what emerged from the collected data, although it is perceived as deterrent, as stated by both buyers and suppliers, the risk of early F.O. is in some way mitigated by the contingencies and by the fact that is it part of the entrepreneurial nature of business. A.A., stated: *“Our philosophy is to be the first. This kind of risk is part of the entrepreneurial nature of our business. As managers our duty is to try to innovate as fast as possible, finding and implementing all the solutions to avoid putting the stability of the company in jeopardy.”*

In this context of fast developing technology where, as was also confirmed by the suppliers, more performing and reliable buses might be available soon (or the price of existing ones might sharply decrease in a short period), it is crucial for acquiring companies

*“to find an equilibrium between being the first and not to expose the company too much”* (Fr.M.). They also remarked that part of the product development is based on the feedbacks they receive from buyers, which will establish direct connection with them sooner, potentially benefiting the acquiring companies’ business in a latter phase.

Moreover, the uncertainty of P.D. rates over time has been confirmed to be perceived as a major risk. Suppliers, as well as buyers, have little insights regarding the effect of several charges, usage and external factors on the ability of the batteries to maintain their initial charging capacity over time. Although some secondary guarantees are already provided to customers, their ensured time span is shorter than the expected life of the vehicles (5 years over 12+ expected years of service), making doubts rise regarding the substitution process of the batteries. In fact, if one of the reasons why electric buses have been introduced is the lower impact they have on the environment, *“batteries need to be regenerated, they cannot represent a source of waste and be dumped in a landfill; in this way the “green” purpose of the process is lost”* (C.A.).

During the interviews other possible risks sources, in addition to the early F.O. and uncertainty of P.D. rates of the new assets came into discussion. Indeed, from the experiment conducted in Milan, the bus seems to be working as expected even though it is kept under strict vigilance when in charge to avoid the possibility of catching fire during this operation. Other concerns regard the feasibility of its adoption in cities which are characterized by a hilly territory (such as Rome), where a different kind of performance is required, and the necessity of different technical skills by the maintenance operators. Furthermore, perplexities rise from the uncertainty regarding the capability of the electricity distribution network to supply the required amount of energy needed to charge a fleet of buses without shutting the lights of households. Another doubt regards the reverse cycle of the batteries after the end of

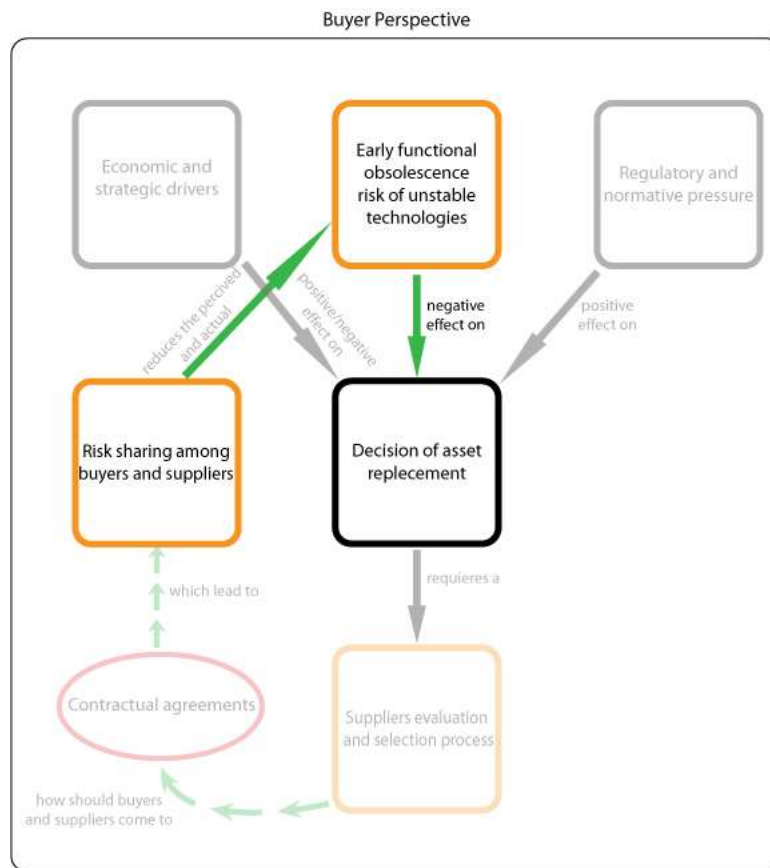
operating life, since this is a major aspect to be consider in both environmental and economic terms.

The perception of this numerous and articulated set of risks Is diametrically opposed for what concerns buyers and suppliers. **Table5** reports all the sources of risk previously analyzed, comparing how they are perceived by different supply chain parts.

<b>Risk Source</b>	<b>Buyers' Perception</b>	<b>Suppliers' Perception</b>
<b>Early F.O.</b>	Perceived as a possible major cause of business instability; partially mitigated by the entrepreneurial necessity to innovate and gamble.	Products are still developing and might improve fast; since they follow feedback from buyers for R&D projects, first partners will find products developed around their needs and preferences
<b>Uncertainty of P.D. Rates</b>	Concerns about the guarantees provided on batteries; their lifetime could be shorter than the of the vehicles they power	From test phase life of the actual batteries should be longer than the guarantees given; never verified on buses working on field for a long period.
<b>Disposal of Used Batteries</b>	It can represent a significant cost for the company; if carried out incorrectly could also damage the imagine of the brand	Specialized firms are already operating to take care of this problem for other kind of vehicles; it might be an expansion of the business of the suppliers' themselves
<b>Major Disruption During Charging Process</b>	The first electric bus of the group is kept under strict eye surveillance during charging process	Very remote incidence; never happened during each of the test phases.
<b>Usage on a Hilly Territory</b>	Current technology may not be suitable on a hilly territory; till today experimented only in the plain.	Test show how the buses would work efficiently on any kind of territory where City Sightseeing Italy is actually operating
<b>Technical Skills to Operate Maintenance</b>	Absence of in-house knowledge; doubts on the reactiveness of suppliers' maintenance service	Guarantee fast and efficient maintenance service; offer courses to train buyers' employees
<b>Capacity of the Electricity Distribution Network to Supply Energy</b>	The local network of energy distribution may not be able to supply enough energy during the picks of electricity demand	After an evaluation process, if the charging process is correctly scheduled and operated, it would not represent a problem in any of the cities potentially interested.

**Table5: Risk Sources, Buyers and Suppliers Perception.**

## 6.2 Risk Sharing Practices



**Figure5 Risk Sharing Practices**

### 6.2.1 Buyers' Approach

With the exception of rare cases, all the maintenance of the endothermic buses is carried out in-house by the members of the City Sightseeing Italy network. The reason behind this is to exploit synergies with other business owned by the individuals associated with the franchise and the fact that maintenance itself is considered as part of the business and a way to increase the company's profits. The only practice, enhanced by the company, that could possibly be associated with the notion of risk sharing is the fact that spare parts are bought ahead of time in order to establish the price a priori without bargaining it in a second phase.

For what concerns the supply of electric double-deckers the perspective of the company changes; for this kind of assets the company does not own the know-how necessary in order to perform the maintenance service on the buses and therefore is looking forward to

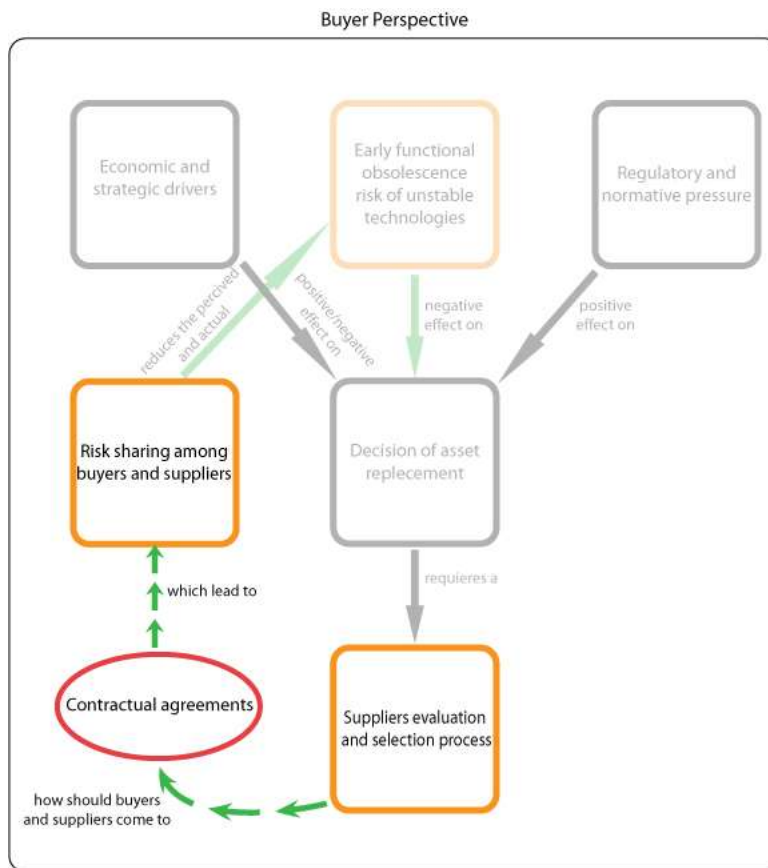
sharing the risk of breakdown deriving from technical failures. Although there is willingness by the members of the network to train the staff in order to be self-sufficient in operating the maintenance service, it does not seem to be possible to do so for the company in a short span of time.

### **6.2.2 Suppliers' Approach**

Suppliers, on their side, seem to be willing to match this kind of request from buyers since they consider their customers as “scared” by the new technology, and thus offer on-site technical assistance and training programs for buyers' operators in order to reassure them and increase the sales. As shown in **Table 5**, they perceive a significantly lower incidence of the breakdowns mentioned by City Sightseeing, so they judge it less onerous to take care of such eventualities.

Suppliers consider this kind of policy possible when the number of vehicles is large enough (no precise number has been indicated, but it seems reasonable to consider a fleet of 10+/20+ buses) and *”it would ensure the alignment of buyers' and suppliers' incentives, ensuring both of us that we are working in the same direction for the mutual interest.”* (G.C.). Acquiring companies would therefore reduce their uncertainty about the new products and be more inclined to invest on them.

### 6.3 Contracting



**Figure6: Contracting**

#### 6.3.1 Current Contractual Structure Chosen by City Sightseeing Roma

Right now, City Sightseeing Roma, and, in general, City Sightseeing Italy is acquiring its endothermic double-deckers by a simple acquisition contract, with a simple factory guarantee of 24/48 months<sup>9</sup>. The electric bus acquired by City Sightseeing Milano has been bought with the same method, but the company is considering adopting different solutions when the bought volumes will increase. This is proven by the fact that the nature of the

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<sup>9</sup> Leasing has also been mentioned as a possible acquisition contract to cover seasonal picks in demand; it represents only a small fraction of the company business and it is therefore ignorable.

vehicles industry, in general, is changing, as reported by M.B. *“vehicles are becoming more a service than a good. The percentage of car driven on a leasing plan or other kind of rent has dramatically increased in the recent years; something analogous seems to be happening for our business and for others which base their operations on passengers’ mobility”*. It underlines how the ownership of the assets is no longer a strict priority when it comes to electric mobility.

### **6.3.2 Introduction of Risk Sharing Parameters in Contracts**

The possibility to effectively introduce clauses in contracts, linking the payments to parameters regarding the P.O. level and the adequacy of the product, with regard to the different substitutes offered by the market over time, does not seem to be feasible. The reason behind this is that *“it is hard to establish parameters to evaluate F.O. First, we should come to a proper definition of P.O. of our products to regard to the new ones offered by the market, and then, we should agree on the measurement of the parameter previously defined; it seems to be overcomplicated and unrealistic.”* (M.C.). The sentiment expressed by suppliers is also confirmed by buyers, who believe that it is not realistic to ask sellers such a contractual condition. Different is the belief on the introduction of clauses regarding the batteries’ P.D. rates. As state by M.B., *“It is something we are looking for, it would make the difference for us to gain additional guarantees and incentivize us to invest”*, and suppliers also confirmed their commitment to work on this aspect, with the requirement of discussing about large volumes instead of single purchases. City Sightseeing Milano tried to bargain this aspect.

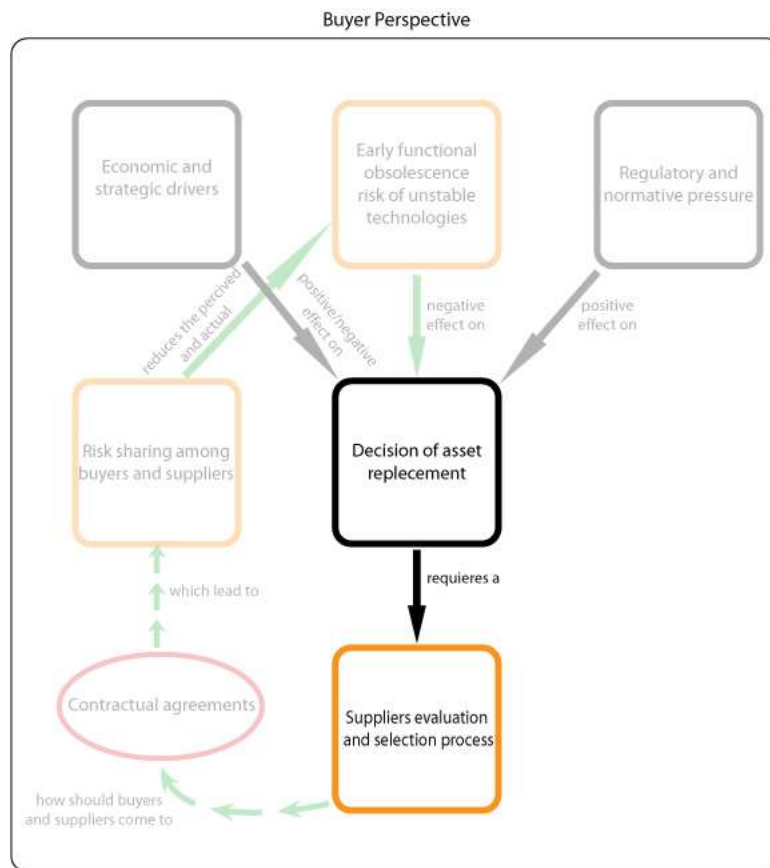
They were not able to come up with anything more than a simple guarantee of five years for the batteries because they were not dealing with a fleet but with a single vehicle; they still believe that it *“could be an improvement of our current structure of the contractual deal”* (C.A.) to introduce such aspect in the contract.

### **6.3.3 Mediation of City Sightseeing Italy in Bargaining with Suppliers**

The need manifested by suppliers of dealing with a large number of vehicles to accept such clauses in contracts could be satisfied by the direct mediation of City Sightseeing Italy. This is confirmed by the words of Fr.M. who stated: *“it is necessary to stay closer to network members to help them; the scope is to create a large fleet to gain contractual power. We always wanted to let the network members operate as free as possible but sometimes it is necessary to play a more active role”* and by what reported by the semi-independent franchisees’ managers: *“Centralized contracting at network level would speed up the process of transition to electric. We would need to invest less time to bargain with suppliers and the process would be faster and simpler for both parts.”* (M.B.); *“A reference contract is necessary to promote the process among the different members of the franchise. It would illustrate to all of us the pattern that needs to be followed and would incentivize the acquisition of electric vehicles”* (C.A.). This scenario is also confirmed by the fact that, at a group level, the Company is not new to the practice of centralized bargain with suppliers, aimed to increase acquired volumes and get better contractual conditions- a practice that might be successfully repeated in this new context.



## 6.4 Suppliers' Selection and Impact of Contracts



**Figure7 Suppliers' Selection**

### 6.4.1 Current Suppliers' Selection for Endothermic Buses

For what concerns the current suppliers' selection for endothermic double-deckers, City Sightseeing is carrying it out in a way similar to a simplification of the AHP method. Even though the methodology of the aforementioned process, illustrated in section 3.2.2.1, is not strictly applied, the logic of it is employed. In fact, *“it takes into consideration several parameters (safety, gas mileage, comfort reliability...) Cost accounts for only 20% of the final decision”* (G.C.), and *“Many features are evaluated, our priority is safety, then we consider all the other attributes, keeping always an eye on price”* (Fr.M.).

The reason behind the simplification of the method is due to the fact that it would take a long time to weigh every single attribute considered, since we are talking about a complex

asset, and the suppliers are few and well known by the company: therefore it is possible to analyze every offer singularly and come up with the choice that guarantees the best fit.

#### **6.4.2 Suppliers' Selection for Electric Buses and Related Impact of Risk Sharing Contracts**

If on one side cost is still a relevant parameter in the suppliers' selection for endothermic buses, on the other side, for what concern the electric vehicles, its importance is lower. Conspicuous resources, in terms of time and money, have been spent by City Sightseeing Milano to evaluate the different suppliers of electric double-deckers on a global base and, in the end, *"They chose the most performant and reliable; we knew that saving money on quality could have resulted in exponentially higher maintenance costs."* (C.A.). This first evaluation of potential buyers is a great indication for other members of the franchise, but it has to be refined since the technology, as well as the reference market<sup>10</sup>, are changing fast, entailing the necessity of repeating the selection periodically.

The effect of the introduction of risk sharing clauses in contracts on the supplier selection has proved positive. Indeed, *"If suppliers use this kind of contracts to promote their products, it would have a great appeal. Our consideration on they offers would completely change; we would feel ensured"* (M.B.), and *"It can be absolutely a factor in selecting one supplier instead of another, the willingness to come to such contractual terms would represent for us the quality of the effort given by the suppliers to fulfill our needs"* (Fr.M.).

City Sightseeing Italy, as reported above, showed its availability to mediate in the contracting process in order to obtain better condition; it also manifested its willingness to help the single franchisee to select, at least during the first approach, the new suppliers for

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<sup>10</sup> As reported in Section 5.3

electric buses. For their part, suppliers seem to be compliant in working in this direction, feeling that it would be a “*Way to be closer to customer and ensure it*” (L.W.), key point to solve the problem of “customers’ distrust”, due to the scarce knowledge of the reference technology by buyers, they are currently facing.

## 7 CLOSING CHAPTER

In this chapter the conclusions of the study are reported. The focal point is to provide an answer to the problem statement presented in Section 1.2: *“How could City Sightseeing Roma mitigate the risk of early obsolescence of electric buses through the proper form of risk-sharing contract?”*. In order to do so, the practical research question reported in Section 1.2 are reported to structure the conclusions of the study.

In the remaining two sections, first practical implications for City Sightseeing Roma are presented and then limitations of the study and areas of possible further research are pointed out.

### 7.1 Conclusions

R.Q. 3, Section 1.2: *“How does the early functional obsolescence risk affect the transition process to electric buses for City Sightseeing Roma?”*

In the light of what emerged from the data analysis, it is clear how the transitional process to the acquisition and utilization of electric double-deckers has reached a crucial stage: suppliers are ready to provide a valid and differentiated set of offers, and lawmakers are pushing and incentivizing the adoption of the new technology.

The process is still uncertain and characterized by several possible sources of risk that have not been pointed out in the introduction of the research but have emerged during the analysis of the collected data. In fact, it emerged that critical issues derive not only from concerns about the eventuality of early P.O. of the acquired assets, or from the doubts on the P.D. rates of batteries over time, but also from other possible sources of disruption, as reported in Section 6.1.4, Table 5.

City Sightseeing has to actively take a position, planning and executing all the steps required to introduce and adopt electric vehicles, always taking into consideration the possible risks and related drawbacks.

Given this complex context, the company is willing and oriented to consider and undertake a strategy to effectively share risks with its possible future suppliers. Even though there are several strategies to share risks among supply chain partners, this study focuses on the role of contracts in achieving an effective subdivision of the risks. A first attempt to do so has been done by City Sightseeing Milano, introducing some technical guarantees in the simple trade contract through which the first electric double-decker of the group has been acquired.

R.Q. 4, Section 1.2: *“What form of contractual agreement would enable City Sightseeing Roma to share risks with its suppliers? How?”*

When dealing with a larger number of buses than a single purchase, as also shown by the feedbacks collected from suppliers, it seems reasonable to adopt a performance-based contract to govern the relationship between buyers and suppliers and achieve an effective share of risks. As illustrated in section 3.3.3, performance-based contracts, by aligning the incentives between supply chain partners, could effectively share the risks among buyers and suppliers. City Sightseeing would no longer buy the vehicles, but the service provided by them. This would align with what reported in section 6.3.1, regarding the change in the mobility industry, and underlines how the ownership of the assets is no longer a strict priority when it comes to electric vehicles. Table 6 illustrates the predicted effect of the adoption of a PBC by City Sightseeing Roma on the risks’ set presented in section 6.1.4.

