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"RISK SHARING IN SUPPLY RELATIONSHIPS: THE CASE OF KERING EYEWEAR"

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ABSTRACT

This thesis analyses the risks in buyer-supplier relationships highlighting the strategic use of cooperation and the risk shared inside the global supply organization.
To understand the strategic ways which a company can pursue, the thesis starts from the general overview of the risk management focusing mainly on the supply chain disruptive events.
Then, in the second chapter, the paper will analyze the risk sharing attitude of the organizations adopting the perspective proposed by the agency theory.
Finally, the third chapter shows the empirical analysis of Kering Eyewear illustrating how the risk is shared inside the eyewear industry.

INTRODUCTION

In managing supply relationships, buyers and suppliers share multiple relationships among which there are transfers, absorptions and sharing of risks. Starting from the notional bases dictated by the risk management discipline, this thesis will study the risk sharing measures in order not to limit the risk mitigation actions to mere passive coverage. The sharing of risk is a treatment aimed at reducing the impact of risks falling between several parties through collaboration. For this reason, it is a concept applicable in most of the vertical inter-organizational relationships and with direct implications in company performance. The presence of several subjects linked to a risk makes necessary not to trivialize the treatment and to carefully analyze the drivers who cause it, so as not to be subjected to strategic behavior of the counterpart.
With this goal, the first chapter of the thesis will introduce the concepts of risk management emphasizing the risks of the supply chain in its more general manifestation. This will give the reader the opportunity to get the basics of risk management and the different treatments that can be pursued in addition to risk sharing.
The second chapter will go into detail of risk sharing looking at it through the agency theory. This framework was taken into account for the identification of the supply contract as an agency contract. This model in fact provides that the principal (the buyer) gives decision-making power to another party (subcontractor) to carry out an activity on his behalf. This framework will be integrated with the elements related to the trust of the parties that in the thesis are considered variable and with a significant impact. The theme will be analyzed through a model that will

set the test of hypotheses regarding risk aversion and moral hazard on suppliers to determine the useful drivers for the proactive management of relationships.

The third chapter will cover the empirical case of Kering Eyewear whose production system is entirely entrusted to third parties and consequently very subject to the management of this type of risk. After an introduction of the company, the results of the previous model will be discussed, testing their validity and providing ideas for the strategic management of significant drivers.

CHAPTER ONE – INTRODUCTION TO THE SUPPLY CHAIN RISK MANAGEMENT

INTRODUCTION TO THE CHAPTER

The chapter deals with supply chain's risks, specifying the drivers and common methods of treatment. Prior to the risk identification, the chapter starts with the definition of risk in general, making an excursus on the different interpretations given to it. Secondly, the chapter will explain how to approach risk management in the supply chain by highlighting a structured process to analyze and effectively treat exposures. Finally, risks in the supply chain will be identified and classified through different frameworks in order to observe them with different perspectives.

1.1 - GENERAL INTRODUCTION TO THE CONCEPT OF RISK

The meaning of risk has been widely discussed and it has several interpretations. The typologies of risk that a company faces are enormous and continually changing; this makes very difficult a univocal academic definition because it could exclude events that may be disruptive. To allow a detailed analysis of the risks, this thesis circumscribes the considerations of the risks concentrating only on the risks related to the supply chain area.
To understand the difficulty of determine what is a risk the paper is going to show different definitions with different perspectives. One shared view identifies as a risk the situation which involves a vulnerability to a danger or a loss. In a mathematical way, this definition shows that the risk (R) is generated by a determined situation which occurs with a likelihood (P) and a gravity (G) linked in the following way:

$$R=P*G$$

The general interpretation talks about vulnerability (V), so the situation that sees the previous concept applied to an organization. It is the measure that identifies how much the entity is unprotected to the risky event, taking into consideration the safeguards it has adopted. It is a less quantified concept of the risk exposure because the exposure is the detailed total risk assessment usually done via statistical algorithms. Hence, the concept is determined by the formula:

R=P*G*V

This method is important because it allows organization to scale different risks and prioritizing them. However, the academia gives also other interpretations to risk; Knight (1964) associates the term with the uncertainty because the future is not predictable; Stark (2009) on the contrary links it to the probabilistic distribution of the outcomes; instead, Crouhy (2006) has stated that risk is as a volatility function determined by several direct and indirect variables. A dissimilar definition has been specified by Segal (2011) which links the risk to three main components: uncertainty, volatility and deviation from the expected result. Segal's vision differs from the others because it is not seen as a merely probability of an event, it is a probability of loss.

These definitions agree on the direct impact of the risk on the company performances and, apart from Knight (1964), that it is a probabilistic event which somehow, every company must take into consideration. However, the paper of Gloria Gardenal (2013) has a more comprehensive indication of what the risk is. She states that it is the variation of the future results due to the manifestation of events which affect the achievement of the expected goal both with a positive or a negative result. Usually these events are predictable, but its emergence is not certain, and their damages are clearly evaluable. Gardebal's risk interpretation is close to the one given by the International Organization for Standardization (ISO) inside their guide 73 (2009) which registers risk like the deviation from the expected (positive or negative) of uncertainty on objectives.

This introduces two sides of the unexpected event highlighting the neutral position of the term. The first one is called downside risk, when the outcome of the event is negative, and a loss is generated. The second one is the upside risk to identify the opportunity that a risk generates; this is the uncertainty that allows businesses to achieve an overall positive performance. It is different from the upside effects because they are positive consequences when the uncertainty generates for the most negative outcomes.

To further identify risks, there is the necessity to distinguish the subjective and objective dimension of the risk. Every risk, which has a different meaning from "risk event" because the latter is the real taking place of the danger, is perceived differently by the evaluator. This subjectivity is due to the individual risk appetite, interpretation of the scenario and the measurement tools utilized. When there is a danger there are several techniques to evaluate its likelihood and the possible outcomes; this is strictly connected with the contest in which it is placed because there are indefinite variables which affect the event that may be under the organization's control or endogenous. Hence, the risks that are not related to the natural events are susceptible to greater subjective evaluation. For example, looking inside the supply chain

and the quality of the service for the final client, there are several enterprise units involved, different cause-effect relation and their perception differs on the information the individual has and the analysis he performs.

In conclusion to the introduction, risk is inside of people day-life and they must take it to develop and achieve their goals. Every institution that successfully manages risks support the world's improvement; it is the reason why people must succeed in their evaluation so that they are able to reduce the possible negative outcomes and maximize the opportunities risks give them.

The next section explains which the risk management's shapes are, giving the essential information to understand, analyze and address risk to create the necessary framework thanks to which companies can exploit their potential.

1.2 - RISK MANAGEMENT

Risk management is a constantly evolving discipline that adapts to external and internal company's changes. To correctly approach this field of study, the paragraph will first define supply chain risk and then provide the guidelines for an effective analysis process.

1.2.1 - Supply Chain Risk Management Definition

Enterprise risk management and supply chain risk management differ in their meaning.

Adopting the explanation settled by Aberdeen Group, Enterprise Risk Management is *the process for effective identification, assessment, and management of all significant risks to an entity, but also larger operational and strategic risks. It refers to the people, tools, systems and structures that are part of a broader framework of Governance, Risk, and Compliance.*

Instead, supply chain risk management has not a standard definition yet. Its interconnected and evolving nature makes difficult to provide a general definition because it includes very dissimilar professional field with their own peculiarities.