<b>Risk Source</b>	<b>Predicted Effect of PBC on Risk Source</b>
<b>Early F.O.</b>	Suppliers would be responsible for the substitution of obsolete buses, exploiting their deeper knowledge of the product to better schedule the replacement program
<b>Uncertainty of P.D. Rates</b>	Suppliers already give partial guarantees on batteries' life and, on the basis of what emerged from the test phases, they do not foresee to have to substitute them before the expected end of their operating life. They either manufacture them or have a direct connection with batteries manufactures, therefore, in the case of early substitution of that component, it would be faster and cheaper for them than for City Sightseeing to take care of such a replacement.
<b>Disposal of Used Batteries</b>	Suppliers would take care more easily of the reverse cycle of exhausted batteries than buyers since they operate with larger volumes; some of them also stated their willingness to take care of the regeneration process of used batteries in-house.
<b>Major Disruption During Charging Process</b>	This eventuality does not represent a consistent risk source for suppliers due to its really low perceived incidence. The arrangement guaranteed by a PBC would relieve City Sightseeing from the direct supervision of the charging process.
<b>Usage on a Hilly Territory</b>	Suppliers' interpretation of the available data ensures them about the suitability of their existing products to be employed on a hilly territory.
<b>Technical Skills to Operate Maintenance</b>	Disposing of the required technical know-how and dealing with a conspicuous fleet of buses would allow the supplier to have a specialized maintenance team dedicated to the City Sightseeing Italy network.
<b>Capacity of the Electricity Distribution Network to Supply Energy</b>	Suppliers' studies showed how, with the proper scheduling, the charging process can be operated without interfering with other users of the electricity distribution network. City Sightseeing Roma would not have to take care of such planning.

**Table6 Effect of PBCs on the Investigated Risk Set**

As this study shows, the different perception of the risks involved, as perceived by City Sightseeing Roma and its possible suppliers, is the key justification of a risk sharing contract.

In order to regulate and compute the payments, a parameter, by the nature of PBCs, has to be established and periodically computed. What seems to be likely the best option, in

terms of facility of computation and risk insurance, is the number of operative hours provided by the suppliers' buses to City Sightseeing. Other parameters could be considered, such as the capacity of batteries over time, but they would be either more difficult to compute or they would not regard the whole sets of risks which turned out to negatively affect the transition process to electric mobility.

This kind of contractual setting may prove to be more expensive for City Sightseeing Roma than a simple acquisition, due to the augmented complexity, absence of complete payment upfront, and the concentration of risks on suppliers. In this reference context though, it seems reasonable to state that the benefits reported above more than compensate the increased costs possibly sustained by the company.

As emerged in section 6.4, this contractual setting, if well managed, would positively affect both suppliers and buyers involved in that specific supply chain interaction. In fact, on one side, buyers would know, ahead of time, the final entity of the cost they will sustain for an hour of effective service of the electric bus, gaining an incentive to buy such supply by the reduced uncertainty. On the other side, analogously, suppliers would increment their incoming cash flows by increasing their volumes, which can be invested to further develop their products and gain a competitive advantage in a growing and unstable market segment.

## **7.2 Implications**

The data analyzed in this study and the conclusions drawn from them point out some major implications, at the operational level, for City Sightseeing Roma.

In order to be able to stipulate a performance-based contract for the supply of electric double-deckers, the proactive mediation of City Sightseeing Italy seems to be necessary, since dealing with large purchased volumes is the key requirement exposed by suppliers. Fortunately, the willingness to operate in this direction has been confirmed by the data collected in this study, interviewing members of City Sightseeing Italy Itself.

The following step will be the development of a schedule to forecast the asset replacement process, considering, in addition to the evolution of technology and possible normative change, also the prospective growth of the reference market and rapid advent of new suitable suppliers. Then the supplier evaluation and selection process will begin, focusing mainly on their propensity to subscribe a satisfactory PBC between parts and the ratio between provided service and asked price. At this point, the contractual agreement will be shaped and signed up by parts, becoming potentially a possible reference for other members of the City Sightseeing company at a global level. If this approach were followed on a worldwide basis, it would further increase the purchased volumes, leaving more space for bargaining on the payments' terms and entity.

As reported in section 7.1 this kind of contract might result to be more expensive than a simple trade one, but, as also illustrated, more suitable for the specific context. For this reason, if in the future the technology will stabilize, City Sightseeing Roma will acquire the know-how to directly perform the in-house maintenance of electric double-deckers, and if other risk mitigating contingencies occur, a second evaluation of the most adequate kind of contract should be accomplished.

### **7.3 Limitations and Further Research**

This study presents some limitations that might interfere with the validity of the research itself. In fact, only members of the Italian network of City Sightseeing have been questioned, while data have been collected from suppliers on a global base. The actual contractual standard of other members of the franchise in the world might differ, the perceived set of risks regarding the transition process to electric mobility might change and the capabilities to operate in-house maintenance on the new kind of buses could be acquired by the company staff. In addition, regulatory pressure differs from country to country, creating a peculiar normative context in each different region where City Sightseeing



operates. This opens the first possibility to further develop the current study, by interviewing other franchisees located in different regions of the world and evaluate if the result is aligned or not with what presented in this work.

Another opportunity to expand the findings of this study would be to repeat the process of investigating the problem statement in an analogous case study; the characteristics to be kept constant should be the acquisition of long-lived assets, based on a developing and unstable technology, which represent a major investment for the acquiring firm. If it led to the same conclusions, the generalizability of the adequacy of performance-based contracts to share risks, rising from the purchase of long-lived assets based on a developing technology, would increase.

As pointed out in Section 7.2, City Sightseeing should evaluate, in a subsequent stage of the process, if the performance-based contract still is the most efficient and effective contractual setting; this could also be the object of further research. The conclusions of the two studies, analyzed together, may create the basis to develop a theory which relates the contractual settings and the stage technology development, in the circumstance of the purchase of long-lived assets.

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**APPENDICES**

I-	Classification of Justification Methodologies in Asset Replacement	68
II-	Rome Market Share for Touristic Double-deckers	69
III-	Interview Guide 1, English and Italian	70
IV-	Interview Guide 2, English and Italian	76
V-	Interview Guide 3, English and Italian	83
VI-	Interview Guide 4, English and Italian	89
VII-	Interviews' Transcripts	92
VIII-	Coding Scheme	134

**Appendix I: Classification of Justification Methodologies in Asset Replacement,**  
retrieved from (Oeltjenbruns, H., et al., 1995)

*H. Oeltjenbruns et al./Int. J. Production Economics 38 (1995) 189–197*

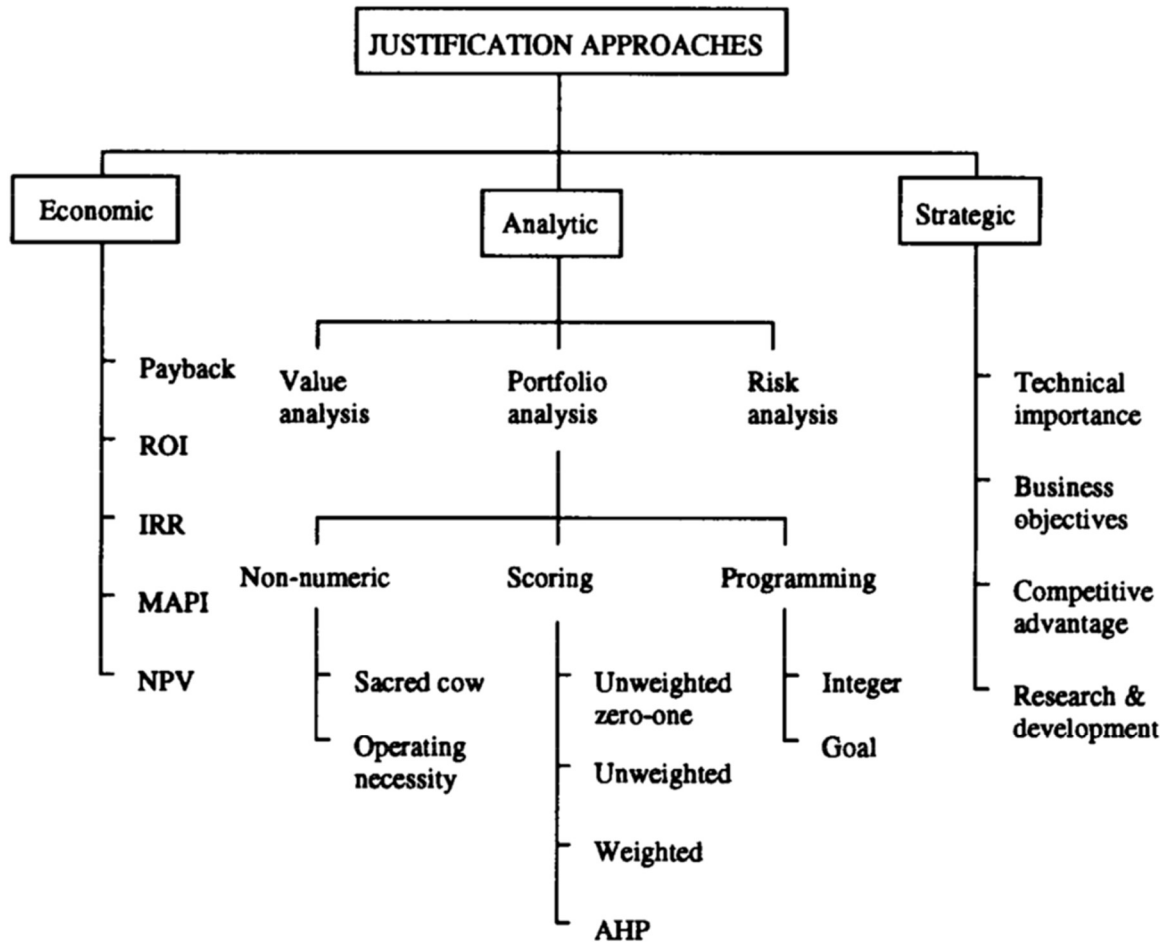
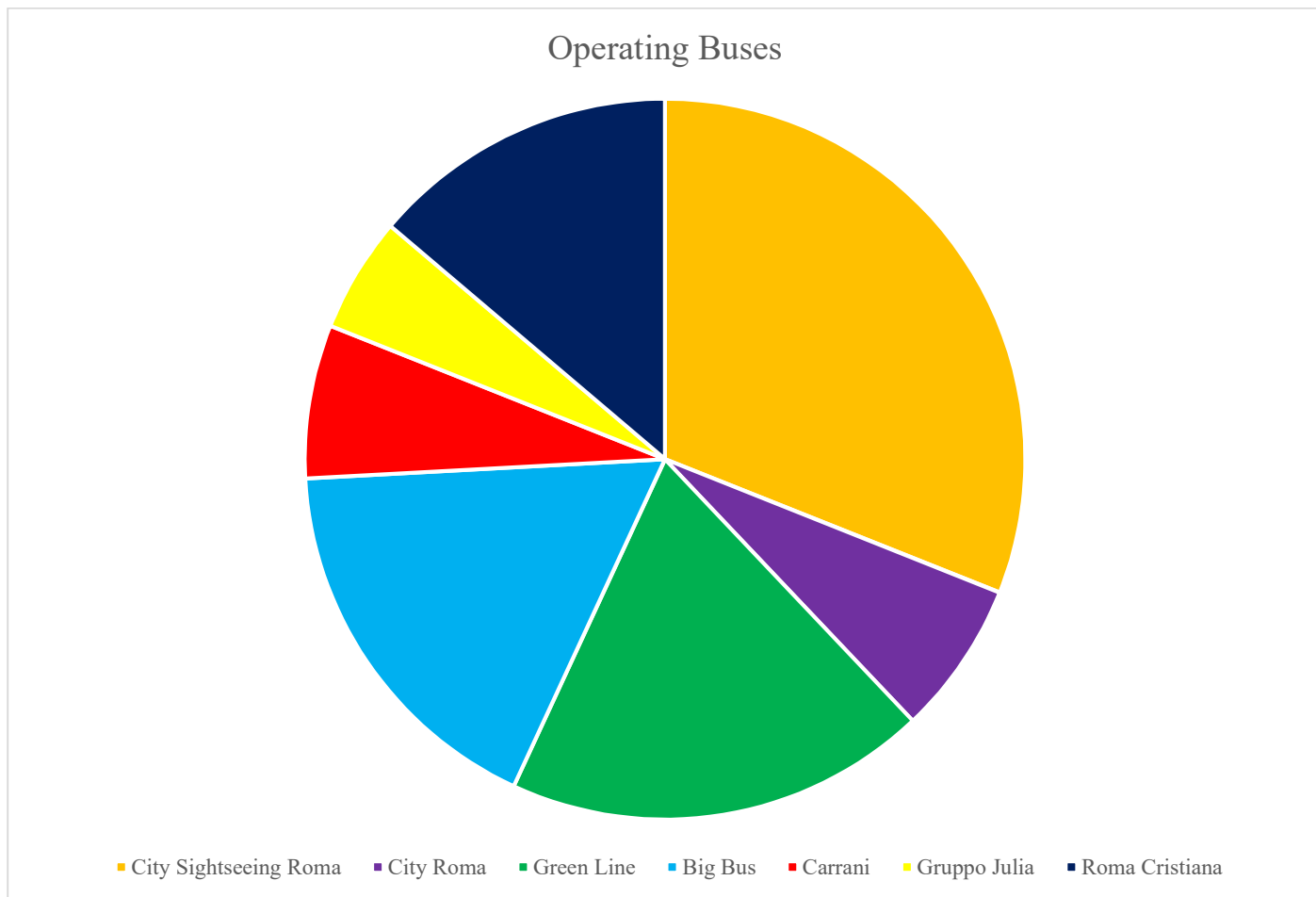


Fig. 1. Classification of justification methodologies [8].

**Appendix II: Rome Market Share for Touristic Double-deckers**



### **Appendix III: Interview Guide 1, English and Italian**

**Design:** semi-structured, 1-on-1 interview

**Language:** Italian

**Subject:** City Sightseeing Roma (buyer)

**Duration:** 45-60 minutes

**Location:** City Sightseeing Roma offices (In case respondent is not available, conference call will be arranged)

#### **Introduction:**

- Interviewer presentation: Eugenio Beretta, 23, Double degree student at Tilburg University and LUISS, MSc in Supply Chain Management.
- Description of the purpose of the interview: Analyzing the role of contracting in sharing the risk of obsolescence between buyer and supplier
- Ask if recording is possible and guarantee about information confidentiality
- Ask the interviewee to introduce himself/herself

#### **Risk Section**

- What implications does the transition process to electric buses have?
- Which factors prevented you to start the process yet?
  - Can you identify a specific set of risks that affect this process?
    - With specific regard to early functional obsolescence risk (further explanation will be provided if necessary) what is the company perception from your standpoint? How does it differ from the current technology?
    - Does uncertainty regarding physical deterioration rates (further description added if needed) affect the process? How does it differ from the current technology?

### **Risk Sharing**

- Do you already apply risk sharing practices with your current supplier base? How do you settle them? Why? (i.e. subdivision of maintenance costs, fixed prices for spare parts, insurances etc.)
- Would you consider risk sharing practices in the new process of transition to electric buses? Is the company already working in that direction? (In case of positive answer) how?
  - With regard to the aforementioned set of specific risks, which are the ones that might be shared with your suppliers? Why?
  - What is your perception about the possibility of sharing risks regarding early functional obsolescence with your suppliers? Which practice could be employed?
  - What is your perception about the possibility of sharing risks regarding uncertainty in the deterioration rates with your suppliers? Which practice could be employed?

### **Contracting**

- What kind of contracts regulate the relation with your current suppliers? Is there any clause that refers to the aforementioned topics?
- If the case, how do you think contracts for electric buses supply should differ from the ones you have subscribed till now? Why?
  - How would you consider the introduction in the contractual agreement of a clause that ensures you against the early obsolescence of your new assets? Do you think it is feasible? How?

- How would you consider the introduction in the contractual agreement of a clause that ensures you against the uncertainty of the physical deterioration rates? Do you think it is feasible? How?

### **Supplier Selection**

- How is currently the supplier selection process carried out?
  - Do you use a specific method with predefined rules, or it is more of a general analysis? Why?
  - Do you believe that the supplier selection process should change for the acquisition of the new electric buses?
    - With specific regard to the early obsolescence risk, do you think that willingness of a supplier to stipulate a contractual agreement where risk sharing is enhanced would influence the final supplier choice?
    - With specific regard to the uncertainty of physical deterioration rates, do you think that willingness of a supplier to stipulate a contractual agreement where risk sharing is enhanced would influence the final supplier choice?
- Is there any other relevant aspect that would play a significant role in the supplier selection process for new buses that you are looking for? (Please mention only if it differs from what mentioned in the current process).

### **Conclusion**

- Ask the interviewee if he/she has anything to add
- Thank interviewee for time and participation
- Greetings

## **Protocollo di intervista 1**

**Forma:** intervista semi-strutturata faccia a faccia

**Lingua:** Italiano

**Soggetto:** City Sightseeing Roma

**Durata:** 45-60 minuti

**Luogo:** City Sightseeing Roma, sede. (Nel caso in cui l'intervistato non sia disponibile di persona, incontri telefonici)

### **Introduzione:**

- Introduzione dell'intervistatore: Eugenio Beretta, 23, studente Double Degree presso Tilburg University e LUISS Guido Carli, MSc in Supply Chain Management.
- Descrizione del fine dell'intervista: Analizzare il ruolo dei contratti nella suddivisione del rischio di obsolescenza fra acquirenti e venditori.
- Richiedere disponibilità alla registrazione dell'intervista e garantire confidenzialità delle informazioni.
- Chiedere all'intervistato di introdurre la propria posizione all'interno del gruppo.

### **Sezione riguardante i rischi**

- Quali sono le implicazioni principali del passaggio da bus tradizionali a bus a trazione elettrica?
  - Quali fattori hanno fatto sì che questo processo non sia ancora iniziato?
  - Può identificare i rischi specifici che hanno un impatto su questo processo?
    - Riguardo al rischio di obsolescenza funzionale anticipata (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'intervistato), quale è la percezione della società? Quale differenza vi è con la tecnologia ad oggi impiegata?

- L'incertezza relativa ai tassi di deterioramento dei nuovi prodotti (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'intervistato), che impatto ha sul processo di transizione menzionato in precedenza? Cosa cambia dalle tecnologie tradizionali?

### **Suddivisione del rischio**

- Svolgete già politiche di suddivisione del rischio con i vostri fornitori? Come sono instaurate? Perché? (Ad esempio, suddivisione dei costi di manutenzione, prezzi fissi per parti di ricambio, garanzie di altra natura etc.)
- Considerereste la possibilità di intraprendere azioni atte alla ripartizione dei rischi citati in precedenza con i vostri fornitori durante il processo di transizione verso i bus elettrici? La società ha già pensato ad alcune possibili soluzioni? In caso di risposta affermativa) come?
  - Riguardo ai rischi menzionati in precedenza, quali potrebbero essere suddivisi con i fornitori? Perché?
  - Quale è la sua percezione rispetto alla possibilità di suddivisione del rischio di obsolescenza funzionale anticipata? Che soluzione potrebbe essere attuata?
  - Quale è la sua percezione riguardo alla possibilità di suddividere, con i vostri fornitori, il rischio derivante dall'incertezza dei tassi di deterioramento? Che soluzione potrebbe essere attuata?

### **Contratti**

- Che tipo di contratti avete in questo momento con i vostri fornitori? Vi è alcun legame con le tematiche citate nella prima parte dell'intervista?
- Nel caso in cui fosse così, come pensa che i contratti per la fornitura di bus elettrici dovrebbero differire da quelli che sono attualmente in vigore?



- Come considererebbe l'introduzione nei contratti di una clausola che “protegga” contro il rischio di obsolescenza anticipata? Pensa che sia realizzabile? Come?
- Come considererebbe l'introduzione nei contratti di una clausola che “protegga” contro il rischio derivante dall'incertezza dei tassi di deterioramento? Pensa che sia realizzabile? Come?

### **Selezione dei fornitori**

- Come avviene al momento il processo di selezione dei fornitori?
  - Adoperate un metodo specifico e con regole predefinite oppure l'analisi è più generale? Perché?
  - Ritieni che il processo di selezione dei fornitori dovrebbe mutare per quanto riguarda i bus elettrici?
    - Ritieni che la disponibilità a condividere il rischio di obsolescenza anticipata con uno specifico fornitore, tramite la stipulazione di un contratto specifico, influenzi la scelta finale del fornitore?
    - Ritieni che la disponibilità a condividere il rischio derivante dall'incertezza nei tassi di deterioramento, tramite la stipulazione di un contratto specifico, influenzi la scelta finale del fornitore?
- Vi è qualche altro aspetto rilevante che ritieni debba essere discusso per quanto riguarda il processo di transizione verso i bus elettrici che non è ancora stato discusso?

### **Conclusione**

- Chiedere all'intervistato se ha niente da aggiungere
- Ringraziare l'intervistato per tempo e partecipazione
- Saluti e congedo

## **Appendix IV: Interview guide 2, English and Italian**

### **Interview Guide 2**

**Design:** semi-structured, 1-on-1 interview

**Language:** Italian

**Subject:** City Sightseeing Italy (buyer)

**Duration:** 45-60 minutes

**Location:** City Sightseeing Italy offices (In case respondent is not available, conference call will be arranged)

#### **Introduction:**

- Interviewer presentation: Eugenio Beretta, 23, Double degree student at Tilburg University and LUISS, MSc in supply chain management.
- Description of the purpose of the interview: Analyzing the role of contracting in sharing the risk of obsolescence between buyer and supplier
- Ask if recording is possible and guarantee about information confidentiality
- Ask the interviewee to introduce himself/herself

#### **Risk Section**

- What implications does the transition process to electric buses have?
- Which factors, as network managing company, do you consider when planning the transition to electric mobility?
  - Can you identify a specific set of risks that affect this process?
    - With specific regard to early functional obsolescence risk (further explanation will be provided if necessary) what is the company perception from your standpoint? How does it differ from the current technology?

- Does uncertainty regarding physical deterioration rates (further description added if needed) affect the process? How does it differ from the current technology?

### **Risk Sharing**

- Do you already apply risk sharing practices with your current supplier base? How do you settle them? Why? (i.e. subdivision of maintenance costs, fixed prices for spare parts, insurances etc.)
- Would you consider risk sharing practices in the new process of transition to electric buses? Is the company already working in that direction? (In case of positive answer) how?
  - With regard to the aforementioned set of specific risks, which are the ones that might be shared with your suppliers? Why?
  - What is your perception about the possibility of sharing risks regarding early functional obsolescence with your suppliers? Which practice could be employed?
  - What is your perception about the possibility of sharing risks regarding uncertainty in the deterioration rates with your suppliers? Which practice could be employed?

### **Contracting**

- What kind of contracts regulate the relation with your current suppliers? Is there any clause that refers to the aforementioned topics? Is there any kind of standard contract agreement you suggest to the members of your network? Do you play any role in the stipulation of the contracts?
- If the case, how do you think contracts for electric buses supply should differ from the ones you have subscribed till now? Why?

- How would you consider the introduction in the contractual agreement of a clause that ensures you against the early obsolescence of your new assets? Do you think it is feasible? How?
- How would you consider the introduction in the contractual agreement of a clause that ensures you against the uncertainty of the physical deterioration rates? Do you think it is feasible? How?
- Do you think that, for the introduction of the new and more complex electric buses, City Sightseeing Italy should mediate the relations with suppliers? Why?
  - What about the definition of a standard contract used as guideline by single franchisee?

### **Supplier Selection**

- How is currently the supplier selection process carried out?
  - Do you suggest a specific method with predefined rules, or it is more of a general analysis? Why?
  - Do you believe that the supplier selection process should change for the acquisition of the new electric buses?
    - With specific regard to the early obsolescence risk, do you think that willingness of a supplier to stipulate a contractual agreement where risk sharing is enhanced would influence the final supplier choice?
    - With specific regard to the uncertainty of physical deterioration rates, do you think that willingness of a supplier to stipulate a contractual agreement where risk sharing is enhanced would influence the final supplier choice?
- In this scenario of uncertainty, how do you plan to support single franchisee in dealing with suppliers?

- Is there any other relevant aspect that would play a significant role in the supplier selection process for new buses? (Please mention only if it differs from what mentioned in the current process).

### **Conclusion**

- Ask the interviewee if he/she has anything to add
- Thank interviewee for time and participation
- Greetings

### **Protocollo di intervista 2**

**Forma:** intervista semi-strutturata faccia a faccia

**Lingua:** Italiano

**Soggetto:** City Sightseeing Italy

**Durata:** 45-60 minuti

**Luogo:** City Sightseeing Italy, sede. (Nel caso in cui l'intervistato non sia disponibile di persona, incontri telefonici)

### **Introduzione:**

- Introduzione dell'intervistatore: Eugenio Beretta, 23, studente Double Degree presso Tilburg University e LUISS Guido Carli, MSc in Supply Chain Management.
- Descrizione del fine dell'intervista: Analizzare il ruolo dei contratti nella suddivisione del rischio di obsolescenza fra acquirenti e venditori.
- Richiedere disponibilità alla registrazione dell'intervista e garantire confidenzialità delle informazioni.
- Chiedere all'intervistato di introdurre la propria posizione all'interno del gruppo.

### **Sezione riguardante i rischi**

- Quali sono le implicazioni principali del passaggio da bus tradizionali a bus a trazione elettrica?
- Quali fattori, in qualità di holding del network, prendete in considerazione quando programmate il processo di transizione verso i bus elettrici?
  - Può identificare i rischi specifici che hanno un impatto su questo processo?
    - Riguardo al rischio di obsolescenza funzionale anticipata (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'Intervistato), quale è la percezione della società? Quale differenza vi è con la tecnologia ad oggi impiegata?
    - L'incertezza relativa ai tassi di deterioramento dei nuovi prodotti (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'intervistato), che impatto ha sul processo di transizione menzionato in precedenza? Cosa cambia dalle tecnologie tradizionali?

### **Suddivisione del rischio**

- Svolgete già politiche di suddivisione del rischio con i vostri fornitori? Come sono instaurate? Perché? (Ad esempio, suddivisione dei costi di manutenzione, prezzi fissi per parti di ricambio, garanzie di altra natura etc.)
- Considerereste la possibilità di intraprendere azioni atte alla ripartizione dei rischi citati in precedenza con i vostri fornitori durante il processo di transizione verso i bus elettrici? La società ha già pensato ad alcune possibili soluzioni? In caso di risposta affermativa) come?
  - Riguardo ai rischi menzionati in precedenza, quali potrebbero essere suddivisi con i fornitori? Perché?
  - Quale è la sua percezione rispetto alla possibilità di suddivisione del rischio di obsolescenza funzionale anticipata? Che soluzione potrebbe essere attuata?

- Quale è la sua percezione riguardo alla possibilità di suddividere, con i vostri fornitori, il rischio derivante dall'incertezza dei tassi di deterioramento? Che soluzione potrebbe essere attuata

### **Contratti**

- Che tipo di contratti avete in questo momento con i vostri fornitori? Vi è alcun legame con le tematiche citate nella prima parte dell'intervista? Vi è alcun tipo di contratto che voi suggerite ai membri del network? Partecipate in alcun modo alla stipulazione dei contratti?
- Nel caso in cui fosse così, come pensa che i contratti per la fornitura di bus elettrici dovrebbero differire da quelli che sono attualmente in vigore?
  - Come considererebbe l'introduzione nei contratti di una clausola che "protegga" contro il rischio di obsolescenza anticipata? Pensa che sia realizzabile? Come?
  - Come considererebbe l'introduzione nei contratti di una clausola che "protegga" contro il rischio derivante dall'incertezza dei tassi di deterioramento? Pensa che sia realizzabile? Come?
- Pensate che, per l'introduzione dei nuovi e più complessi bus elettrici, City Sightseeing Italy dovrebbe mediare nei rapporti fra singoli franchisee e fornitori? Perché?
  - Che cosa ne pensa di un contratto standard da utilizzarsi come linea guida per tutti i membri del gruppo?

### **Selezione dei fornitori**

- Come avviene al momento il processo di selezione dei fornitori?
  - Consigliate un metodo specifico e con regole predefinite oppure l'analisi è più generale e meno standardizzata? Perché?

- Ritiene che il processo di selezione dei fornitori dovrebbe mutare per quanto riguarda i bus elettrici?
  - Ritiene che la disponibilità a condividere il rischio di obsolescenza anticipata con uno specifico fornitore, tramite la stipulazione di un contratto specifico, influenzi la scelta finale del fornitore?
  - Ritiene che la disponibilità a condividere il rischio derivante dall'incertezza nei tassi di deterioramento, tramite la stipulazione di un contratto specifico, influenzi la scelta finale del fornitore?
- In questo scenario di incertezza, avete pensato di supportare i singoli frichisee nel processo di scelta dei fornitori?
- Vi è qualche altro aspetto rilevante che ritiene debba essere discusso per quanto riguarda il processo di transizione verso i bus elettrici che non è ancora stato discusso?

### **Conclusione**

- Chiedere all'intervistato se ha niente da aggiungere
- Ringraziare l'intervistato per tempo e partecipazione
- Saluti e congedo



## **Appendix V: Interview guide 3, English and Italian**

### **Interview Guide 3**

**Design:** semi-structured, 1-on-1 interview

**Language:** Italian

**Subject:** City Sightseeing Milano (buyer)

**Duration:** 45-60 minutes

**Location:** City Sightseeing Milano offices (In case respondent is not available, conference call will be arranged)

#### **Introduction:**

- Interviewer presentation: Eugenio Beretta, 23, Double degree student at Tilburg University and LUISS, MSc in supply chain management.
- Description of the purpose of the interview: Analyzing the role of contracting in sharing the risk of obsolescence between buyer and supplier
  - Ask if recording is possible and guarantee about information confidentiality
  - Ask the interviewee to introduce himself/herself

#### **Risk Section**

- What implications does the transition process to electric buses have?
- Which factors did you consider when acquiring the first bus?
  - Can you identify a specific set of risks that affected this process?
    - With specific regard to early functional obsolescence risk (further explanation will be provided if necessary) what is the company perception from your standpoint? How does it differ from the current technology?

- Does uncertainty regarding physical deterioration rates (further description added if needed) affect the process? How does it differ from the current technology?
- What changed from your risk perception before the acquisition and what is actually happening?

### **Risk Sharing**

- Do you already apply risk sharing practices with your current supplier base (of traditional buses)? How do you settle them? Why? (i.e. subdivision of maintenance costs, fixed prices for spare parts, insurances etc.)
- Did you consider risk sharing practices in the new process of transition to electric buses? What have you done? how?
  - With regard to the aforementioned set of specific risks, which are the ones that are shared with your suppliers? Why?
  - What is your perception about the possibility of sharing risks regarding early functional obsolescence with your suppliers? Which practice could be employed?
  - What is your perception about the possibility of sharing risks regarding uncertainty in the deterioration rates with your suppliers? Which practice could be employed?

### **Contracting**

- What kind of contracts regulate the relation with your current suppliers? Is there any clause that refers to the aforementioned topics?
- If the case, how do contracts for electric buses supply differ from the ones you have subscribed before? Why?

- How would you consider the introduction in the contractual agreement of a clause that ensures you against the early obsolescence of your new assets? Do you think it is feasible? How?
- How would you consider the introduction in the contractual agreement of a clause that ensures you against the uncertainty of the physical deterioration rates? Do you think it is feasible? How?

### **Supplier Selection**

- How is currently the supplier selection process carried out (for thermic engine buses)?
  - Do you use a specific method with predefined rules, or it is more of a general analysis? Why?
  - Did you apply a different supplier selection process for the acquisition of the new electric buses?
    - With specific regard to the early obsolescence risk, do you think that willingness of a supplier to stipulate a contractual agreement where risk sharing is enhanced would influence the final supplier choice? Did it play a role in your choice?
    - With specific regard to the uncertainty of physical deterioration rates, do you think that willingness of a supplier to stipulate a contractual agreement where risk sharing is enhanced would influence the final supplier choice?
- From your acquired experience, how should contracting and supplier selection differ for electric buses from what it used to be? Why?

### **Conclusion**

- Ask the interviewee if he/she has anything to add
- Thank interviewee for time and participation

- Greetings

### **Protocollo di intervista 3**

**Forma:** intervista semi-strutturata faccia a faccia

**Lingua:** Italiano

**Soggetto:** City Sightseeing Milano

**Durata:** 45-60 minuti

**Luogo:** City Sightseeing Milano, sede. (Nel caso in cui l'intervistato non sia disponibile di persona, incontri telefonici)

#### **Introduzione:**

- Introduzione dell'intervistatore: Eugenio Beretta, 23, studente Double Degree presso Tilburg University e LUISS Guido Carli, MSc in Supply Chain Management.
- Descrizione del fine dell'intervista: Analizzare il ruolo dei contratti nella suddivisione del rischio di obsolescenza fra acquirenti e venditori.
- Richiedere disponibilità alla registrazione dell'intervista e garantire confidenzialità delle informazioni.
- Chiedere all'intervistato di introdurre la propria posizione all'interno del gruppo.

#### **Sezione riguardante i rischi**

- Quali sono le implicazioni principali del passaggio da bus tradizionali a bus a trazione elettrica?
- Quali fattori sono stati considerati al momento dell'acquisto?
  - Può identificare i rischi specifici che hanno un impatto su questo processo?
    - Riguardo al rischio di obsolescenza funzionale anticipata (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'Intervistato), quale è la percezione della società? Quale differenza vi è con la tecnologia ad oggi impiegata?

- L'incertezza relativa ai tassi di deterioramento dei nuovi prodotti (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'intervistato), che impatto ha sul processo di transizione menzionato in precedenza? Cosa cambia dalle tecnologie tradizionali?
- È cambiato qualcosa per quanto riguarda i rischi menzionati in precedenza durante il primo periodo di utilizzo del bus elettrico?

### **Suddivisione del rischio**

- Svolgete già politiche di suddivisione del rischio con i vostri fornitori di prodotti tradizionali? Come sono instaurate? Perché? (Ad esempio, suddivisione dei costi di manutenzione, prezzi fissi per parti di ricambio, garanzie di altra natura etc.)
- Avete considerato la possibilità di instaurare pratiche di suddivisione del rischio con i vostri nuovi fornitori?
  - Riguardo ai rischi menzionati in precedenza, quali potrebbero essere suddivisi con i fornitori? Perché?
  - Quale è la sua percezione rispetto alla possibilità di suddivisione del rischio di obsolescenza funzionale anticipata? Che soluzione potrebbe essere attuata?
  - Quale è la sua percezione riguardo alla possibilità di suddividere, con i vostri fornitori, il rischio derivante dall'incertezza dei tassi di deterioramento? Che soluzione potrebbe essere attuata

### **Contratti**

- Che tipo di contratti avete in questo momento con i vostri fornitori? Vi è alcun legame con le tematiche citate nella prima parte dell'intervista?
- Nel caso in cui fosse così, come differiscono i contratti per la fornitura di bus elettrici da quelli che sono attualmente in vigore?

- Come considererebbe l'introduzione nei contratti di una clausola che “protegga” contro il rischio di obsolescenza anticipata? Pensa che sia realizzabile? Come?
- Come considererebbe l'introduzione nei contratti di una clausola che “protegga” contro il rischio derivante dall'incertezza dei tassi di deterioramento? Pensa che sia realizzabile? Come?

### **Selezione dei fornitori**

- Come avviene al momento il processo di selezione dei fornitori?
  - Adoperate un metodo specifico e con regole predefinite oppure l'analisi è più generale? Perché?
  - Ritieni che il processo di selezione dei fornitori dovrebbe mutare per quanto riguarda i bus elettrici?
    - Ritieni che la disponibilità a condividere il rischio di obsolescenza anticipata con uno specifico fornitore, tramite la stipulazione di un contratto specifico, influenzi la scelta finale del fornitore?
    - Ritieni che la disponibilità a condividere il rischio derivante dall'incertezza nei tassi di deterioramento, tramite la stipulazione di un contratto specifico, influenzi la scelta finale del fornitore?
- Dalla vostra esperienza passata come (eventualmente) il processo di selezione dei fornitori e la stipulazione dei contratti di acquisto dovrebbe differire da quanto fatto in passato?

### **Conclusione**

- Chiedere all'intervistato se ha niente da aggiungere
- Ringraziare l'intervistato per tempo e partecipazione
- Saluti e congedo

## **Appendix VI: Interview guide 4, English and Italian**

### **Interview Guide 4**

**Design:** semi-structured, 1-on-1 interview

**Language:** Italian-English

**Subject:** Supplier1, Supplier2 (supplier)

**Duration:** 30-45 minutes

**Location:** City Sightseeing Roma offices (In case respondent is not available, conference call will be arranged)

#### **Introduction:**

- Interviewer presentation: Eugenio Beretta, 23, Double degree student at Tilburg University and LUISS, MSc in supply chain management.
- Description of the purpose of the interview: Analyzing the role of contracting in sharing the risk of obsolescence between buyer and supplier
- Ask if recording is possible and guarantee about information confidentiality
- Ask the interviewee to introduce himself/herself

#### **Risk Section**

- What implications does the transition process to electric buses have?
- How do you incentivize the selection of your products by customers?
  - Can you identify a specific set of aspects that incentivize or disincentivize the selection of electric buses over traditional ones?
    - With specific regard to early functional obsolescence risk (further explanation will be provided if necessary) is it a concern of your customers? How does it affect the decision of acquiring your products?

- Does uncertainty regarding physical deterioration rates (further description added if needed) affect the process? What do your customers report?

### **Risk Sharing**

- Do you already apply risk sharing practices with your current customer base? How do you settle them? Why? (i.e. subdivision of maintenance costs, fixed prices for spare parts, insurances etc.)
  - Would you consider risk sharing practices in the process of transition to electric buses to incentivize it? What could you offer to your customers?
  - What is your perception about the possibility of sharing risks regarding early functional obsolescence with your customers? Which practice could be employed?
  - What is your perception about the possibility of sharing risks regarding uncertainty in the deterioration rates with your customers? Which practice could be employed?

### **Contracting**

- What kind of contracts regulate the relation with your current costumers? Is there any clause that refers to the aforementioned topics?
- What are the contractual clauses that your customers ask for?
  - How would you consider the introduction in the contractual agreement of a clause that shares the risk of early obsolescence of your products? Do you think it is feasible? How?
  - How would you consider the introduction in the contractual agreement of a clause that share the uncertainty of the physical deterioration rates? Do you think it is feasible? How?



### **Selection**

- What impact do you believe that risk sharing practices could have on the decision of selecting you as supplier? Do you think such practices could foster and speed up the transition process to electric buses? Why?

### **Conclusion**

- Ask the interviewee if he/she has anything to add
- Thank interviewee for time and participation
- Greetings

### **Protocollo di intervista 4**

**Forma:** intervista semi-strutturata faccia a faccia

**Lingua:** Italiano

**Soggetto:** Fornitore1, Fornitore2

**Durata:** 45-60 minuti

**Luogo:** City Sightseeing Roma, sede. (Nel caso in cui l'intervistato non sia disponibile di persona, incontri telefonici)

### **Introduzione:**

- Introduzione dell'intervistatore: Eugenio Beretta, 23, studente Double Degree presso Tilburg University e LUISS Guido Carli, MSc in Supply Chain Management.
- Descrizione del fine dell'intervista: Analizzare il ruolo dei contratti nella suddivisione del rischio di obsolescenza fra acquirenti e venditori.
- Richiedere disponibilità alla registrazione dell'intervista e garantire confidenzialità delle informazioni.
- Chiedere all'intervistato di introdurre la propria posizione all'interno del gruppo.

### **Sezione riguardante i rischi**

- Quali sono le implicazioni principali del passaggio da bus tradizionali a bus a trazione elettrica?
- Come incentivate la scelta dei vostri prodotti (al posto di quelli tradizionali) da parte dei vostri clienti?
  - Può identificare i rischi specifici che hanno un impatto su questo processo?
    - Riguardo al rischio di obsolescenza funzionale anticipata (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'Intervistato), quale è la percezione della società? Quale differenza vi è con la tecnologia ad oggi impiegata?
    - L'incertezza relativa ai tassi di deterioramento dei nuovi prodotti (nel caso fosse necessaria, una spiegazione aggiuntiva verrà fornita all'intervistato), che impatto ha sul processo di transizione menzionato in precedenza? Cosa cambia dalle tecnologie tradizionali?

### **Suddivisione del rischio**

- Svolgete già politiche di suddivisione del rischio con i vostri clienti? Come sono instaurate? Perché? (Ad esempio, suddivisione dei costi di manutenzione, prezzi fissi per parti di ricambio, garanzie di altra natura etc.)
  - Riguardo ai rischi menzionati in precedenza, quali potrebbero essere suddivisi con i clienti? Perché?
  - Quale è la sua percezione rispetto alla possibilità di suddivisione del rischio di obsolescenza funzionale anticipata? Che soluzione potrebbe essere attuata?
  - Quale è la sua percezione riguardo alla possibilità di suddividere, con i vostri fornitori, il rischio derivante dall'incertezza dei tassi di deterioramento? Che soluzione potrebbe essere attuata

### **Contratti**

- Che tipo di contratti avete in questo momento con i vostri clienti? Vi è alcun legame con le tematiche citate nella prima parte dell'intervista?
- Quali sono le clausole contrattuali che cercate?
  - Come considererebbe l'introduzione nei contratti di una clausola che “protegga” contro il rischio di obsolescenza anticipata? Pensa che sia realizzabile? Come?
  - Come considererebbe l'introduzione nei contratti di una clausola che “protegga” contro il rischio derivante dall'incertezza dei tassi di deterioramento? Pensa che sia realizzabile? Come?

### **Selezione dei fornitori**

- Che impatto pensate che possa avere la propensione a suddividere il rischio con i vostri clienti sulla decisione di scegliervi come fornitori? Pensate che tale propensione potrebbe accelerare il processo di transizione verso la mobilità elettrica e i vostri prodotti? Perché?