The book "Supply chain risk management: an emerging discipline" (2015) takes as example different notions of SCRM meaning developed by different organizations. The National Institute for Standard and Technology identifies it as a multidisciplinary practice with many interconnected processes that, when perform correctly, will help departments and agencies manage the risk of using information technology products and services. MITRE, a company which provides engineering support to the US security government, defines it as the process

with which engineers can minimize the risk to systems and their components obtained from sources that are not trusted or identifiable as well as those that provide inferior material or parts. The one which suits the most with this thesis is the strategic and managerial interpretation: the implementation of strategies to manage everyday exceptional risks along the supply chain through continuous risk assessment with objective of reducing vulnerability and ensuring continuity.

1.2.2 - Supply Chain Risk Management Process

Supply chains are composed by different connected participants which are exposed to not predictable endogenous and exogenous influences of the entire chain (Guo, 2011). As suggested by Pfohl et al. (2010) the focus of the risk management must not limit itself to the singular company, but it must take into consideration all the suppliers because the effects may spread to all of them. To assess risks, one of the most recent set of standards created is the ISO 31000: 2009; it has been developed for the enterprise risk management but, given its generic approach, Lalonde and Boiral (2012) found its structured process a powerful toll for the supply chain risks understanding. For this reason, to complete the generic overview on the supply risk management, the thesis will cover also this topic.

ISO 31000 standards

The first standard process to manage risk was drafted by Joint Technical Committee and approved on behalf of the Council of Standards Australia on 21 July 2004. This systematic scheme for managing risk called Australian/New Zeland Standards 4360: 2004 has been lately adopted by ISO 31000: 2009 and it is formed as presented in Figure 1.

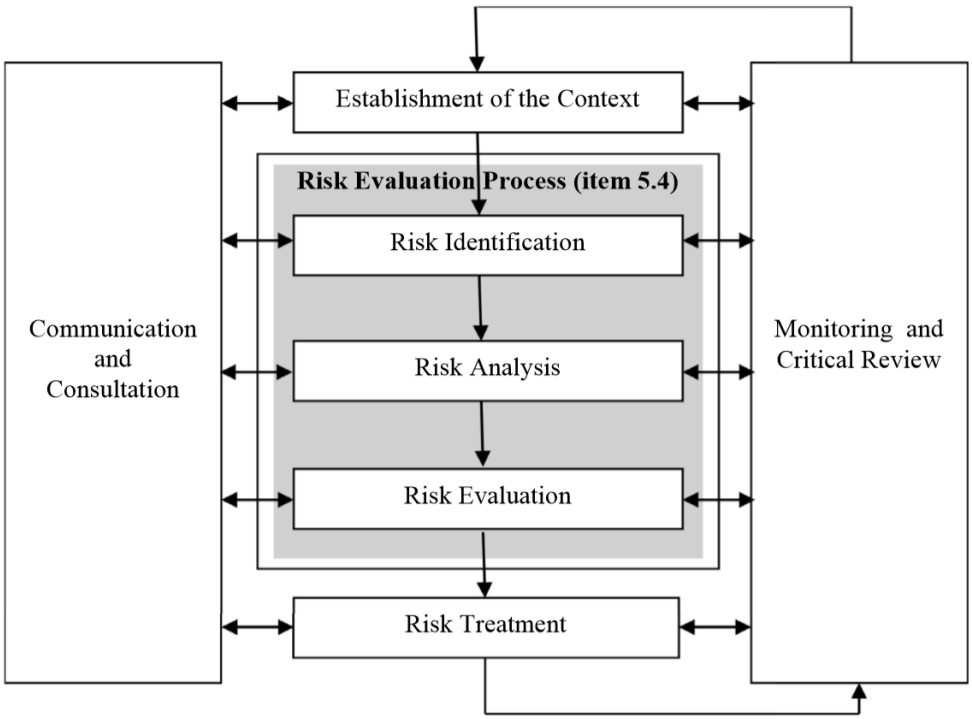


Figure 1.1. Risk Management Process.
Source: ISO 31000: 2009

Having a detailed look at the model there are these phases:

Communication and consultation

Communication and consultation inside and outside the organization is essential to mutually share information with the internal and external environment. It must be done to increase the awareness of the risks themselves and align all the stakeholders on the risk management process. For this reason, as shown in the figure 1.2.3, it is necessary in every step of the management procedure.