### **Conclusione**

- Chiedere all'intervistato se ha niente da aggiungere
- Ringraziare l'intervistato per tempo e partecipazione
- Saluti e congedo

## **Appendix VII: Interviews' Transcripts**

**Company:** City Sightseeing Roma

**Respondent:** Giuseppe Cilia, President and board member of City Sightseeing Italy

**Date and Location:** 7/5/19, Cilia Group Offices

*“Allora è chiaro che oggi il mondo è orientato sempre più su questo tipo di alimentazione soprattutto per quanto riguarda il nostro lavoro che è un lavoro dove noi la mobilità la facciamo all'interno, nel cuore delle città e quindi è chiaro che se uno riesce a fare un trasporto più green che sia possibile è meglio, da anni già che si prova ad andare verso questo orientamento però è chiaro che sull'autobus gli investimenti che sono stati fatti dalle grosse case costruttrici fino a due o tre anni fa non sono stati investimenti importanti per fare in modo che uscisse che già da oggi avevamo a disposizione dei mezzi per poter fare questo tipo di trasporto, perché poi il mezzo elettrico comunque oggi è un mezzo complicato perché immagina che l'autobus è una massa molto importante, c'è un peso molto importante, trasporta tante persone, ci vuole un carico di batterie molto importante e quindi è un po' complicato perché se poi si aumentano il peso delle batterie, diminuiscono le persone a bordo, bisogna poi, può fare anche un autobus che ha una durata di 15 ore, di 20 ore, però poi rimangono come peso soltanto per trasportare 20 persone a bordo e invece la specificità deve essere che più gente si trasportano più capienza c'è sull'autobus e con un carico di batterie adeguato. Ci stanno lavorando, ci sono diverse aziende costruttrici che lavorano su questo settore che hanno creato dei prototipi però a me sembra che oggi quella che è più vicina ad avere un prodotto di questa natura qua, che più si avvicina a quella che potrebbe essere il trasporto open bus, sembra una fabbrica in particolare in Cina.*

*Questo mi sembra un aspetto, sicuramente, quando un'azienda fa un investimento cerca di fare un investimento che abbia una durata più lunga possibile. E' chiaro che oggi in*

*una fase ancora di prototipi, in una fase ancora di studio, in una fase di mettere a punto un mezzo che ti dia delle prestazioni che siano buone, è chiaro che l'azienda cambiando il parco autobus forse oggi rischierebbe che fra qualche anno si ritrova, e siccome parliamo di investimenti importanti, si trova nelle condizioni di dover fare di nuovo a fare qualcosa per prendere quelli più evoluti di ultima generazione che si ricaricano in meno tempo, che hanno un gruppo di batterie che con meno peso, hanno più durata, perché tutta la partita si gioca sulle tecnologie è chiaro che chi riesce a fare il mezzo più importante perché per noi qual è il problema, il problema basato sulla durata, intanto dobbiamo avere un mezzo che dura per 12 ore al giorno e poi gli impianti di ricarica, innanzitutto che non è facile perché comunque c'è un assorbimento forte e quindi nei centri delle città non è facile trovare degli impianti di questa natura, a meno che una non li costruisca e poi successivamente anche questi autobus bisogna poi vedere tutto l'aspetto successivo che è poi quello dello smaltimento di tutto il gruppo batterie e quant'altro quindi diciamo che va bene, si va sempre di più verso un orientamento green, però bisogna pensare anche che non è tutto scontato, è anche un processo che va studiato in tutti i suoi aspetti perché mentre con un motore euro6 l'autobus l'accendi quando vuoi di giorno di notte con un secondo lo rifornisci e riparti, sull'altro cambia anche un po' tutta la parte operativa, cioè del mezzo.*

*Assolutamente sì perché infatti un altro di questi aspetti è capire la durata proprio del gruppo batterie e soprattutto anche l'aspetto poi del costo dello smaltimento delle batterie, bisogna calcolare bene i costi dell'assorbimento che ha il mezzo per fare le ricariche e io sono uno di quelli che sono convinto che fra qualche anno si arriverà, e di questo ne sarei anche felice che nel centro delle città si gira con questi mezzi però mentre per l'auto privata è più semplice, no, perché a parte che ci lavorano già da anni e quindi siamo arrivati non dico alla perfezione ma siamo arrivati su tecnologie avanzate, sul settore*

*autobus questo processo è iniziato più tardi e quindi siamo un po' più indietro e ripeto tutto è legato anche a una serie di situazioni che riguardano la massa complessiva dell'autobus quindi tutta una situazione di tecnologia di calcoli di batterie, di durata delle batterie, però io sono sicuro che nell'arco di 2 o 3 anni se si continua con l'evoluzione che c'è stata negli ultimi 2 anni posso pensare alla stessa evoluzione nei prossimi 3 anni, penso che fra 3 anni avremo un mezzo che darà delle prestazioni più che sufficienti.*

*Noi, ci sono due tipi di possibilità, oggi quando uno acquista un mezzo c'è il leasing normale oppure il leasing operativo o addirittura spesso noi non ricorriamo neanche a questo tipo di finanziamento per l'acquisto dell'autobus e fino ad oggi la maggior parte dei mezzi sono stati comprati con fondi propri e tutta la parte delle manutenzioni, proprio perché comunque quest'azienda nasce da tre imprenditori che hanno una storia di impresa proprio nel settore autobus, tre famiglie che fanno questo lavoro da sicuramente più di 50 anni, tutte tre esperienze che si sono messe insieme e la parte manutenzione sappiamo bene come farla, la facciamo in casa, cerchiamo di economizzare tutto al massimo e questo è tutto frutto della nostra esperienza di anni quindi diciamo che non ci siamo buttati a fare questo lavoro come tanti hanno fatto perché hanno visto che era un'opportunità di business e però non avevano un storia, non avevano una tradizione, noi alcune cose le facciamo ancora perché ce l'hanno insegnate, perché sappiamo come si affronta una manutenzione, sappiamo la manutenzione mezzi, abbiamo il centro revisioni interno in uno dei nostri depositi autorizzato dal ministero quindi passiamo le revisioni nei nostri impianti, possiamo passarle più volte durante l'anno, abbiamo l'officina aperta H24 quindi su questo cerchiamo di fare proprio i mestieranti, lavoriamo secondo alcune tradizioni, secondo alcuni metodi, che negli anni sono frutto dell'esperienza*

*E si questo quando sicuramente con l'avvento che nel futuro ci sarà, anche nell'officine cambierà la qualità delle persone che ci lavorano. Oggi per questo tipo di mezzi credo che cominci ad aver bisogno nell'officina di qualche ingegnere elettronico, di competenze sicuramente più avanzate rispetto alla manualità di oggi e quindi sicuramente tante cose cambieranno anche in quel comparto e in quel settore per quei tipi di mezzi che arrivano, oggi già sul diesel ci sono tipologie importanti però diciamo che con l'elettrico cambierà tutto, proprio il personale dell'officine cambierà qualitativamente*

*Questa mi sembra tra l'altro per l'azienda sarebbe ottimale un tipo di contratto di questa natura perché un po' ribalta il rischio della funzionalità del mezzo e dell'efficienza del mezzo alla fabbrica. Sarebbe ottimale per me e auspicabile un contratto che va in questo senso; io fino ad oggi di questi non ne ho visti per quanto riguarda l'alimentazione convenzionale perché oltre alla garanzia che dà la fabbrica normalmente oltre 24 o 48 mesi non vai; su un tipo di contratto di questa natura sarebbe interessante poterci lavorare perché sicuramente sarebbe uno stimolo in più per l'azienda nel fare quell'investimento*

*Come no assolutamente!*

*Ripeto sarebbe ottimale, per l'azienda sarebbe importante, per l'azienda sarebbe sicuramente un incentivo per l'azienda nell'orientarsi da subito nel settore nel comparto elettrico perché sarebbe come ripartire il rischio di impresa tra l'azienda di produzione e l'azienda che poi va a comprare il mezzo per fare la sua attività*

*Diciamo che intanto partiamo da un presupposto, le aziende che costruiscono questo tipo di autobus non sono molte ma non sono molte al mondo, per cui se parliamo proprio di*

*Europa sono 3 o 4 le aziende che diciamo così quelle un po' più evolute che costruiscono questi tipo d autobus e quindi è chiaro che la prima cosa sono le prestazioni dell'autobus, quindi anche se si parla di alimentazione tradizionale si guardano le prestazioni dell'autobus, l'affidabilità, si guardano i consumi, i posti a bordo, i comfort che un autobus può avere e in ultimo anche il prezzo; però devo dire che per questo tipo di autobus rispetto ad altri comparti che abbiamo in azienda dove magari diamo un aspetto più importante al prezzo, su questo tipo di autobus forse il prezzo è l'elemento che guardiamo meno, più guardiamo le prestazioni, le tecnologie, la capienza, se c'è una sola scala all'interno per salire al piano superiore o se ce ne è due, se c'è l'aria condizionata al piano inferiore o non c'è, il raggio di sterzata dell'autobus, i consumi dell'autobus, il tipo di motore perché lo stesso autobus può essere costruito da una casa, montare un motore \*\*\*\*\* anziché un \*\*\*\*\* o anziché un motore \*\*\*\*\* bisogna capire tra questi motori; si vedono le prestazioni e chiaramente quello che poi prevale sulla durata del motore, che comunque storicamente si sa i motori che possono dare prestazioni maggiori e il consumo; questa è oggi l'analisi che facciamo, sicuramente il prezzo per questo tipo di attività che non è un'attività dove uno deve comprare flotte di autobus di 100, 200, 500 o 1000 autobus ma è più un lavoro di nicchia il prezzo rappresenta probabilmente il 20% dell'importanza sull'acquisto del mezzo rispetto a tutto il resto*

*Assolutamente sì, sarebbe l'ottimale per un'azienda, farebbe sicuramente la differenza*

*No per quanto riguarda questo comparto, questo momento di cambiamento sul discorso nel passare dal diesel all'elettrico, penso che abbiamo detto tutto; per la mia esperienza quello che posso dire è che comunque immagino sicuramente che da qui a 6 o 7*



*anni all'interno delle capitali europee soprattutto per questo tipo di lavoro saranno quasi al 100% tutte con autobus elettrici, per la mia esperienza posso dire che ho la sensazione che la cosa vada in questo modo qua”*

**Company:** City Sightseeing Roma

**Respondent:** Mauro Braghese, Purchasing Manager

**Date and Location:** 15/5/19, City Sightseeing Rome Offices

*“Sicuramente il problema più grande sarà l’organizzazione dei nostri depositi per poter attivare tutte le cose che servono per l’energia proprio dei bus; noi avendo 20 autorizzazioni abbiamo 20 bus su Roma se dobbiamo sostituire tutta la flotta per ricaricare 20 bus quanta corrente serve? e quindi sarà proprio creare nei depositi nostri qualcosa che insieme ad \*\*\*\*\* o a \*\*\*\*\* ci darà la possibilità di non trovarci poi in mezzo alla città con i bus scarichi*

*Una sorta di partnership*

*Non tanto dell’autobus quanto dell’energia*

*È chiaro, sicuro*

*E’ un rischio sicuramente anche perché il primo bus elettrico che sta a Milano che tu poi avrai l’opportunità di parlarne con i colleghi della Citysightseeing Milano sta dando problemi, quindi il rischio è proprio quello oggi se il comune di Roma o se la nazione dell’Italia o se il Ministero dei trasporti dovesse obbligare tutti i vettori a cambiare i bus a trazione a gasolio e inserire oggi l’elettrico il rischio sarebbe enorme proprio perché ancora non è così in stato avanzato e perfezionato il bus elettrico stesso*

*Ti faccio un esempio che proprio che sta su a Milano quindi andiamo su quello perché c’è soltanto quel bus elettrico oggi in Italia. È un rischio tutto, non soltanto la durata della batteria. Si è fermato il bus a gennaio; per andare a sostituire un pezzo che era in un angolo del bus dove non ci si arrivava si è dovuto aspettare il meccanico cinese che arrivasse dalla Cina perché lui sapeva come arrivarci quindi sarà un processo di problemi che si*

*creeranno anche per il meccanico che non sarà più meccanico ma sarà un elettrauto, sarà un meccanico specializzato sul bus elettrico quindi anche da parte nostra corsi di aggiornamento per i meccanici, scuole particolari e sarà un rischio sicuramente tutto il processo di cambio dalla trazione a gasolio per arrivare a quella elettrica*

*Non abbiamo nessun motivo di accordo, cioè c'è la classica garanzia sui mezzi che viene data anche alle autovetture su alcuni pezzi, su altri naturalmente no e però non ci sono accordi né scontistica particolare su acquisti di ricambio quando si rompono e quant'alto c'è solo, l'unica cosa è il filo diretto che abbiamo con i costruttori perché noi in questo momento abbiamo dei bus acquistati da un costruttore spagnolo e da un costruttore turco quindi sia con l'uno sia con l'altro abbiamo un filo diretto; questo ci permette, magari, se si rompe un ricambio che non abbiamo in magazzino, di chiamarli e di averlo nel più breve tempo possibile*

*Sicuramente sì ma mi faccio la domanda: il costruttore vorrà fare una roba del genere? Prenderà lui il rischio di dividere con noi un qualcosa del genere? Non lo so chiudo gli occhi e forse dico di no perché il costruttore una volta che ti ha messo l'autobus che tu lo ritiri, si accende, cammina e funziona, il costruttore ti dà la garanzia sulla batteria per tot tempo, su altre cose dentro il bus ma non penso assolutamente possa attuarsi una cosa del genere*

*Guarda Eugenio questa è una domanda intelligente perché penso che la casa madre nostra Citysightseeing dovendo prima o poi sostituire tutti i mezzi quindi tutti i mezzi che sono in Italia partendo dai 20 di Roma i 10 di Firenze i 10 di Milano, Genova e quant'altro, per un numero importante di mezzi sicuramente andrà a chiedere garanzie di questo tipo al costruttore sicuro al 100%*

*Sicuramente si può pensare di introdurre una cosa del genere anche se chi costruisce l'autobus nel momento in cui lo consegna se non ha l'assegno o il bonifico totale è difficile che ti dà le chiavi*

*Questa è sicuramente una scelta che faranno i fornitori; i costruttori di autobus elettrici per entrare sul mercato europeo e mondiale potrebbero fare una scelta del genere cioè proporre differenziazioni nell'acquisto, nelle garanzie e in quanto altro e a noi farebbe solo del bene*

*Un contratto di compravendita come quando tu vai dal concessionario e acquisti un'automobile quindi con l'autobus tanti e tali. Costruire in questo modo tot posti, al piano superiore questo, al piano inferiore quell'altro, motorizzazione x e y, costo, sconto eventuale, pagamento. Questa è la modalità precisa identica all'acquisto di un'autovettura da un concessionario*

*Ma io penso che il gruppo si muoverà sempre nello stesso modo sì, sicuramente*

*Il bus elettrico attualmente in servizio a Milano alla City Sightseeing Italia serve proprio a questo. Serve a far sì che in un periodo abbastanza lungo di prova, che può essere un anno, possa dare delle risposte che permettano poi a City Sightseeing Italia di andare dal fornitore e dire in Italia il bus elettrico che abbiamo provato va bene per "a b c", non va bene per "d e f" e quindi costruire poi insieme al fornitore l'autobus elettrico dei nostri sogni con il contratto giusto per tutte le clausole*

*Allora per quanto riguarda il gruppo City Sightseeing ci muoviamo seguendo le indicazioni della City Sightseeing Italia facendo parte di un franchising noi come Roma, nel momento in cui abbiamo deciso di acquistare un autobus siamo andati sempre a chiedere a City Sightseeing Italia dove come e quando acquistarlo perché sono loro che hanno i rapporti diretti con i fornitori di costruzione dell'autobus quindi anche per il bus elettrico dovremmo seguire le indicazioni che ci vengono date dalla casa madre*

*Ma veramente il processo di acquisto in generale come politica, City Sightseeing adotta una politica di indicazione del fornitore ma legata al fatto che si fa massa critica come è stato ad esempio con i fornitori turchi noi siamo passati dalla tecnologia \*\*\*\*\* che ha smesso la costruzione dei bus a quella \*\*\*\*\* per il motivo anche che acquistarlo come singola città avrebbe significato un costo maggiore rispetto ad un unico acquisto come City Sightseeing Italia. Quindi diciamo l'acquisto centralizzato serve soprattutto per abbassare il costo che poi significa anche che ogni singola città si ritrova perché tu sai che il passaggio all'elettrico diciamo in parte è stato selezionato anche osservando le esperienze degli altri competitors sul mercato perché ricordiamoci che il primo bus elettrico in Europa l'ha introdotto Bigbus, nostra società concorrente a Parigi, esperimento che tra i molti fatti nel mondo è l'unico credibile, accettabile, e non è un caso che la City Sightseeing Italia si è rivolta a quel fornitore di autobus, in Cina. Adesso a Milano stanno sperimentando e lo proveranno su altri circuiti Roma, Palermo, altre situazioni per vedere come risponde su specifiche esigenze, sui specifici contesti per ogni città anche in quel caso quindi la scelta del fornitore è stata fatta più sul progresso di esperienze con risultati positivi, anche perché c'è già una sperimentazione Palermo ma con bus di dimensioni più piccole, non diciamo di volumi di trasporto di cui stiamo parlando, ma parliamo di bus elettrici con capacità di trasporto minima quindi non era un esperimento diciamo di valore; il primo vero*

*esperimento c'è stato a Parigi è l'altro vero lo siamo facendo noi a Milano. In quel senso il fornitore si è rivelato comunque affidabile con già esperienze all'attivo che si sono verificate e sono state riscontrate come affidabili*

*Assolutamente, potrebbe essere anche un fattore discriminante proprio per il futuro perché poi il bus come la macchina in quest'epoca sta andando a diventare sempre più un servizio rispetto a un bene e l'assistenza che ci dà il meccanico sull'elettrico tra l'altro in accesso remoto dalla Cina è un tipo di assistenza che configura il mezzo più come un servizio che come un bene cioè un po' come per le macchine che poi questa assistenza in remoto funziona poi fino ad un certo punto come è successo per quella cosa che stava infilata dentro al bus sotto alle ruote da una parte si è dovuto muovere il tecnico cinese però per dire che io ancora non riesco a definirlo come servizio tecnico perché io non riesco ancora a definirlo se è un meccanico a logica è un ingegnere più complessità richiede un know-how completamente diverso e più rischi. Facciamo un esempio proprio concreto domani con una bacchetta magica tutti i bus diventano elettrici bene io credo che ci troveremmo d'ambì ad avere un'equipe meccanica non più in grado di metterci le mani; per assurdo tutta quell'esperienza sulla motorizzazione classica del mezzo a meno che il singolo meccanico la singola officina non abbia già fatto corsi di formazione specialistici, ultra specialistici, noi parliamo tra l'altro di un tecnico, cioè per un piccolo aspetto quando fai un tagliando controlli i freni, la parte meccanica ma poi quando andiamo sui componenti motore parliamo di tutt'altra roba, parliamo di diagnosi molto più rispetto ad adesso, parliamo di tutta una serie di rilevatori, di spie di sintomi che mostra il mezzo completamente diversi da, la banalissima lampadina che si sta per rompere, la fumata bianca, oppure il filtro del gasolio sporco, la fumata nera, diverso quando parliamo di tutt'altra tipologia e poi questa cosa che da città a città cambia la possibilità di utilizzazione del bus perché a Milano, che il percorso*

*sono 17 km di pianura, può funzionare in un modo, a Roma dove ci sono salite, discese e sanpietrini potrebbe funzionare in un altro quindi qua potrebbe non avere successo perché qua un percorso di 16 km e mezzo ma fatto da salite discese san pietrini pavé cose che in altre città non esistono e quindi sono tante le variabili proprio per vedere se il funzionamento poi sarà ottimo*

*E poi tutto il discorso delle batterie che sarà essenziale in prospettiva penso che la tecnologia le migliorerà tutto. Dipende dal ciclo di vita delle batterie*

*E' un po' come quando da noi si è parlato del cambio di normativa sugli euro. Il passaggio agli all'euro6 di oggi, la riconversione di un'azienda doveva essere supportata da forti investimenti. In futuro ci sarà un discorso ecologico ma sarà un discorso tecnologico cioè ovvero come io sulla successione di tecnologia mi consenti tu con il tuo motore di convertirmi perché a quel punto, con motore più scattanti, batterie che si ricaricano prima, di più durata, più potenza, che invecchiano tardi, cioè quindi meno ore di consumo ma bisogna anche vedere se mi accompagnerai nel riconvertire sempre la tecnologia? Cioè ok, ho creato un nuovo modello, però ho delle macchine che ancora potrebbero migliorare le prestazioni del vecchio modello. Mi dai tre o quattro anni per ammortizzare il mezzo*

*Assolutamente si*

*Sarebbe una fortuna trovare un fornitore così”*

**Company:** City Sightseeing Italy

**Respondent:** Fabrizio Maddii, Vice President

**Date and Location:** 20/5/19, City Sightseeing Italy Offices

*“Allora il futuro per me sui trasporti urbani non sarà al 100% elettrico perché andiamo a pensare ad aziende grosse urbane come Milano Roma Firenze si sostituisco il 70, 80% dei veicoli con veicoli elettrici la sera quando vanno a fare la ricarica privato della corrente la città e noi non abbiamo strutture centrali e con potenze del genere a mio avviso per cui io credo che l'elettrico sia una nicchia che andrà bene per determinate zone proprio cruciali del centro e basta, ecco ,quindi arrivare a un 20, 30% del parco urbano e l'altro parco cercare di avere veicoli minori inquinanti possibili. So che c'è già alcune case che stanno pensando a celle, le famose celle di combustibile, ora non mi viene il nome, per poter avere meno inquinamento, ecco*

*Esatto, di supporto alla ricarica*

*Di sicuro, Le posso già dire che il nostro, chiamiamolo prototipo, è già prevista la sostituzione delle batterie con batterie di nuova generazione e il mezzo ha 8 mesi. Proprio stamani stavamo definendo con la Cina la spedizione del nuovo pacco batterie in garanzia e che ci manderanno in sostituzione.*

*Esatto perché questi sono tutti dati che oggi, perché noi per esempio abbiamo la garanzia della casa costruttrice di 5 anni loro per 5 anni ci garantiscono le batterie al 100% però dicono che dureranno molto di più però è tutto un dire perché le esperienze dirette non ce ne sono fatto sta infatti che in 8 mesi abbiamo già la seconda generazione di batterie chissà fra qui a cinque anni si arriverà alla terza o alla quarta generazione.*

*Sulla mobilità tradizionale noi abbiamo la nostra officina interna che cerca di gestire l'80, 90% delle riparazioni nostre*



*Si certo*

*Ma allora per quanto riguarda il bus elettrico le esperienze diciamo in Italia sono ben poche per cui noi al momento abbiamo inviato due nostri tecnici in Cina per fare un corso full immersion di pochi giorni per avere una base di dove potere lavorare sul mezzo per fare le riparazioni se ci sono delle complicazioni delle sostituzioni capire un po' il cablaggio come è fatto, ecco, per ora abbiamo, stiamo facendo in questo modo, ecco, però ci dovremo con il tempo attrezzare se i numeri aumentano come dovrebbero aumentare*

*Quello sicuramente si infatti stiamo stilando dei protocolli per forniture future con dei punti, cioè stando molto attenti sulle garanzie sulle eventuali modifiche perché esce un prodotto migliore, per tenere l'autobus sempre aggiornato, quello sì*

*Sarebbe l'ottimale. Su questo lo stanno già facendo le grandi flotte ma poiché noi, i nostri numeri sono numeri piccoli, non c'è Casa costruttrice che ti fa questo, cioè consideri se Lei va da \*\*\*\*, \*\*\*\*\*, da \*\*\*\*\* e fa un ordine di 200 autobus urbani per la città e chiede anziché il prezzo singolo, ma un prezzo full service cioè che il prezzo comprenda la manutenzione e tutto e quindi Lei ha un costo chilometrico certo sa che il bus le costa X euro al chilometro poi se succede magari! Però sul caso nostro nessuno che lo fa perché i produttori nostri a parte il cinese sull'elettrico sono tutti produttori piccoli, piccolo produttore che fa 30, 40 autobus a due piani scoperti all'anno, non di più, per il mercato europea, e metà li prendiamo noi*

*È che qui il problema è che essendo proprio una nicchia di mercato i produttori sono pochissimi, i produttori sul motore termico normale ci sono due costruttori in Spagna e un*

*costruttore in Turchia, stop, non c'è altro per cui alla fine, e poi sono tutti motorizzati con lo stesso motore quindi è solo l'estetica, mi piace più lo spagnolo, mi piace di più il turco*

*Essendo appunto un mercato molto di nicchia in Europa vengono costruiti 50 bus all'anno di questi tipi, forse più 40, sono numeri artigianali e sull'elettrico invece non c'è tanta scelta. È stato costruito un prototipo da una fabbrica spagnola che però esperienza zero aveva sull'elettrico questa e poi ci sono i cinesi, consideri i cinesi io sono andato in fabbrica e produce 22.000 autobus all'anno, cioè si parla di numeri, non solo a due piani, fa di tutto però hanno un'esperienza sull'elettrico che noi qua non ci si arriverà mai*

*Si, di sicuro si specialmente sui tempi di intervento, sostituzione, durata, certo perché per noi tenere il mezzo fermo sono costi elevati, per cui io se riesco avere delle garanzie maggiori sulla percentuale di utilizzo sono disposto a pagarlo di più*

*Esatto*

*No, tutto a posto, se Lei ha bisogno ancora di me, ha il mio cellulare, mi chiami”*

**Company:** City Sightseeing Italy

**Respondent:** Franco Maddii, President

**Date and Location:** 20/5/19, City Sightseeing Italy Offices

*“Il problema principale riguarda il fatto che prima di tutto se noi oggi andassimo a spostare tutta la mobilità degli autobus che abbiamo nelle grandi città sull’elettrico la rete che dovrebbe supportarci per la ricarica non sarebbe in grado di fornire la quantità di corrente necessaria per questa ragione noi stiamo pensando di fare accordi con compagnie elettrico con multi-utilities del territorio che ci garantiscano durante la fascia di ricarica che per noi sarebbe la fascia oraria notturna la possibilità di avere una fornitura di corrente che ci permetta di ricaricare in sicurezza i nostri autobus senza danneggiare i consumatori che utilizzano l’energia per usi domestici. Quindi sicuramente questa è una cosa che noi teniamo in considerazione e per questa ragione possiamo dire che questa è una delle ragioni principali per cui questo processo non è ancora partito del tutto. Poi ci sono anche altri dubbi riguardo al fatto proprio alla tenuta tecnica di questi bus. Quello che abbiamo potuto sperimentare con i colleghi di Milano è che questo bus, essendo ancora in fase di test ha avuto problemi e non ha garantito lo stesso rendimento che garantiscono i bus endotermici. Vero anche che quello che ci era stato garantito dalla Società erano 250 km di autonomia e questi 250 km di autonomia sono più che sufficienti per l’utilizzo che viene fatto su quella linea di Milano oggi. È bene anche ricordare che questi sono prodotti che si stanno sviluppando molto velocemente e quindi bisogna riuscire a trovare il punto di equilibrio fra il vantaggio di essere i primi ad entrare sul mercato e quindi ad essere più reattivi rispetto ai competitors rispetto al rischio ancora alto di esporsi troppo.*

*Per quanto riguarda il fatto che possano uscire in tempi brevi prodotti migliori è un po' un rischio che chiunque faccia attività imprenditoriale si trova davanti. È vero anche il fatto che il motore endotermico è rimasto più o meno lo stesso negli ultimi 50 anni. È vero che sono diminuite le emissioni, è stato migliorato ma non è mai uscito nulla di particolarmente innovativo. Oggi andare a comprare una flotta di bus elettrici pensando che questi bus possano diventare obsoleti in breve tempo è sicuramente qualcosa di cui tenere conto perché la tecnologia si sta rapidamente evolvendo ed essendo una tecnologia più complessa rispetto a quella del Passato Per il motore endotermico, ci sono più parti che possono evolvere in tempi molto brevi.*

*La batteria e le centraline sono i componenti su cui abbiamo le maggiori incertezze. La sperimentazione delle batterie è una sperimentazione che è ancora in corso. La sperimentazione sta puntando sulle batterie al litio invece del piombo, ma io non sono un tecnico quindi tendo a fidarmi di quello che mi viene illustrato dai consulenti esterni. Al momento sembra che le batterie mantengano le promesse fatte dal costruttore, perché noi al momento abbiamo un fornitore unico per un solo bus. Bisogna però vedere nel tempo, come dopo ricariche frequenti, queste batterie durino. Quindi sì, la durata nel tempo delle batterie è un'incognita.*

*No, guardi al momento non abbiamo grosse pratiche da questo punto di vista perché quasi tutte le nostre sedi italiane hanno officine a cui si appoggiano di loro proprietà. Parte del business oggi è anche il fatto proprio di sfruttare.... ad esempio, posso citarle il caso di Roma che già conosce, anche il caso di Milano e anche il nostro caso specifico perché oltre ad operare sul gruppo operiamo anche nella città di Firenze, avendo nelle nostre famiglie dei business che sono collegati a quello che è il settore degli autobus e dei trasposti in*

*generale abbiamo anche accesso ad officine e a manutenzioni. Dobbiamo anche dire che talvolta con i nostri fornitori decidiamo di comprare insieme all'autobus o alla lotta di bus anche quelle parti di ricambio che noi sappiamo avere una vita più corta rispetto a quella del mezzo quindi cerchiamo in qualche modo di suddividere i rischi con i nostri fornitori agendo in preventivo e stabilendo il prezzo all'inizio senza che questi possano dire un domani, ok questo è un bus che non produciamo più e allora quel determinato pezzo di ricambio ve lo facciamo pagare ad un prezzo particolarmente alto.*

*Guardi, per quanto riguarda i bus elettrici c'è un livello di complessità molto superiore. Ad oggi noi non siamo in grado di gestire la manutenzione di questi bus per conto nostro e quindi sia per quanto riguarda un discorso di manutenzione ma anche di sostituzione e di test di diagnostica e di valutazione dello stato di usura come per le batterie, sicuramente per noi sarà importante lavorare più a stretto contatto con i nostri fornitori perché questa complessità crescente ci porta a non avere le figure in azienda che si possano occupare di queste cose. Per cui sicuramente prima di tutto da un punto di vista della manutenzione per quanto riguarda la possibilità di suddividere anche il rischio dovuto all'evoluzione del mercato, questo sicuramente potrebbe essere qualcosa da prendere in considerazione come ad esempio possibilità di permuta anticipata o sostituzione*

*Questa è una cosa che noi come Gruppo apprezzeremmo molto perché ci permetterebbe di avere la certezza che ad un certo punto, sostenendo la fase di test da parte dei fornitori, noi possiamo avere il ritorno di essere clienti privilegiati rispetto agli altri. Per quanto riguarda le batterie, come ha detto Lei, è il problema principale perché sono le parti più sollecitate quindi, se questo pacchetto batterie avesse delle garanzie superiori a quelle che ci vengono attualmente concesse, perché noi adesso abbiamo delle garanzie che sono poco definite. Quello che abbiamo nel contratto di oggi, in pratica noi chiediamo che la*

*batteria si ricarichi correttamente, non abbia fragilità tecniche che possano generare inconvenienti di grande impatto, però non abbiamo una parametrizzazione di quella che può essere l'efficienza residua come magari hanno altri device, ad esempio i PC o gli smartphone.*

*Al momento all'interno del Gruppo, quello che noi facciamo solitamente è acquisto e quello che anche suggeriamo ai nostri affiliati come linea guida per via del fatto come ho detto nella parte precedente noi possiamo sfruttare sinergie con altri business per quanto riguarda la parte della manutenzione e questo fa sì che siccome in molti contratti leasing la manutenzione è diciamo ripartita fra noi acquirenti e chi fornisce il bus si perderebbe parte del profitto perché parte del nostro profitto è anche la manutenzione del bus stesso. Per quanto riguarda i pezzi di ricambio, Le ho detto che noi talvolta andiamo ad acquistarli a prezzi fissi per avere poi la possibilità di non dover fare una contrattazione successiva.*

*Sicuramente per quanto riguarda il fatto di poter avere garanzie contrattuali per quelle che noi pensiamo possano essere delle problematiche sarebbe qualcosa da considerare proprio per proteggerci da questa grande complessità. Noi andiamo incontro ad un cambiamento rivoluzionario del business perché partiamo da qualcosa a cui noi siamo abituati ed è stabile a qualcosa che ci destabilizza totalmente perché è in rapida evoluzione e quindi noi non abbiamo un grosso controllo su questo. Sicuramente l'idea di essere pionieri nel nostro settore è qualcosa che ci affascina e ci sfida però giustamente poter inserire nel contratto qualcosa che ci riguarda, il fatto che i nostri autobus non vengano superati da invenzioni particolarmente rivoluzionarie in tempi brevi o per lo meno in tempi non troppo inferiori a quella che noi ci aspettiamo essere la vita del bus e che le batterie continuino a darci una performance soddisfacente è qualcosa che noi prendiamo in considerazione da*

*mettere nei contratti come anche la manutenzione perché, come ho detto, oggi noi abbiamo dei nostri dipendenti che sono a seguire dei corsi presso il fornitore unico da cui abbiamo acquistato il bus elettrico, comunque ci rendiamo conto che è solo un piccolo passo che ci permette ad oggi di contenere solamente problematiche di second'ordine.*

*Noi pensiamo che come Nucleo direzione del Gruppo dobbiamo in questo caso essere più vicini ai nostri affiliati per riuscire ad indirizzarli meglio nella scelta dei fornitori da un lato e dall'altro per riuscire anche a stabilire qualcosa che possa essere un contratto nuovo e standardizzato per far sì che ogni volta che si decide di acquistare una flotta o solamente alcuni nuovi bus si possa avere un contratto di riferimento su cui basarsi e non dover ogni volta ridefinire le clausole una volta che si è riusciti a trovare un equilibrio tra quello che ci può offrire il fornitore è quello di cui noi abbiamo bisogno*

*Al momento la selezione dei fornitori, diciamo che noi operiamo in un mercato che è abbastanza di nicchia, quindi anche i fornitori che abbiamo sull'endotermico non sono tantissimi. Diciamo che abbiamo una dozzina di fornitori, però quello che noi andiamo a fare, ci sono tanti parametri da andare a valutare una volta che si va ad acquistare questo bus. Non parliamo solo del costo perché ci sono tante caratteristiche di cui noi abbiamo bisogno. Prima di tutto la sicurezza, noi valutiamo molto la sicurezza perché operando con terzi, con turisti e quindi avendo dei mezzi sui quali il pubblico sale dobbiamo essere sicuri che questi siano bus che non mettano in pericolo l'incolumità delle persone che trasportiamo quindi possiamo anche pensare a quella che può essere l'accessibilità per le persone anziane o con difficoltà di deambulazione. Poi un'altra parte importante è quella sull'affidabilità perché se noi non possiamo permetterci di saltare dei turni soprattutto nei periodi di alta stagione ed ancora ciò che posso dirle a riguardo è che il costo è una componente che fa*

*parte dell'analisi e della scelta dei fornitori ma non è la principale anche perché ci sono tutti dei discorsi che sono legati a quella che è la manovrabilità e l'utilizzo. Non tutti i bus ci offrono la possibilità di essere manovrabili in città e centri storici dove la viabilità è difficile o dove ci sono problemi legati alle vibrazioni sui monumenti quindi anche tutto quello che riguarda l'impatto proprio sulla città oltre ad un fatto ecologico di cui bene o male abbiamo già parlato dal punto di vista dell'inquinamento acustico, delle vibrazioni che possono danneggiare monumenti storici*

*Quello che possiamo pensare noi è che i fornitori che riescono a suddividere e a condividere con noi questa incertezza sono fornitori da privilegiare e da anteporre rispetto agli altri. L'idea di poter condividere con loro il rischio di impresa di questo processo è una cosa che da noi viene apprezzata sia per quanto il riguarda il fatto di essere innovativi ma non volerci trovare ad essere inopportuni perché siamo stati innovativi nel passato ma allo stesso tempo quello che non vogliamo fare è rimanere indietro. Anche per quanto riguarda le batterie l'idea di avere delle garanzie aggiuntive quindi un rischio diviso con i nostri fornitori potrebbe essere assolutamente un fattore che ci a scegliere un fornitore piuttosto che un altro proprio perché abbiamo delle grosse incertezze, dei grossi dubbi e più un fornitore si dimostra disponibile a collaborare più noi siamo rassicurati su questo Gruppo, su questo determinato fornitore quindi noi siamo più propensi al rischio.*

*Sicuramente può essere fatto a livello di Gruppo l'idea di scelta di un fornitore soprattutto in una prima fase. Noi tendiamo a lasciare una certa libertà a quelli che sono i membri del nostro network però c'è anche da tenere in considerazione il fatto che siccome è un processo molto difficile, il potere contrattuale che questi nostri membri possono avere è inferiore a quello che possiamo avere noi tutti riuniti ci sentiamo anche in dovere di guidare e mediare in questo ambito, cosa che non facevamo particolarmente in passato se non su*



*richiesta esplicita da parte dei nostri associati per via del fatto che volevamo lasciargli autonomia imprenditoriale. Ora oggettivamente pensare all'autonomia imprenditoriale, quando si vanno a vedere i numeri del nostro mercato che è un mercato di nicchia questa probabilmente viene in secondo piano rispetto a quello che potrebbe essere una mediazione a livello di Gruppo e diciamo la sottoscrizione di un contratto diciamo da prende come modello e che quindi noi potremmo anche suggerire un determinato fornitore con un determinato contratto per le prime forniture. È qualcosa che potremmo sperimentare all'inizio, non è stato nella politica del Gruppo fino ad ora però se le evenienze ci porteranno a dover fare una cosa del genere, saremo disposti a farlo*

*No grazie, penso che il discorso sia molto chiaro. Spero che sia chiaro il mio come è stato chiaro il Suo nelle Sue domande, sicuramente quello su cui io voglio soffermarmi e voglio ribadire come messaggio è che noi abbiamo bisogno di garanzie perché non conosciamo il prodotto che andiamo ad acquistare bene come conoscevamo il bus endotermico, quindi dal punto di vista nostro un'assenza di conoscenza che è dovuta sì al fatto che non abbiamo mai operato con questo genere di prodotti anche perché sono prodotti che sono arrivati sul mercato veramente da poco che hanno rivoluzionato quello che è il concetto della mobilità e del nostro business, quindi.*

*No, penso di aver detto tutto quello che ritenevo interessante.”*

**Company:** City Sightseeing Milano

**Respondent:** Andrea Astori, Operation Manager

**Date and Location:** 16/5/19, City Sightseeing Milano Offices

*“Da noi l’acquisto del bus elettrico è stato fatto selezionando fornitori in tutto il mondo infatti poi siamo arrivati ad una società cinese che è un colosso della costruzione di bus elettrico appunto in Cina e siamo andati a visionare la loro fabbrica più volte per capire appunto come funziona come sono strutturati - si parla di 20000 autobus elettrici, e abbiamo visto anche i loro competitors che si stanno affacciando sul mercato in Europa che però al momento sono sempre in fase di test, non danno ancora le garanzie che ci è riuscita a dare questa società cinese. La scelta è stata fatta anche in termini di costi: diciamo che sono un po' più cari i fornitori europei però ovviamente arrivando dalla Cina con l'importazione costa anche quella diciamo più o meno non c'è una grandissima differenza, la differenza è che i cinesi ci garantiscono l'utilizzo subito del mezzo per questo motivo questo bus elettrico è stato acquistato, è stato testato su Milano, è da novembre che lo stiamo testando su Milano abbiamo avuto anche dei comunicati stampa con il comune di Milano perché appunto siamo la prima società in Italia ad acquistare un bus a due piani elettrico anche perché a differenza degli altri noi abbiamo determinate specifiche da seguire, appunto l'autobus non è un semplice autobus a un piano ma essendo a due piani è aperto e alcuni componenti della batteria dovevano essere posizionati in determinate posizioni dell'autobus*

*Esattamente perché ci sono determinate tipologie di autobus. Ci sono parecchie compagnie che adesso costruiscono bus elettrici ma studiati per lo più per autobus mono piano, a due piani non ce ne sono in giro tanti che hanno fatto lo sviluppo. Questa società è stata in grado già in Cina di dare sviluppo a questo tipo di autobus motivo per cui siamo andati a scegliere un fornitore già predefinito che appunto è “\*\*\*\*\*”, che è non dico*

*leader perché ci sono diverse società in Cina che fanno lo stesso mestiere però è una grossa realtà*

*Gli autobus tradizionali durano anche più di 10/12 anni si poi a seconda, ad esempio su Milano la scelta è stata fatta perché per la nostra tipologia di servizio fino al 2018 c'era una legge regionale che comunque diceva che gli autobus su questa tipologia di servizi dentro alla città di Milano non dovevano avere più di 6 anni e comunque abbiamo pensato: possiamo prendere un autobus elettrico, testarlo e vedere fino a 6 anni cosa succede e quanto è la tenuta perché ovviamente il nostro più grande punto di domanda, come per chiunque acquista un bus elettrico, è la tenuta della batteria che è una grossa problematica perché non si sa ancora come sarà tra 6 anni, se comincia a non durare e si scarica o se dopo 6 anni la batteria è ancora in ottimo stato*

*Beh noi come società, come filosofia, vogliamo essere comunque i primi, chi sperimenta, siamo imprenditori quindi il rischio fa parte del gioco e però non possiamo aspettare che gli altri ci sorpassino e quindi vogliamo essere i primi; è un rischio ma un imprenditore deve saper rischiare ed è una scommessa anche da un punto di vista di immagine della società. Noi siamo usciti già quest'anno con una campagna che siamo i primi ad avere l'autobus elettrico a due piani e questo potrebbe portare dei benefici anche a livello di immagine sul risvolto politico, non solo a livello di immagine, ma comunque la politica ci vede con un altro occhio e quindi una società attenta all'ambiente che è quello che chiedono le politiche di tutte le città italiane. Ormai a Milano ATM sta convertendo tutta la flotta e noi dobbiamo non essere da meno anche perché poi le città tra qualche anno vorranno tutti gli autobus elettrici e non più endotermici, almeno per questo tipo di servizio*

*Su una flotta composta da 11 autobus sono tre di una società spagnola che è “\*\*\*\*\*”, che anche lei sta studiando una tipologia di autobus elettrico, in fase di sperimentazione a Barcellona, però siamo molto attivi e ci stiamo sentendo con loro anche perché se poi nell’arco di 2/3 anni il nostro fornitore diventa il fornitore spagnolo anche i rapporti sono più vicini rispetto al fornitore che arriva dalla Cina. Il problema è però che al momento oggi loro purtroppo non hanno ancora la tecnologia che hanno già i cinesi perché la stanno già studiando da più anni. invece gli altri autobus della flotta sono di una fabbrica turca e sono 7, le logiche sono quindi che si prendono pezzi di ricambio un po' per tutti e i diversi fornitori li tengono in magazzino in modo tale che se succede qualcosa ad un autobus quasi tutti uguali la manutenzione viene fatta senza troppi problemi*