Establishment of the context

This is the first step of the risk management process and its purpose is to define what is going to be assessed. In this stage are analyzed the internal and external factors that affects the success in reaching the goals. To generate the right framework, it is necessary to communicate and consults all the stakeholders to take into consideration their objectives which apply at different levels such as strategic, project, product, process, organization, and they have several features

like financial, health and safety, environmental goals etc. (ISO guide 73: 2009). In this way, the manager can put in place risk criteria in their respect.

According to Harland et al. (2003), the increase of globalization and the complexity of the products make supply chains more intricate and subjected to disruptive events. To uncover, analyze and manage risks the author created a model shown in figure 2.

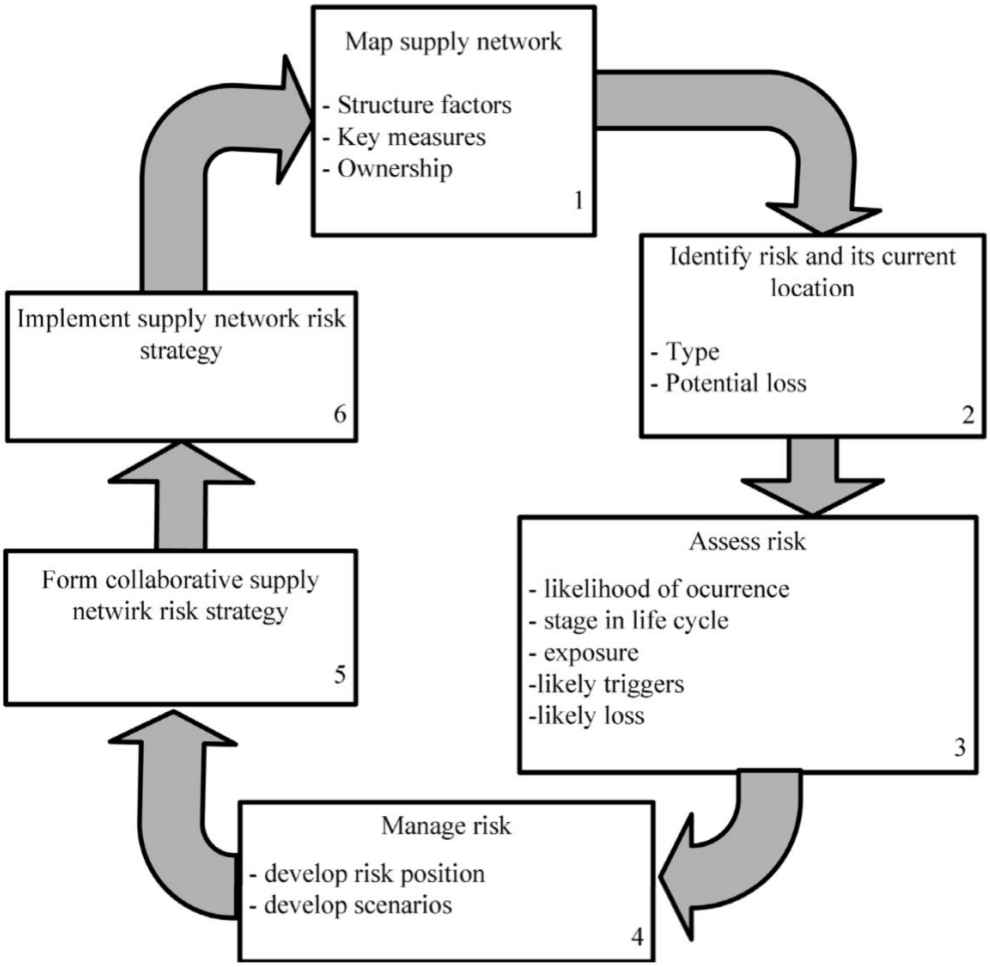


Figure 1.2. Supply chain risk management model.