*Allora per quanto riguarda l’autobus elettrico noi abbiamo una sorta di accordo con appunto “\*\*\*\*\*” che ci ha garantito comunque assistenza per tutto quello che riguarda l’autobus elettrico mentre invece con le altre ci son poi dei manutentori locali a cui si appoggiano le società, “\*\*\*\*\*” ad esempio ha un manutentore nella bergamasca dove noi ci appoggiamo*

*Sono stati tutti acquistati con una compravendita tradizionale*

*Adesso ci hanno dato una sorta di garanzia di assistenza. è successo che il bus elettrico ha manifestato un malfunzionamento a livello del caricatore. Come un cellulare, se si danneggia il caricatore il cellulare non si carica più e quindi noi avevamo avuto un problema non legato al bus ma in realtà era un problema del caricatore. È arrivato l’ingegnere cinese che nel giro di pochi giorni ha risolto il problema. Adesso l’autobus gira su Milano tutti i giorni su un itinerario predefinito. Il bus è stato brandizzato di verde rispetto a quello classico, fa giornalmente circa 130 km e ritorna in deposito con ancora*

*circa il 45% di carica. Quindi diciamo che per noi adesso va bene. Io all'inizio ero un po' scettico ma mi sto pian piano ricredendo sul bus elettrico, anche perché quando sali a bordo di un bus elettrico senti la differenza. Non senti le vibrazioni, non senti un filo di rumore che fa il bus classico, ed è una cosa abbastanza strana, tutto sommato la macchina si muove senza grossi problemi.*

*Se comunque si parla di gruppo noi siamo in fase di trattativa e con queste società se comunque dovesse andare in porto questa trattativa l'idea è quella di prendere più autobus. Noi il primo lo stiamo proprio testando e il terzo non finirà solo su Milano ma adesso dobbiamo capire come spostarlo anche su altre città perché comunque Milano è una città piatta e in Italia noi lavoriamo con città differenti e ognuna ha le proprie caratteristiche. Firenze, Roma sono città collinari, anche la stessa Torino, l'idea sarebbe di testarlo sulla stessa Torino, un'altra città pianeggiante dove l'autonomia è sempre la stessa perché poi a seconda delle pendenze potrebbe variare.*

*Come ho detto in precedenza ho la speranza che vengano anche dei fornitori europei che possano entrare nel mercato perché i rapporti comunque con la Cina, è distante. Una cosa è avere un fornitore vicino rispetto ad averlo, con tutto il rispetto per il nostro fornitore cinese che è sempre stato molto attivo per tutte le cose basta fare una chiamata, però anche per quanto riguarda la manutenzione, così, averlo in casa, in Europa, forse potrebbe essere più interessante. Ovviamente poi si parla anche del prezzo perché la società dove noi acquistiamo autobus endotermici che è "\*\*\*\*\*" ha già un prototipo di bus elettrico che sta testando però anche lì il prezzo è fuori mercato rispetto anche all'importazione arrivando dalla Cina e non ha le stesse garanzie*

*Di manutenzione e di tenuta. L'autobus cinese ha garantito che 250 km riesce a farli e effettivamente guardando proprio l'autobus che abbiamo in uso adesso riusciamo a farli senza problemi”*

**Company:** City Sightseeing Milano

**Respondent:** Claudio Astori, President of City Sightseeing Milano and board member of City Sightseeing Italy

**Date and Location:** 16/5/19, City Sightseeing Milano Offices

*“Io vorrei fare una piccola introduzione che è legata alla politica cioè in questo momento le amministrazioni comunali vedono gli autobus tradizionali come autobus “sporchi” legati alla catena cinematica per cui olio, acqua e quant’altro è evidente che, legati all’inquinamento, qual è il mezzo più pulito? Il mezzo più pulito è l’autobus elettrico che ha due motori, semplice funzionamento e un pacco di batterie che permette di far funzionare i motori, poi per il resto è tutto elettrico il riscaldamento, aria condizionata, compressori per far funzionare l’aria per poi far funzionare i freni. Partendo da questa introduzione è evidente che come City Sightseeing abbiamo dovuto guardare quali prodotti c’erano sul mercato, prodotto elettrico che l’Europa sotto questo profilo è ancora un pochettino agli albori mentre la Cina, abbiamo visto due o tre aziende, che è già un po’ più propensa all’elettrico per cui ci siamo avvicinati a queste società cinesi che costruiscono autobus elettrici; la domanda prevalente è quella che l’autobus elettrico a differenza di quello tradizionale è più pulito in ogni senso e questo è l’elemento che ci contraddistingue. Per i rischi bisogna valutare che noi siamo i primi in Europa, e la Cina è la prima, per cui conosciamo alcuni rischi sulle batterie ma non sappiamo ancora il loro funzionamento tant’è che noi il nostro autobus lo carichiamo alla sera ma lo lasciamo all’aperto perché ancora non conosciamo quali sono le controindicazioni dei circuiti, le controindicazioni che*

*potrebbero avvenire attraverso dei contatti o dei cortocircuiti le istruzioni che ci hanno dato sono delle istruzioni semplici: il bus deve essere caricato con tutto spento e a un certo punto vengono anche sorvegliati, perché se i 280kw con un carico di 75 KW ci vogliono circa dalle tre ore e mezza alle quattro è evidente che degli uomini devono stare attenti alla sua ricarica ,questa è la prima avvertenza di sicurezza; a differenza degli autobus tradizionali che sappiamo quali sono le controindicazioni quegli elettrici non sappiamo come funzionano bene o quanto meno non sappiamo quali sono le controindicazioni per cui l'avvertenza che facciamo noi è di tenerli sempre sotto controllo. Quindi si parla di un rischio tecnico. Se le batterie si incendiano devono essere immerse in acqua perché non sappiamo ancora quali sono le reazioni chimiche di queste batterie al litio a differenza delle batterie al piombo. Le batterie al litio sono più performanti però non sappiamo ancora come sono questi probabili incidenti che potrebbero accadere, così la ricarica e quando sono in esercizio per cui gli uomini che vengono impiegati in questo momento sono quelli che hanno fatto un minimo di corso per capire quali sono gli inconvenienti e gli interventi da fare qualora dovesse succedere qualcosa; l'unica osservazione che facciamo in questo momento è un'osservazione mirata e costante*

*Come in tutte le situazioni tutto è migliorabile e perfezionabile di conseguenza siamo aperti all'avvento del meglio. Posso dire che in questo momento come scelta avendo fatto un'indagine di quei prodotti di questo tipo sul mercato siamo andati a scegliere il più performante e il più affidabile, tant'è che noi abbiamo iniziato a gennaio; a parte le prime tre settimane che abbiamo avuto degli inconvenienti per le tarature delle centraline perché torno a ripetere la tecnologia è talmente nuova, ma poi per il resto, calibrate le centraline, calibrato l'esercizio devo dire che siamo più che soddisfatti. È evidente come diceva Lei prima che potrebbe esserci qualcosa di più performante e lì andremo poi a vedere quali sono*

*le performances che saranno innovate e quali sono quelle che abbiamo già in atto, oltre a questo è bene sottolineare che l'autobus elettrico in questo momento è un autobus che è nuovo e di conseguenza bisogna fare in modo che funzioni bene quello che si ha a disposizione. Oltre a questo, le batterie che noi abbiamo posizionato sono batterie che noi abbiamo garantite da questa fabbrica cinese che è \*\*\*\*\*, e anche loro dicono che ci potrebbero essere delle batterie più performanti o meno performanti. Come in tutte le cose per dire qual è quella più performante e quella meno performante ha bisogno delle situazioni di verifica che si hanno solo quando l'autobus viene utilizzato; è evidente che in un futuro io mi auguro che anche le batterie siano migliorate. In questo momento non ci danno problemi nel futuro non so. Per quanto riguarda invece il problema dello smaltimento in prima battuta la fabbrica ci ha detto che possono essere rigenerate per quanto non lo so perché torno a ripetere noi siamo ancora i primi ma l'idea è quella di rigenerare perché è evidente che se in questo momento l'autobus tradizionale ha una emissione, per cui un tasso di inquinamento, anche in futuro lo smaltimento di queste batterie sarà legato a un inquinamento. Se però queste batterie dovessero essere riciclate, rigenerate come ci confermano, penso che il problema non sussista o quanto meno si dovranno cambiare degli elementi al fine di poter utilizzare le batterie al meglio e per un tempo molto lungo*

*diciamo che in questo momento abbiamo fatto un accordo tra le parti in cui noi facciamo le prove con quest'autobus per cui lo stiamo provando in inverno in estate in salita con l'aria senz'aria insomma tutte le condizioni che potrebbero verificarsi però è altrettanto vero che una scorta di pezzi di ricambio ce la siamo già fatta dare al inizio perché se c'è da cambiare una centralina, perché tenete conto che in questo momento è tutto un discorso legato alle centraline. Le centraline che danno o chiudono energia nel senso che aprono l'aria condizionata, la chiude, apre e chiude il riscaldamento, è tutto legato ad un discorso di*



*centraline. Ora le batterie, le batterie forniscono solamente energia, e sotto questo profilo stiamo facendo tutte le prove e una volta che avremo perfezionato il nostro mezzo, una volta che lo avremo collaudato al meglio sapremo anche, come negli autobus tradizionali, quali sono i difetti e quali sono i pregi; sulla scorta dei pregi e dei difetti andremo ad agire e a fare i correttivi con l'azienda costruttrice perché alcune cose le abbiamo già modificate*

*diciamo che per i bus tradizionali è sufficiente avere un tester di quelli che forniscono le case costruttrici e va bene, in questo caso è più difficile vuoi perché sono mezzi cinesi, vuoi perché è una tecnologia assolutamente nuova che se prima avevi un meccanico adesso devi avere un computerista, qualcuno che si occupa di software piuttosto che di meccanica*

*al momento per quelli elettrici abbiamo fatto la fornitura di alcuni bus con le stesse caratteristiche però come torno a ripetere stiamo monitorando la situazione nel senso che se ci sono delle modifiche da fare siamo in stretto contatto con gli ingegneri della fabbrica per cui vorremmo poi arrivare ad un mezzo performante per poi fare un contratto quadro per averli poi a livello nazionale*

*vero, questo è quello che vorremmo fare*

*siamo andati alle più grandi fiere di autobus a Utrecht e lì c'è sul mercato una grande fiera di autobus per cui prima di andare a prendere \*\*\*\*\* siamo andati a veder altri tre tipi di autobus, e quello che ci ha dato più soddisfazione è stato quello cinese. perché non è che siamo partiti dicendo "compriamo questo e basta", da attenti gestori di autobus la cosa fondamentale che noi cerchiamo è che l'autobus sia performante, che ci sia il comfort, che si stia bene, di sicuro che sia affidabile e sicuro, sia per l'autista sia per i passeggeri, questo è*

*fondamentale, per cui abbiamo fatto un po' di giri in Europa, dall'Inghilterra all'Olanda, all'Italia, qualche fiera poi siamo andati due volte in Cina, siamo andati nella fabbrica e dopo vari accordi e incontri abbiamo fatto la scelta di \*\*\*\*\* che secondo me è il prodotto che, devo dire la verità, sta funzionando a Milano, anche come distribuzione dei pesi perché gli altri autobus erano a due assi per cui distribuisci il peso delle batterie che non sono poco su due assi, questo invece su tre assi per cui hai una distribuzione del peso e una distribuzione più omogenea tenuto conto che questi autobus qui andranno a fare percorsi urbani per cui l'eco delle città, le strade della città possono essere anche dissestate, abbiamo anche l'opinione pubblica che ci dice che sono autobus enormi che sfasciano tutto invece avendo il terzo asse si riesce a distribuire meglio il peso dell'autobus*

*È fuor di dubbio che i fornitori che hanno una capacità di poter rigenerare e gestire al meglio le batterie che sono quelle che poi saranno l'inquinamento del futuro; è evidente che lì dovremo fare delle forti attenzioni per la scelta del fornitore però io sono convinto che coloro i quali adesso stanno costruendo hanno pensato anche al futuro di queste batterie perché poi il resto è la batteria che deve essere rigenerata perché cambi, differenziali non ce ne sono più. Ci sono due motori, uno a destra e uno a sinistra, e il gruppo freni e gruppo sterzante. Poi per il resto c'è poco di inquinante*

*aggiungo che siamo la prima Società a livello nazionale che ha voluto avere un occhio di riguardo sul futuro e sull'ecologia per cui vogliamo essere all'interno delle città, perché facciamo conoscere le città e questo penso che sia la cosa più importante per un turista che viene a conoscere la città ma nello stesso tempo non vogliamo inquinare e fare in modo che i servizi che andiamo a fare siano i servizi d'eccellenza come City Sightseeing a livello nazionale”*

**Company:** Supplier1

**Respondent:** L. W., Sales Manager for the European Region

**Date and Location:** 21/5/19, Phone Call

*“Many companies are now selecting our products for many reasons; government is pushing with monetary incentives and with laws that require buses to be electric in the inner cities. It is also true that companies want our product because to be good to the environment often means to be more attractive for customers since people, nowadays, care way more about the environment than before.*

*What we do is to offer a cleaner product as I said before, the problem is that our buses are more expensive than traditional ones and that our buses are more difficult to manage. They need to be put under charge, and they have more electronic parts than traditional ones, so we have to help our customers because they do not know what is wrong when something breaks. It can also be something easy to fix but they are scare and insecure about.*

*Of course, they think that our products can be cheaper later in time or there can be better buses made by us or others soon. They are skeptic to buy large fleets till they really have to because they think they can save money buying some year later and, as you said, also batteries are a concern. We are trying to develop the best battery possible, but it requires time. We also do not how battery will age, we have ideas and tried aging in labs, but nothing is sure until we will have evidence from the real use of them, so this is a problem when selling buses.*

*Yes, what we do is that we ensure assistance when something is not working as it should. We send technicians out to customers to fix things that are not working properly, and we try to find solutions to problems. We also offer courses to the buyers' people to teach them about how to fix problems that occur often but are relatively easy to fix. For others this is not possible because it requires many years of studying and training.*

*Of course, we consider risk sharing important because we think that our potential customers are scared by the new technology and so if we help them sharing the risk with them this could be beneficial for both parts since we could ensure them more. For what concerned the risks you said before, I think we should work on it, but it is different if they are buying 1 bus or a fleet because we could do better offers for larger numbers.*

*We usually directly sell our products. As a firm we manufactured 22.000 electric buses in 2018 and we sold them around the globe. Sometimes we sold just a few and other times we sold many. We almost always sold them but sometimes the contracts are mediated by a bank and they are called leasing*

*They want to have guarantees about almost anything because they are new products and not well known as I said. We could integrate something in the contracts, guaranteeing that the parts that we will not be adequate as the chargers could be will be replaced as well as other electronic complements that might be updated soon. Of course, also the batteries might be part of what we give guarantees about. Right now, we guarantee them for 5-6 years up to 60% but we are not really sure about how they will be in the future also because we are investing a lot in r&d because we want to develop them better. So, we might put something about this in the contracts but to do so the number of buses should be equal to a fleet and not just 2-3*

*Sure. We already share many data with our customers in the test phase to help both parts. As I said before, our customers look to be scared by the new technology, so we have to ensure them in order to get them. We want to be close to them so we can learn where we are failing and where we are doing good at.*

*No, I think that I made my point. Thanks for your interest and good luck with the graduation”.*

**Company:** Supplier2

**Respondent:** M. C., Sales and Operations Manager

**Date and Location:** 22/5/19, City Sightseeing Roma Offices

*Guardi sicuramente ci sono dei problemi per quanto riguarda il passaggio dai bus tradizionali ai nostri prodotti che offriamo che sono i bus elettrici e sono dovuti al fatto che vi è una scarsa conoscenza da parte di quelli che sono i nostri acquirenti del prodotto che noi vendiamo e delle sue specifiche tecniche; questo perché è un prodotto nuovo e a livello di tecnologia è molto differente da quello che è stato ed ha caratterizzato il business degli ultimi 50 anni. Le prestazioni che i bus con motori endotermici hanno avuto in questi ultimi 50 anni sono stati sì significativi per quanto riguarda i consumi ma dal punto di vista del funzionamento non è che sia cambiato molto. Cambiando proprio il genere di motorizzazione e andando su quello che è un bus elettrico diciamo che ci sono delle competenze e delle conoscenze da avere che sono diverse e sono tecnicamente più complicate, ancora da assimilare. Quello che possiamo dire è che questo processo non è ancora iniziato, ovvero, che non sia ancora iniziato non è vero del tutto, il processo sta iniziando. Siamo ancora in una fase di test, per quanto possiamo dire però i nostri prodotti sono già disponibili per il mercato e stiamo già iniziando a venderli, quello che noi facciamo non è partire da zero*

*nella costruzione dell'autobus ma noi assembliamo semplicemente parti. Non abbiamo una produzione delle singole parti, quello che facciamo è ricercare sul mercato i componenti migliori, le parti che offrono quelle che sono le garanzie che noi con le nostre competenze tecniche riteniamo migliori e le assembliamo per formare un bus. Da un lato questo per noi è un vantaggio perché non abbiamo problemi di sviluppo però da un altro lato è difficile perché bisogna avere un grande coordinamento per tutte quelle che sono le parti tecniche che possono variare dalle ricariche, centraline, batterie quindi diciamo che il nostro lavoro non è proprio quello di manifattori dei bus quanto quello di assemblatori di parti, e la fase più difficile è proprio quella di ricercare sul mercato le componentistiche migliori.*

*Ritornando proprio nello specifico della sua domanda, questo processo non è ancora del tutto iniziato perché da un lato i bus endotermici sono ancora più efficienti, hanno un costo ridotto, c'è più competenza da parte degli acquirenti sulla manutenzione di questo tipo di bus rispetto su questi nuovi. Vero anche che c'è una forte pressione legislativa che spinge in questa direzione ed è questa una delle ragioni per cui noi siamo entrati in questo business.*

*Ecco diciamo che il nostro lavoro in questo momento, pur essendo quello di fornitori è anche quello di andare a ricercare i possibili clienti e non aspettare che i possibili clienti arrivino da noi. Questo perché parliamo di una tecnologia nuova che va incentivata. Sicuramente quando noi andiamo a parlare con i nostri possibili clienti una cosa che sentiamo è che loro dicono "ok, va bene mi piace l'idea però aspetto ancora". Sembra che sentano la necessità di informarsi più della necessità di acquistare il prodotto al momento, e penso che ci sia da parte loro scetticismo dovuto anche al fatto che non hanno proprio la conoscenza del prodotto e quindi non hanno fiducia in quello che vanno ad acquistare. Per la seconda domanda che mi ha fatto, sicuramente le batterie sono il più grande dubbio, il più grande punto interrogativo che i nostri acquirenti hanno. Devo essere onesto, in parte anche*

*noi non possiamo garantire certezze sulle batterie ma non perché noi non le sviluppiamo le nostre stesse batterie ma perché essendo qualcosa per cui manca una sperimentazione di lungo periodo sul campo è difficile per chiunque dare garanzie e chi dà garanzie si espone come coloro che acquistano le batterie stesse. Quindi sicuramente posso dire che il fatto che le batterie siano un prodotto nuovo, difficile da smaltire, che debbano essere rigenerate e che un corretto utilizzo delle batterie vada poi a determinare l'impatto ecologico, è una delle ragioni per cui i prodotti vengono acquistati è sicuramente da prendere in considerazione.*

*Guardi quello che facciamo noi oggi è quello di ricercare sul mercato quelle che possono essere le soluzioni tecnologiche migliori, assemblarle per fornire quello che è il prodotto che rispecchia meglio le esigenze del nostro cliente. Noi cerchiamo di non standardizzare il nostro prodotto ma di riuscire a creare un prodotto che possa essere proprio quello che viene cercato dal nostro cliente; mi spiego meglio, se nel caso di una produzione in serie noi abbiamo il fatto che la produzione in serie riduce i costi ma se la produzione in serie richiede un compromesso sulle specifiche tecniche, quello che cerchiamo di fare noi è guardare un po' meno all'aspetto dei costi, che è comunque qualcosa che noi dobbiamo fare infatti ad esempio con i nostri fornitori, siccome le batterie hanno un grosso contenuto di litio noi stabiliamo dei prezzi delle batterie che non vadano, cioè cerchiamo di stabilizzare il prezzo delle batterie indipendentemente dal mercato del litio che è molto volatile, quindi noi acquistiamo le batterie dai nostri fornitori stabilendo un prezzo che sia di riferimento per 6, 12, 18 mesi successivi a seconda del fornitore. Quindi noi già abbiamo questo concetto di dire: vogliamo far sì che i costi in qualche modo siano stabili per un periodo di tempo ragionevole per poterlo proporre ai nostri acquirenti. Quello che cerchiamo di fare noi ora con i nostri prodotti è come ho detto quello di farli specifici per i nostri clienti e allo stesso tempo quello di dare più garanzie possibili e di prendersi cura di*

*loro dalla a alla zeta. Cioè per quanto riguarda manutenzione, problemi tecnici, diagnostica noi tentiamo di essere presenti e rispetto a quelli che sono i nostri competitors principalmente sul mercato asiatico cerchiamo di essere più vicini perché avendo sede in Europa riusciamo a intervenire più prontamente*