Source: Harland et al. (2003)

This six step tools map the supply network, identifies risks, locates, evaluates and manages them as well as creating a roadmap to identify all the inputs to decide the treatment and to implement the supply chain strategy. Its structure presents several similarities to the one proposed by ISO 31000. For example, the establishment of the context (ISO 2009) could be associated to the first step “map supply network”.

Risk evaluation process

The evaluation process includes the risk identification, its analysis and finally its evaluation. This stage is to gather the right information about the menace with a structure pattern which lead to a complete description of it. Even if sometimes a simple explanation is enough, in many cases a comprehensive understanding is essential to complete the assessment process showing the not well-known risks too. Companies need to properly define the risks' consequences prioritizing them on quantitative, semi-quantitative or qualitive basis.

Risk identification

The identification is the methodical understanding of a threat answering the questions what, how, when and why.

An example of structured approach to the risk description is provided by the guide written by AIRMIC, IRM and Alarm shown in the figure 3.

Answering to all these questions provides to organizations possible scenarios and prevent missing the identification of the uncommon risks. This phase is crucial in the process because every risk that is not considered in this phase, it will not be taken into consideration afterwards. The manager must consider the control systems and those risks already treated as well because control systems are built to alter the consequences or the probability, but the danger is still latent.

1	Name or title of risk	• Unique identifier or risk index
2	Scope of risk	• Scope of risk and details of possible events, including description of the events, their size, type and number
3	Nature of risk	• Classification of risk, timescale of potential impact and description as hazard, opportunity or uncertainty
4	Stakeholders	• Stakeholders, both internal and external, and their expectations
5	Risk evaluation	• Likelihood and magnitude of event and possible impact or consequences should the risk materialise at current level
6	Loss experience	• Previous incidents and prior loss experience of events related to the risk
7	Risk tolerance, appetite or attitude	• Loss potential and anticipated financial impact of the risk • Target for control of risk and desired level of performance • Risk attitude, appetite, tolerance or limits for the risk
8	Risk response, treatment and controls	• Existing control mechanisms and activities • Level of confidence in existing controls • Procedures for monitoring and review of risk performance
9	Potential for risk improvement	• Potential for cost-effective risk improvement or modification • Recommendations and deadlines for implementation • Responsibility for implementing any improvements
10	Strategy and policy developments	• Responsibility for developing strategy related to the risk • Responsibility for auditing compliance with controls

Figure 1.3. Risk description.
Source: A structured approach to Enterprise Risk Management (ERM) and the requirements of ISO 31000, 2010.

Risk Analysis

In this examination the company develop the understanding about the risks. It provides the input data for the risk modelling and for the management which decides whether treat it or not.
This analysis makes considerations about the causes and the sources of the risk, the consequences and its likelihood. A singular event may affect in a several ways the organizational objectives, so the analysis is usually done on the consequences. The analysis must consider the actual control mechanisms of the company identifying their effectiveness and their possible gaps.

Risk Evaluation

The purpose of this phase is to support the manager on defining which risks must be treated and with which priority.
The evaluation compares the level of risk found by the risk analysis with the criteria initially set on the establishment of the context. Usually cost-benefit analysis is elaborated to verify if a treatment is valuable. The results of the assessment are affected by the tolerance to the risk and, when there are external parties involved, it must consider them too.

Risk Treatment

Treatments are those actions which modify the probability, the timing or the damages of the consequences. When companies When the company adopt treatments, they expand their controls.
Treatment approaches are various, and one classification is based on their primary risk objective. These are:

- Risk mitigation
- Risk avoidance
- Risk prevention
- Risk acceptance
- Risk sharing

Risk mitigation

Usually, people use the term risk mitigation thinking that it has the same meaning of risk management. According to the literal definition of mitigation, it is "lessen in force or intensity something". Applied to this context, the mitigation is the reduce of probability of a risk. However, in risk management and inside this thesis, the risk mitigation is the ability to respond to a risk, rather than preventing it. Many risks cannot be predicted and then prevented so it is a critical approach to face unknown events.