*Ecco sicuramente per quanto riguarda la percezione del fatto che un domani sul mercato ci possa essere un prodotto migliore anche sviluppato da noi o da altri è difficile stabilire quali possano essere i parametri che vanno realmente a dire che un prodotto è meglio di un altro perché è un continuo tradeoff il nostro lavoro fra quello che può essere la manovrabilità e la durata delle batterie o quello che può essere i posti a sedere e quindi la capienza e la durata sui percorsi, oppure la maneggevolezza, la velocità massima, i tempi di ricarica, ci sono un sacco di diversi attributi che fanno sì che sia difficile dare un valore complessivo ad un prodotto. E' proprio per questo che noi puntiamo su prodotti che possano essere specifici per i nostri clienti quindi sarebbe difficile andare a capire quali sono i parametri per definire un prodotto migliore o peggiore. Per quanto invece posso dire sulla durata della batteria è qualcosa per cui dobbiamo riuscire a farcene carico e coordinare il fatto che noi siamo a metà fra i nostri fornitori delle batterie e i nostri acquirenti che sostanzialmente comprano gli autobus ma siccome il grosso della tecnologia sta nelle batterie è un po' come dire che loro comprano batterie.*

*Quello che possiamo dire dal punto di vista dei contratti è che sono contratti... diciamo che la compravendita dell'autobus è l'ultima parte del nostro contratto cioè è la parte meno importante. Noi vendiamo un autobus ad un prezzo ma quello che il nostro cliente cerca è tutto quello che ci sta intorno ovvero tutte quelle che possono essere le garanzie che riguardano manutenzione, un nostro coinvolgimento e anche il discorso della*



*gestione delle batterie alla fine del ciclo di vita. Oggi è difficile trovare qualcuno in Europa che smaltisca batteria delle dimensioni di quelle degli autobus. Queste batterie più che essere smaltite si punta a rigenerarle quindi a darle nuova vita; quello che noi dobbiamo fare è, siccome non sviluppiamo direttamente le batterie, non ci occupiamo direttamente dell'assemblaggio di queste batterie ma solo dell'autobus dobbiamo cercare fornitori delle batterie che ci garantiscano anche un processo di ritorno e di rigenerazione. Ovviamente noi facciamo da tramite con le Società che comprano autobus da noi quindi oltre a tutta la manutenzione che noi offriamo, condivisione di dati riguardo alle fasi di test, alle fasi di sviluppo e alla nostra disponibilità sul campo per quanto riguarda la cura dei prodotti che vendiamo, anche la gestione del processo di ritorno delle batterie è qualcosa di cui noi ci facciamo indirettamente carico o meglio, proviamo a farci indirettamente carico anche perché siccome le batterie vengono fatte oggi ma verranno rigenerate in futuro, bisogna considerare il fatto che noi non dobbiamo per forza avere qualcuno che ce le rigeneri ora. Però bisogna puntare fin dall'inizio a trovare il modo per rigenerarle.*

*Guardi per quanto riguarda il primo punto, gliel'ho detto anche prima, è difficile stabilire cosa sia meglio o cosa sia peggio quindi trovare un parametro oggettivo col quale io possa stabilire che un nuovo autobus presente sul mercato sia migliore è difficile, perché i cambiamenti possono non creare una discrepanza così evidente da quello che era prima e dopo ma essere una continua piccola miglioria e aggiornamento tecnico. Quindi qui avrei delle difficoltà a pensare ad un contratto che vada a introdurre questa clausola perché appunto la valutazione sarebbe molto impegnativa. Per quanto riguarda invece le batterie ovviamente lì è facile come può immaginare, se Lei utilizza uno smartphone, lo stato della batteria con una semplice diagnostica è facilmente valutabile; noi non sviluppiamo le batterie quindi dovremmo riuscire ad allineare il contratto che abbiamo con i nostri fornitori*

*e con i nostri acquirenti. Non è una cosa semplicissima però per quanto riguarda il contratto che Lei mi sta chiedendo con gli acquirenti sicuramente è qualcosa che noi possiamo prendere in considerazione. Sarà poi nostro compito parlare con i nostri fornitori ma siccome il suo focus è quello sui nostri acquirenti, Le posso dire che sì, è qualcosa su cui si possa lavorare.*

*Sicuramente quello di cui noi abbiamo bisogno in questo momento è ...noi vogliamo instaurare rapporti con i nostri clienti che durino nel tempo. Oggi non Le dico che è un mercato a perdere ma non è così semplice riuscire a fare profitto da questo genere di mercato. Noi vogliamo farci conoscere, vogliamo essere la Soluzione per quando ce ne sarà bisogno e quindi vogliamo riuscire fin da oggi ad avere rapporti con i nostri clienti che ci permettano di instaurare una buona posizione sul mercato. Quindi cerchiamo di andare molto incontro a quelle che sono le esigenze dei nostri clienti e soprattutto ci rendiamo conto che, siccome loro sono molto timorosi, più noi riusciamo ad ascoltarli ed ad andare incontro alle loro necessità più questo sicuramente è motivo di selezione nostra come loro fornitori e quindi ci rendiamo conto che forse il costo non è la parte su cui chi viene oggi a comprare un bus elettrico si focalizza di più. Guardano di più quelle che possono essere le specifiche tecniche e soprattutto le garanzie. Il costo è una cosa secondaria perché si rendono conto che preferiscono pagare un pochetto di più ma essere sicuri che il loro prodotto funzionerà piuttosto che tentare di tirare sul prezzo e poi trovarsi a pagare i costi aggiuntivi e secondari in futuro, frustrazioni, tempo, energie, tutte queste cose*

*Quello che posso aggiungere in conclusione a questo discorso è che noi ci siamo resi conto di come oggi sia difficile sviluppare un prodotto che vada bene a tutti. Quindi anche se noi non abbiamo gli impianti produttivi ci siamo resi conto che il mercato offre diverse parti*

*che possono essere combinate e il nostro lavoro è un lavoro appunto ingegneristico e tecnico, di mettere a frutto le nostre conoscenze per combinare pezzi provenienti da diverse parti del mondo perché abbiamo fornitori localizzati in tutte le parti del mondo e speriamo in futuro di avere acquirenti in tutte le parti del mondo, anche se per ora siamo solo sul mercato europeo. La parola d'ordine di quello che facciamo è "Andiamo incontro al cliente", facciamo sì che come la necessità dei nostri prodotti non è ancora così imminente da parte dei clienti ma lo diventerà a breve, vogliamo far sì che loro anticipino questo processo sia per riuscire noi a sviluppare prodotti migliori sia per riuscire ad avere anche dei ritorni economici che ci permettano di continuare il nostro mestiere e vogliamo riuscire ad essere i primi sul mercato perché tante volte quando si è i primi si rimane nella memoria e si viene scelti anche in futuro*

**VIII-Coding Scheme**

**Coding Scheme for Buyers' Data**

		City Sightseeing Roma	City Sightseeing Italy	City Sightseeing Milano
<b>Process Stage and Risks</b>	<b>Process Stage</b>	Early stage, no consistent investments till the last 2-3 years (G.C.). Tradeoff between battery and passenger capacity (G.C.). Consolidated test Phase (G.C.).	About 30% of the bus in the cities will be soon electric; even more in the city center (Fa.M.).	Test phase started in November 2018 with the first bus of the group (A.A.). Chinese supplier seems to be the one with the most advanced product (C.A.). Pushed by CSR issues (A.A.).
	<b>Perceived Risks</b>	Disposal of used batteries (G.C.). Inadequacy of the network for electricity distribution (G.C.; M.B.). Usage on hilly territory (M.B.). Maintenance of the buses requires new know how (M.B.).	Support of the public-owned network is weak (Fa.M.; Fr.M.). Usage on hilly, not plane territories (Fr.M.).	Major havocs e.g. fire during charging process (A.A.). Major havocs due to more dangerous lithium in batteries (C.A.). Reverse cycle of the batteries (C.A.) Technical breakdown risk (C.A.).
	<b>Perception of Early F.O. Risk</b>	Strong, impossible to change a complete fleet all together (M.B.; G.C.). It takes at least 4 years to amortize the bus (M.B.).	Need to find an equilibrium between “being the first” and not to expose the company too much (Fr.M.) Technology is fast development; endothermic has been the same for 50 years (Fr.M.)	Perceived as part of the entrepreneurial risk (A.A.). Mitigated by a regional law (A.A.). Necessity to be careful because it is new and uncertain (C.A.). Traditional buses last even more than 10/12 years, electric is not sure at all (A.A.).
	<b>Uncertainty of P.D. Rates</b>	We have some guarantees but not much (M.B.). Way more complex to predict than for cars; they operate all day long (G.C.).	Batteries guaranteed 5 years, but already substituted after 8 months (Fa.M.). Battery duration over times and numerous charges is an unknown (Fr.M.).	Right now, are performing well but doubts for the future (A.A.). Strongly felt, it also implies necessity to regenerate batteries; if not “green” purpose is lost (C.A.). Biggest question mark for the company (A.A.).
<b>Risk Sharing</b>	<b>Risk Sharing Practices for Endothermic</b>	None, maintenance is done in-house to exploit synergies with other business owned by the same president of the company (G.C.; M.B.). Strong non contractual collaboration for spare parts (M.B.).	About 80-90% of the maintenance is carried out in-house; only the rest is on suppliers (Fa.M.). Maintenance is done in-house (Fr.M.). Sometimes spare parts are bought with the bus to fix price (Fr.M.).	Spare parts bought ahead of time, not to have to bargain on them when needed (A.A.).
	<b>Risk Sharing for Electric</b>	More complex than endothermic, necessary because little technical knowledge is owned (G.C.). Felt as necessary (M.B.).	Batteries guaranteed but for a shorter period than expected lifetime (Fa.M.). Necessary because maintenance, test and complex diagnostic is not possible in-house (Fr.M.).	Technical assistance is provided by the supplier (A.A.; C.A.).
	<b>Effect of Risk Sharing</b>	It would ensure regarding the alignment of incentives with manufacturers (G.C.). Doubtful about the possibility of its implementation (M.B.).	Technicians sent to supplier to learn maintenance (Fa.M.; Fr.M.). Useful to reduce uncertainty (Fr.M.).	Crucial to ensure an acceptable level of service (A.A.).

		City Sightseeing Roma	City Sightseeing Italy	City Sightseeing Milano
<b>Contracting</b>	<b>Actual Contracts</b>	Simple trade contract; sometimes leasing employed to fulfill volatility in final service demand (G.C.). Simple trade (M.B.).	Simple acquisition contract; also suggested at a group level (Fr.M.).	Traditional simple trade contracts (A.A.; C.A.). Electric bus acquired with simple trade (A.A.)
	<b>F.O. and P.D. clauses in contracts</b>	Endothermic buses guaranteed for only 24-48 months; It might change for electric (G.C.). Something they are looking for (M.B.).	Something similar offered on big fleets (Fa.M.). Necessary due to high speed of technological change (Fr.M.).	No specific ones in the actual contract but could be an improvement (C.A.). Batteries are guaranteed for 5 years (C.A.)
	<b>Effect of Contracts on Process</b>	Great Incentive to adopt electric solutions (G.C.). Skepticism regarding acceptance by suppliers (M.B.). Centralized contracting at network level would speed up the process of transition to electric (M.B.).	Of course, something desirable but impossible if numbers are too small (Fa.M.). Necessity to stay closer to network members to help them; the scope is to create large fleet to gain contractual power (Fr.M.). Time saved if a model of contract is created (Fr.M.).	Necessity of a reference contract to promote the process among the different members of the franchise (C.A.).
<b>Supplier Selection</b>	<b>Current Supplier Selection</b>	Takes in consideration several parameters (safety, gas mileage, comfort reliability...) Cost accounts for only 20% of the decision (G.C.). First technical requirements are met, then the cheapest is chosen. (M.B.). Following City Sightseeing Italy guidelines (M.B.).	Small number of suppliers (Fa.M.; Fr.M.). Suppliers' products are well known, short time needed (Fa.M.). Many features evaluated, safety first (Fr.M.)	More oriented on costs than for the electric one (the product is known well) (A.A.).
	<b>Supplier Selection for Electric</b>	New suppliers will have to be evaluated and more parameters considered (G.C.). Right now, Chinese are the most advanced; European are catching up but still too expensive (M.B.). Following City Sightseeing Italy guidelines (M.B.). Based on feedbacks from Milano's bus (M.B.).	Production line of 2 potential suppliers has been visited directly by the firm (Fa.M.). It had better to be at a group level in the first stage (Fr.M.).	Not many suppliers to select from (A.A.). Suppliers chosen on a global basis (A.A.) Need to find a European valid supplier to create closer contact (A.A.). They chose the most performant and reliable (C.A.). Active participation in sector fairs (C.A.).
	<b>Effect of Contracts on Supplier Selection</b>	Suppliers which engage in closer collaboration are preferred (G.C.). If suppliers use this kind of contracts to promote their products it would have a great appeal (M.B.). Vehicles are becoming more a service than a good; such suppliers would offer a great incentive (M.B.).	It can be absolutely a factor in selecting one supplier instead of another (Fr.M.) It would ensure them and make them more willing in investing on electric mobility (Fr.M.).	Contracts which ensure against breakdowns incentivize the acquisition of electric buses (A.A.). Suppliers which will take care of reverse logistics after end of life of batteries will be preferred (C.A.).

### Coding Scheme for Suppliers' Data

	Supplier1 and Supplier2
<b>Incentives and Implication of the Transition to Electric Buses</b>	Governments are pushing with monetary incentives (L.W.). CSR related benefits (L.W.). Products more expensive than endothermic (L.W.). Customers know little about what they buy (L.W.; M.C.). A new technology has to be incentivized (M.C.).
<b>Facts Related to Early F.O. and Uncertain P.D. Rates</b>	Might develop better products soon (L.W.; M.C.). Actual products might become consistently cheaper soon (L.W.; M.C.). Suppliers as little insights as well over battery performance over time (L.W.; M.C.).
<b>Risk Sharing Practices Undertaken with Buyers</b>	Send technicians on field to buyers' locations when needed (L.W.) Non-standardized products to satisfy single customer needs. Provide base training to buyers' people (L.W.). Perceived as necessary because customers are "scared" by the change (L.W.). Done with their own suppliers (M.C.)
<b>Possibility to Share F.O. and P.D. Related Risks</b>	Yes, but it depends on volumes acquired (L.W.). Hard to establish parameters to evaluate F.O. (M.C.). Possible, important to mediate with their own suppliers (M.C.)
<b>Actual Contracts</b>	Almost always simple trade, sometimes leasing mediated by a bank (L.W.). Trade contract but the many guarantees are asked by buyers (M.C.).
<b>Risk Sharing Consoles in Contracts</b>	Possible, but only when working on fleets instead of single purchases (L.W.). Some guarantees are already given but are not complete (L.W.). Hard for F.O. (M.C.). Easy, possible and auspicial for P.D. related rates (M.C.).
<b>Effect on the Selection as Suppliers</b>	Positive. Way to be closer to customer and ensure it. (L.W.). Try to fulfill customers' needs in order to create a durable relationship (M.C.).

## **Thesis Summary**

### **Research Purpose**

This research has been carried as part of a double degree program between Tilburg University (Master's in Supply Chain Management) and LUISS (master's in Management).

### **Thesis Structure**

This thesis is divided in seven chapters. The first one serves as introduction and definition of the problem statement. In the second chapter, a connection between the programs object of the double degree between Tilburg University and LUISS is given. The third one is a literature review of the theoretical arguments on which the specific problem is based on; at the end of it a conceptual model is developed and exposed. The fourth chapter describes the research methodology of the study. The fifth chapter describes the research context and introduces the analyzed case study. The sixth chapter is dedicated to data analysis while the seventh chapter exposes conclusions, limitations and possible further extension of the research.

## **Introduction to the Case Study (Chapter 1)**

### **Problem Identification**

Asset lifecycle is the natural evolution of an asset in terms of the increase and decrease in its use and value from inception to retirement (Queensland Government Chief Information Office, 2018). Since the majority of the assets' categories have a limited time span of operating service, companies need to periodically carry out the replacement analysis, which is concerned with determining the optimal time to remove a current asset (defender) from service and selection of another asset to take its place (Hartman, 2004).

Under technological progress, decision makers may be encouraged to replace assets before their economic life in order to take advantage of technologically more advanced models (Hartman and Tan, 2014). Consequently, under technological progress, the phenomenon of functional obsolescence, defined by Stacchetti and Stoyarov, 2015, as “the condition that, with regard to a specific asset, occurs with the mere passage of time, typically because superior substitutes become available at the same price”, can result to be faster than expected, changing the projected lifecycle of the new assets.

This peculiarity is particularly relevant for the so-called long-lived assets, also known as non-current assets, long-term assets or durables, which are assets that are expected to provide economic benefits over a future period of time, typically greater than one year, (“Long-Lived Assets. CFA Institute”, 2019) and, therefore, an incorrect management of their lifecycle could have a severe impact on the owning company performance.

The scenario of early functional obsolescence of recently acquired durables could represent a risk for the acquiring company and thus needs to be mitigated.

Although it is impossible to completely eliminate risks from a supply chain, they can be reduced, or organizations can better prepare themselves to neutralize them and this can be done if there is a shared understanding among supply chain partners of the variables that could impact the risks and the mitigation strategies. (Faisal M, N, et al., 2006).

In order to mitigate the risk perceived by the acquiring company an effective risk sharing policy with its suppliers could be supposedly adopted, this means to find a way to align risks taken and revenues awarded to each partner interacting in a supply chain dynamic. This study wants to focus on the particular risk of early functional obsolescence, pointing out the role played by specific categories of contractual agreements as mediators for an efficient risk-sharing practice among supply chain partners. In fact, risk-sharing contracts have been suggested and used for handling risks in supply chains<sup>11</sup> (Wakolbinger and Cruz, 2011). City Sightseeing is the world’s leading open-top bus tour operator. This study has been developed and carried out in collaboration with one of the franchisees of the group, the agency of City Sightseeing based in Rome.

City Sightseeing Rome’s business is characterized by the transportation of tourists on board of double-decker buses in order to provide them with guided tours of the city’s monuments. These buses represent the major investment of the company and are considerable as long-lived assets.

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<sup>11</sup> As presented by Li and Kouvelis (1999), Lindroth and Norrman (2001), Harland et al. (2003), Ojala and Hallikas (2006), Kouvelis et al. (2006), Krueger and Uhlig (2006) and He and Zhang (2008)



Today, with regard to this specific kind of equipment, the company is facing a problem during the process of asset replacement. In fact, new suppliers are offering to the company an electric alternative to the endothermic engine buses currently employed by City Sightseeing Roma, increasing the number of variables to be considered during the aforementioned replacement procedure.

If on the one hand lawmakers are exercising their regulatory pressure, namely the action of government's agencies on firms in order to make them embrace a desired behavior (Berrone, 2012), to incentivize the adoption of electric vehicles and reduce the environmental impact of businesses, on the other hand the transition process to electric mobility involves risks for the company. Indeed, the technology on which these new goods are developed is still unstable and uncertain and it might signify that the functional obsolescence of the new durable could take place faster than for buses based on the actual, stable technology.

The study is carried out from a buyer perspective, but, at the same time, incorporates perceptions and feedbacks collected from suppliers, in order to gather a better understanding on the whole segment of supply chain interested by the introduction of this innovation.

This research wants to investigate the possibility to implement and, eventually assess the effectiveness risk-sharing contracts between City Sightseeing Roma and its suppliers.

The outcomes and findings of my work will be directly deployed by City Sightseeing Rome to adapt its strategy during the supplier selection, namely the process of selecting a supplier to acquire the necessary materials to support the outputs of organizations (Shyur and Shih 2006).

### **Research Questions:**

- 1) What is the early functional obsolescence risk in relation to the asset replacement process?
- 2) How does the proper form of contracting share the risks between buyers and suppliers?
- 3) How does the early functional obsolescence risk affect the transition process to electric buses for City Sightseeing Roma?
- 4) What form of contractual agreement would enable City Sightseeing Roma to share risks with its suppliers? How?

### **Problem Statement**

How could City Sightseeing Roma mitigate the risk of early obsolescence of electric buses through the proper form of risk-sharing contract.

## **Connection Between Programs (Chapter 2)**

This thesis has been firstly conducted as conclusion of a master's degree in Supply Chain Management at Tilburg University. As required by the double degree program at LUISS University, a direct link with a subject part of the master's degree in Management has been found; in fact, this chapter explains the connection between the digital transformation of business and its impact on supply chain's dynamics.

In this chapter it has been supposed that the digital transformation had an impact on supply chain dynamics. The study of the related literature has suggested that differences between the analog era and the digital era exist, affect five principal domain and have an impact on a single businesses and whole supply chains. The table below briefly summarizes them.

	<b>Analog Era</b>	<b>Digital Era, Single Business Perspective</b>	<b>Digital Era, Supply Chain Perspective</b>
<b>Costumers</b>	Customers as mass market; one-way value flows (Rogers, 2016)	Customers as dynamic network, communications are two-way and the value flows are reciprocal (Rogers, 2016)	Focus on value creation; final customers feedbacks reported from bottom to top of DSC.
<b>Competition</b>	Competition within defined industries; clear distinctions between partners and rivals; products with unique features and benefits; key assets are held inside the firm (Rogers, 2016)	Competition across fluid industries; blurred distinction between partners and rivals; competitors cooperate in key areas; Key assets reside in outside networks (Rogers, 2016)	Even competing companies are collaborating to pursue integration of the entire supply chain (Korpela, 2017)
<b>Innovation</b>	Testing ideas is expensive, slow, and difficult; failure is avoided at all cost (Rogers, 2016)	Testing ideas is cheap, fast, and easy; failures are learned from, early and cheaply (Rogers, 2016)	DSC integration allow concurrent engineering in substitution to sequential engineering for innovation projects (Korpela, 2017)
<b>Data</b>	Data is expensive to be generated in firms; firms make use only of structured data; data is a tool for optimizing processes (Rogers, 2016)	Data is continuously generated everywhere; unstructured data is increasingly usable and valuable; data is a key intangible asset for value creation (Rogers, 2016)	DSC is characterized by the strategic and operative exchange of information between suppliers (financial, production, design, research and/or competition) to enhance communication between actors in the chain (Chen and Paulraj, 2004)
<b>Value Proposition</b>	Value proposition defined by industry; execute your current value proposition; market success allows for complacency (Rogers, 2016)	Value proposition defined by changing customers' needs; uncover the next opportunity for customer value; judge change by how it could create your next business (Rogers, 2016)	Systematic integration and bundling of information about products and services to create additional value to customers (Mikkonen et al., 2016).

## **From Analog to Digital Era: The Domains of Change for Businesses and Supply Chains**

These theoretical assumptions have been confirmed by the data collected in the case study lately discussed; in particular it has emerged that

- Companies are willing to approach the market with products that are not fully developed; an initial failure is just a starting point to learn and improve the first prototype.
- Data sharing between supply chain members and even competitors is a key success factor; digital transformation has exponentially increased the data available to firms and the new challenge is to refine the data analysis techniques.
- Mass production is considerable as an anachronistic concept. Today suppliers have to work closely with buyers in order to be able to provide the value that customers really need.

### **Literature Review (Chapter 3)**

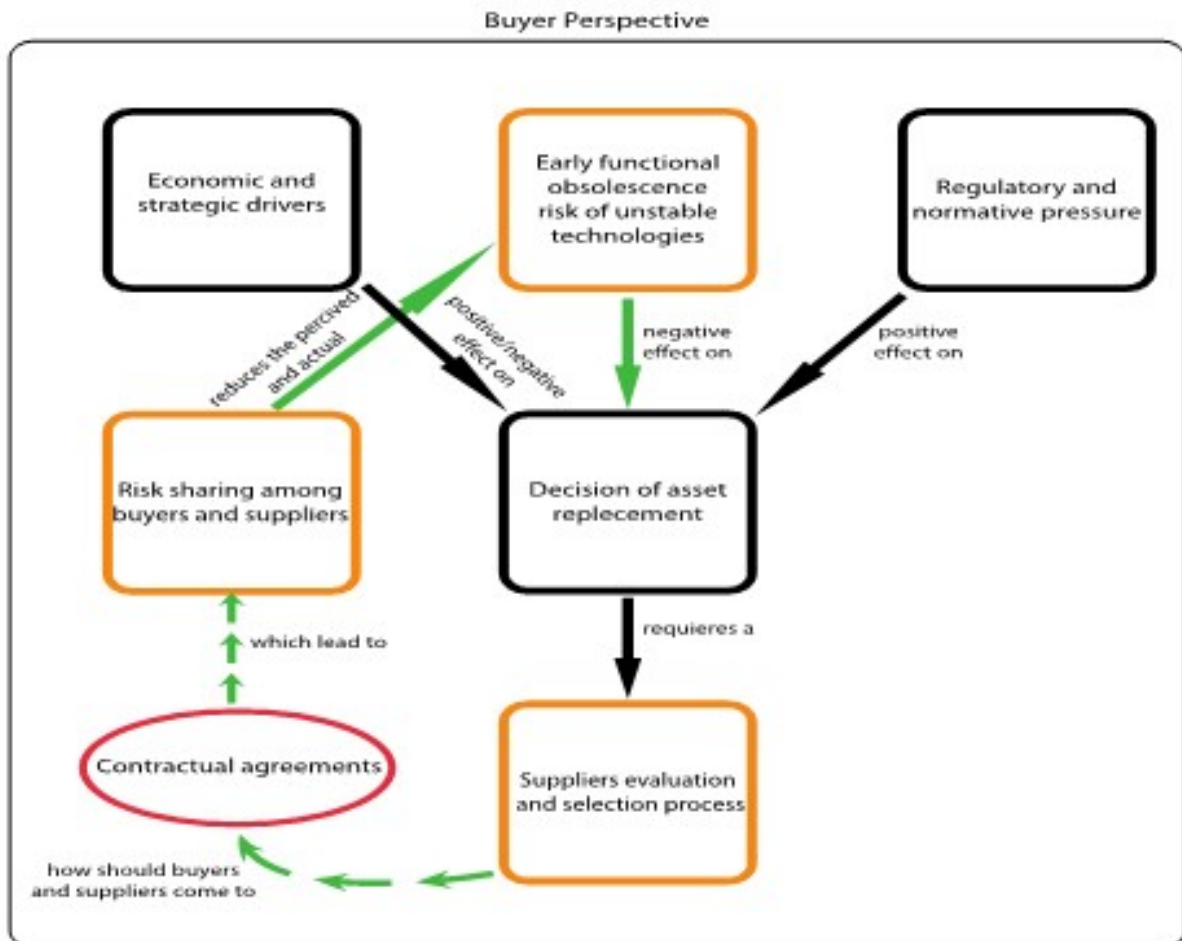
In addition to the literature topics mentioned in the previous paragraph (related to the management of innovation), others have been deeply analyzed (inherent to supply chain management). The following scheme has been followed during the desk research:

- Risk of early functional obsolescence during the asset replacement process
  - Strategic, long-lived assets
  - Asset replacement process
    - Overview of assets' investment justification
    - Assets' replacement decision-making process in a context of technological innovation
    - Environmental innovation incentives in durables assets' replacement
  - Obsolescence risk
- Risk sharing among supply chain partners and the role of contractual agreements
  - Risk analysis and risk sharing among supply chain partners
  - The role of contractual agreements is sharing the risk among supply chain actors
  - The risk-revenue sharing contracts and the performance-based contracts
- Suppliers' selection process
  - Suppliers' evaluation

- Analytic hierarchy process

### Conceptual Model

The literature review has conducted to the creation of a conceptual model of the research, displayed by the following flow diagram



### Conceptual Model

The research elements, reported in the black boxes, provide the description of the context of the study and increase the understanding of the causal relations of the overall model.

Analogously, the black arrows underline relations which are supposed to exist between them, completing the reference framework of the case study analyzed.

Elements in the orange boxes, even though they have already been analyzed in the literature review, have been the target of the research, as well as the relations indicated by the solid green arrows, which, after the literature review, have been object of further investigation.

The main focus of the study has been on the relations displayed by the discontinuous green arrows, and the role played by contractual agreements (drawn in the red circle). A specifically

customized design of such element and derived relations has been the final goal of this research, taking into consideration literature knowledge and features that have emerged from the specific case study.

## **Research Methodology (Chapter 4)**

The study object of this research is definable as an inductive study since the aim is to generate a new theory based on the data (Gabriel, 2013). The research has been carried out as a qualitative research because the data take the form of words rather than numbers (Frey, et al., 1992). The approach has been exploratory, therefore the existing theory has demonstrated only a little part of the information provided, even though it has been the starting point of the analysis.

The strategy adopted is the case study. The motivation behind this choice is that by using the case study approach, it is possible to identify the reasons why certain decision were made, how they were implemented and with what result, can be identified (Chetty, 1996).

### **Data Collection**

For the purpose of this research both primary and secondary data have been collected and subsequently analyzed.

Both have been collected mostly in the form of qualitative data even though quantitative data have been employed to reinforce the findings and make the contest easier to understand.

Secondary data come from the literature, exposed in the previous section, and from on-site observation collected during company visits.

Primary data have been collected through semi-structured interviews, in order to make the questioning more adaptable to possible insights not evaluated in beginning but keeping, at the same time, the focus on the selected topics.

### **Sampling Strategy**

As mentioned in the introduction, the focus of the study has been on the buyers prospective, therefore members of City Sightseeing Italy, Milano and Roma have been interviewed. At the same time, to gather an overall view of the investigated segment of supply chain, also managers working for relevant suppliers have been questioned, with the aim of acquiring feedbacks to the contractual agreement proposed by buyers.

## **Data Analysis**

The first step has been the creation of the conceptual model displayed in the previous section, based on the secondary data collected. The following step has been employing interviews to analyze and prove the relations proposed by the conceptual model, with the final goal of answering the problem statement. In order to do so, a coding scheme has been created and used to classify the collected data. On the basis of the analysis the conclusions and implications of the study have been drawn.

## **Company Introduction (Chapter 5)**

City Sightseeing is the world leader in touristic buses tours with the hop-on, hop-off system, operating in 110 locations spread in five continents and with approximately 800 vehicles. The company is structured as a franchising, this allows the local operators to have the flexibility to introduce the right infrastructures to suit their locality whilst, with full support and coordination of the worldwide company. This kind of governance aims to leave entrepreneurial freedom to the single franchisees, while at the same time, creating a well-established and recognizable brand and standard of service.

### **City Sightseeing Italy**

City Sightseeing Italy is the company that owns the authorization for the use and grant of the City Sightseeing brand in the Italian peninsula, actually present in 16 different locations with about 100 double decker buses operating on sites.

It owns direct participations in each of the subsidiaries part of its network. Its duties are to establish the regional strategy of the company, to oversee its implementation and to coordinate the relations with suppliers and institutions.

### **City Sightseeing Roma**

City Sightseeing Rome, at the time of the study, is operating in the city of Rome with 18 buses, representing the leader in the reference market segment for what concerns the Italian capital. The buses are bought by the company with a simple acquisition contract. Recent memoranda from the European Union and local Authorities have announced that, in approximately 3 to 5 years, the transition from fossil fuels engines to electric ones will be required by law. This, in addition to CSR issues, convinced City Sightseeing Rome to evaluate the early replacement of their buses fleet, and start a supplier selection process since the actual suppliers do not own the know-how for electric mobility.

The electric mobility is an unstable sector, and therefore, the company has worries regarding the lifetime of the new acquired durables. With regard to electric buses, disruptive change in technology could make them become obsolete earlier than expected, reducing sensibly the value of the firm's investments.

Given this situation, City Sightseeing is looking forward to finding the right supplier and stipulate together a contractual agreement that would grant them the possibility to keep their business away from service disruption and, at the same time, mitigate the obsolescence risk described above.

### **City Sightseeing Milano**

Taking the position of first movers, they introduced the second electric grand tourism bus in Europe in November 2018 (first of the company worldwide). They selected a Chinese company as supplier. As part of the City Sightseeing Italy network, they manifested their willingness to share with City Sightseeing Rome data regarding the test phase of their electric bus. Their experience can be used by City Sightseeing Rome in order to further increase the knowledge of the company by learning from the empirical evidence and data collected on field.

### **Data Analysis (Chapter 6)**

The following scheme has been followed in order to draw the conclusions deeply exposed in the following section. The aim has been to code the data and analyze them as consistently as possible with the conceptual model proposed by the literature review.

- Factors affecting the decision-making process of assets replacement:
  - Economic and strategic factors: the transition process to electric mobility seems to be an unavoidable event; what is still uncertain and needs to be considered is its timing
  - Regulatory pressure and incentives: the public interest over the environmental impact of businesses has risen sharply in the recent years, incentives awarded to “green mobility” have changed the strategic and economic impact of the adoption of electric busses.
  - Early functional obsolescence of unstable technologies and other risks related to the process: the data collected have shown how, in addition to the early functional obsolescence risk, there are other sources of risk affecting the



transitional process to electric mobility. The following table summarizes them and compares the buyers' and suppliers' perceptions.

<b>Risk Source</b>	<b>Buyers' Perception</b>	<b>Suppliers' Perception</b>
<b>Early F.O.</b>	Perceived as a possible major cause of business instability; partially mitigated by the entrepreneurial necessity to innovate and gamble.	Products are still developing and might improve fast; since they follow feedback from buyers for R&D projects, first partners will find products developed around their needs and preferences
<b>Uncertainty of P.D. Rates</b>	Concerns about the guarantees provided on batteries; their lifetime could be shorter than the of the vehicles they power	From test phase life of the actual batteries should be longer than the guarantees given; never verified on buses working on field for a long period.
<b>Disposal of Used Batteries</b>	It can represent a significant cost for the company; if carried out incorrectly could also damage the imagine of the brand	Specialized firms are already operating to take care of this problem for other kind of vehicles; it might be an expansion of the business of the suppliers' themselves
<b>Major Disruption During Charging Process</b>	The first electric bus of the group is kept under strict eye surveillance during charging process	Very remote incidence; never happened during each of the test phases.
<b>Usage on a Hilly Territory</b>	Current technology may not be suitable on a hilly territory; till today experimented only in the plain.	Test show how the buses would work efficiently on any kind of territory where City Sightseeing Italy is actually operating
<b>Technical Skills to Operate Maintenance</b>	Absence of in-house knowledge; doubts on the reactivity of suppliers' maintenance service	Guarantee fast and efficient maintenance service; offer courses to train buyers' employees
<b>Capacity of the Electricity Distribution Network to Supply Energy</b>	The local network of energy distribution may not be able to supply enough energy during the peaks of electricity demand	After an evaluation process, if the charging process is correctly scheduled and operated, it would not represent a problem in any of the cities potentially interested.

## **Risk Sources, Buyers and Suppliers Perception**

- Risk sharing practices:
  - Buyers' approach: with the exception of rare cases, all the maintenance of the endothermic buses is carried out in-house by the members of the City Sightseeing Italy network and no other kind of risk sharing practice is undertaken.
  - Suppliers' approach: suppliers seem to be willing to match this kind of request from buyers since they consider their customers as “scared” by the new technology, and thus offer on-site technical assistance and training programs for buyers' operators in order to reassure them and increase the sales
- Contracting:
  - Current contractual structure chosen by City Sightseeing Roma: City Sightseeing Roma is currently subscribing only simple acquisition contract for the supply of endothermic engine busses.
  - Introduction of risk sharing parameters in contracts: It does not seem to be feasible to be added for what concerns functional obsolescence since it is difficult to find an efficient measurement of it; it could be implemented for what concerns physical deterioration rates.
  - Mediation of City Sightseeing Italy in Bargaining with Suppliers: the need manifested by suppliers of dealing with a large number of vehicles to accept the inclusion of the aforementioned parameters in contracts could be satisfied by the direct mediation of City Sightseeing Italy.
- Suppliers' selection and impact of contracts:
  - Current suppliers' selection for endothermic busses: City Sightseeing is carrying it out in a way similar to a simplification of the AHP method. Even though the methodology of the aforementioned process is not strictly applied, the logic of it is employed.
  - Suppliers' selection for electric buses and related impact of risk sharing contracts: The effect of the introduction of risk sharing clauses in contracts on the supplier selection has proved positive. For their part, suppliers seem to be compliant in working in this direction.

## Conclusions and implications (Chapter 7)

### Conclusions

Following the research questions reported in the first section, the problem statement “*How could City Sightseeing Roma mitigate the risk of early obsolescence of electric buses through the proper form of risk-sharing contract?*” has been answered.

R.Q. 3: “*How does the early functional obsolescence risk affect the transition process to electric buses for City Sightseeing Roma?*”

In the light of what emerged from the data analysis, it is clear how the transitional process to the acquisition and utilization of electric double-deckers has reached a crucial stage: suppliers are ready to provide a valid and differentiated set of offers, and lawmakers are pushing and incentivizing the adoption of the new technology.

The process is still uncertain and characterized by several possible sources of risk that have not been pointed out in the introduction of the research but have emerged during the analysis of the collected data. In fact, it emerged that critical issues derive not only from concerns about the eventuality of early physical obsolescence of the acquired assets, or from the doubts on the physical deterioration rates of batteries over time, but also from other possible sources of disruption.

City Sightseeing has to actively take a position, planning and executing all the steps required to introduce and adopt electric vehicles, always taking into consideration the possible risks and related drawbacks.

Given this complex context, the company is willing and oriented to consider and undertake a strategy to effectively share risks with its possible future suppliers. Even though there are several strategies to share risks among supply chain partners, this study focuses on the role of contracts in achieving an effective subdivision of the risks. A first attempt to do so has been done by City Sightseeing Milano, introducing some technical guarantees in the simple trade contract through which the first electric double-decker of the group has been acquired.

R.Q. 4: “*What form of contractual agreement would enable City Sightseeing Roma to share risks with its suppliers? How?*”

When dealing with a larger number of buses than a single purchase, as also shown by the feedbacks collected from suppliers, it seems reasonable to adopt a performance-based contract to govern the relationship between buyers and suppliers and achieve an effective share of risks. Performance-based contracts, by aligning the incentives between supply chain

partners, could effectively share the risks among buyers and suppliers. City Sightseeing would no longer buy the vehicles, but the service provided by them. Ownership of the assets is no longer a strict priority when it comes to electric vehicles. The table below illustrates the predicted effect of the adoption of a PBC by City Sightseeing Roma on the risks' set presented in the analysis.

<b>Risk Source</b>	<b>Predicted Effect of PBC on Risk Source</b>
<b>Early F.O.</b>	Suppliers would be responsible for the substitution of obsolete buses, exploiting their deeper knowledge of the product to better schedule the replacement program
<b>Uncertainty of P.D. Rates</b>	Suppliers already give partial guarantees on batteries' life and, on the basis of what emerged from the test phases, they do not foresee to have to substitute them before the expected end of their operating life. They either manufacture them or have a direct connection with batteries manufactures, therefore, in the case of early substitution of that component, it would be faster and cheaper for them than for City Sightseeing to take care of such a replacement.
<b>Disposal of Used Batteries</b>	Suppliers would take care more easily of the reverse cycle of exhausted batteries than buyers since they operate with larger volumes; some of them also stated their willingness to take care of the regeneration process of used batteries in-house.
<b>Major Disruption During Charging Process</b>	This eventuality does not represent a consistent risk source for suppliers due to its really low perceived incidence. The arrangement guaranteed by a PBC would relieve City Sightseeing from the direct supervision of the charging process.
<b>Usage on a Hilly Territory</b>	Suppliers' interpretation of the available data ensures them about the suitability of their existing products to be employed on a hilly territory.
<b>Technical Skills to Operate Maintenance</b>	Disposing of the required technical know-how and dealing with a conspicuous fleet of buses would allow the supplier to have a specialized maintenance team dedicated to the City Sightseeing Italy network.
<b>Capacity of the Electricity Distribution Network to Supply Energy</b>	Suppliers' studies showed how, with the proper scheduling, the charging process can be operated without interfering with other users of the electricity distribution network. City Sightseeing Roma would not have to take care of such planning.

### **Effect of PBCs on the Investigated Risk Set**

As this study shows, the different perception of the risks involved, as perceived by City Sightseeing Roma and its possible suppliers, is the key justification of a risk sharing contract. In order to regulate and compute the payments, a parameter, by the nature of PBCs, has to be established and periodically computed. What seems to be likely the best option, in terms of facility of computation and risk insurance, is the number of operative hours provided by the suppliers' buses to City Sightseeing. Other parameters could be considered, such as the capacity of batteries over time, but they would be either more difficult to compute or they

would not regard the whole sets of risks which turned out to negatively affect the transition process to electric mobility.

This kind of contractual setting may prove to be more expensive for City Sightseeing Roma than a simple acquisition, due to the augmented complexity, absence of complete payment upfront, and the concentration of risks on suppliers. In this reference context though, it seems reasonable to state that the benefits reported above more than compensate the increased costs possibly sustained by the company.

This contractual setting, if well managed, would positively affect both suppliers and buyers involved in that specific supply chain interaction. In fact, on one side, buyers would know, ahead of time, the final entity of the cost they will sustain for an hour of effective service of the electric bus, gaining an incentive to buy such supply by the reduced uncertainty. On the other side, analogously, suppliers would increment their incoming cash flows by increasing their volumes, which can be invested to further develop their products and gain a competitive advantage in a growing and unstable market segment.

### **Implications**

The data analyzed in the study and the conclusions drawn from them point out some major implications, at the operational level, for City Sightseeing Roma.

In order to be able to stipulate a performance-based contract for the supply of electric double-deckers, the proactive mediation of City Sightseeing Italy seems to be necessary, since dealing with large purchased volumes is the key requirement exposed by suppliers.

Fortunately, the willingness to operate in this direction has been confirmed by the data collected in this study, interviewing members of City Sightseeing Italy Itself.

The following step will be the development of a schedule to forecast the asset replacement process, considering, in addition to the evolution of technology and possible normative change, also the prospective growth of the reference market and rapid advent of new suitable suppliers. Then the supplier evaluation and selection process will begin, focusing mainly on their propensity to subscribe a satisfactory PBC between parts and the ratio between provided service and asked price. At this point, the contractual agreement will be shaped and signed up by parts, becoming potentially a possible reference for other members of the City Sightseeing company at a global level. If this approach were followed on a worldwide basis, it would further increase the purchased volumes, leaving more space for bargaining on the payments' terms and entity.

This kind of contract might result to be more expensive than a simple trade one, but, as also illustrated, more suitable for the specific context. For this reason, if in the future the technology will stabilize, City Sightseeing Roma will acquire the know-how to directly perform the in-house maintenance of electric double-deckers, and if other risk mitigating contingencies occur, a second evaluation of the most adequate kind of contract should be accomplished.

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