Risk avoidance

This approach consists on avoiding those activities which may bring risk inside the organization. For example, it can be the elimination of a determined product which is not profitable or the choice of changing a critical material or supplier because they are too dangerous. With this practice the organization strategically decides to dodge or remove the exposure.

Risk prevention

It is one of the preferred method inside the companies, even if they are usually not enough prepared for that. Prevention is the process to adopt measures which limit or counter the risk event. This approach is used for known risk and it is preferable to the risk avoidance because the company will not renounce to do an action just because of the risk connected.

Even if most of the companies would like to prevent all the risk they face, in practice it is impossible. There are risks such as hazard ones that the company cannot anticipate so the organization must act after the risk event. For this reason, managers should combine risk prevention activities with responsiveness plans to increase the company resiliency. Resiliency is firm's aptitude to recover from a risk event and supply chain managers must adopt a combination of preventive activities and risk mitigation quickness to face respectively known and unknown risks.

Risk acceptance

This approach consists on taking the risk without managing it. It may happen when a company does a cost-benefit analysis of the risk and sees that its prevention is more expensive than the loss they could suffer. Another reason which can support this practice of non-taking any counter measure is the low interest of the company in the risk management for the supply chain or other units. Finally, the last cause which may lead the enterprise to this approach is the lack of effective risk mitigation, risk prevention or risk sharing activities, so the company has just to embrace it.

Risk sharing

According to ISO guide 73:2009, it is a process to modify risk involving the agreed distribution of danger with other parties. This risk treatment is designed to maximize the likelihood of positive outcomes with the use of collaboration through the shifting or absorption of the risk to from a party to another. Risk sharing is usually performed via contracts with suppliers or insurance companies to distribute among them the potential cost. This approach can be used for those risks that fall across different parties such as in foreign currency transactions where the exchange rate must be managed to hedge the variation of the cost of raw material. However, it is crucial to highlight that when a company share the risk, it does not mean that the company is shifting its responsibility. If there are accidents which were transferred to the subcontractor, the company will be seen still responsible: it means that not all risks can totally be transferred and that the shifting of a risk may rise other ones.

Richard Wilding, full professor and chair in Supply Chain Risk Management at Cranfield School of Management, UK, stated that Supply Chain risk is diminished principally thanks to collaborative relationships. When a company starts to collaborate, it obtains information about the other parties and understand them, finding that risks are not a singular company issues even if there are effects inside it: they are a common problem among the supply chain. Hence, the quality of the relationship is important to overcame specific critical points which may menace the entire system, not only the intra-firm productivity. The problem which rises from the network is the time that is needed to build effective relationships. Companies which want to achieve a relevant hedge of the risk must invest in specific instruments such as transparency to build trust and collaboration among the networking, so once a risk occurs the global system can react faster than the singular firm.

Monitoring and critical review

The monitoring and review phase is a set of periodical o ad hoc actions to verify the whole risk management process. They are done to capture the existence of new threats, changes in the external or internal environment and gather new information helpful for implementing the analysis. In some cases, this phase does not identify any new risk, but it finds that the control systems need to be implemented because they are antiquated and not as effective as they could be.

The next figure 4 proposed by Oliveira et al. (2017) harmonizes the ISO 31000: 2009 with the main articles regarding Supply Chain Risk Management, creating a roadmap in which there are the main steps used by SCRM scholars. They have proved that ISO 31000 suits to the supply chain risk management, even if every structured process has an intrinsic limit on identifying all the risk requirements of the company. This is due to every organization operates in different contests with different needs, so it is not feasible generating all the right questions to reveal the risks with just one model. This issue opens several possibilities to the risk managers on improving their existing models with other studies which may reveal unknown risks.

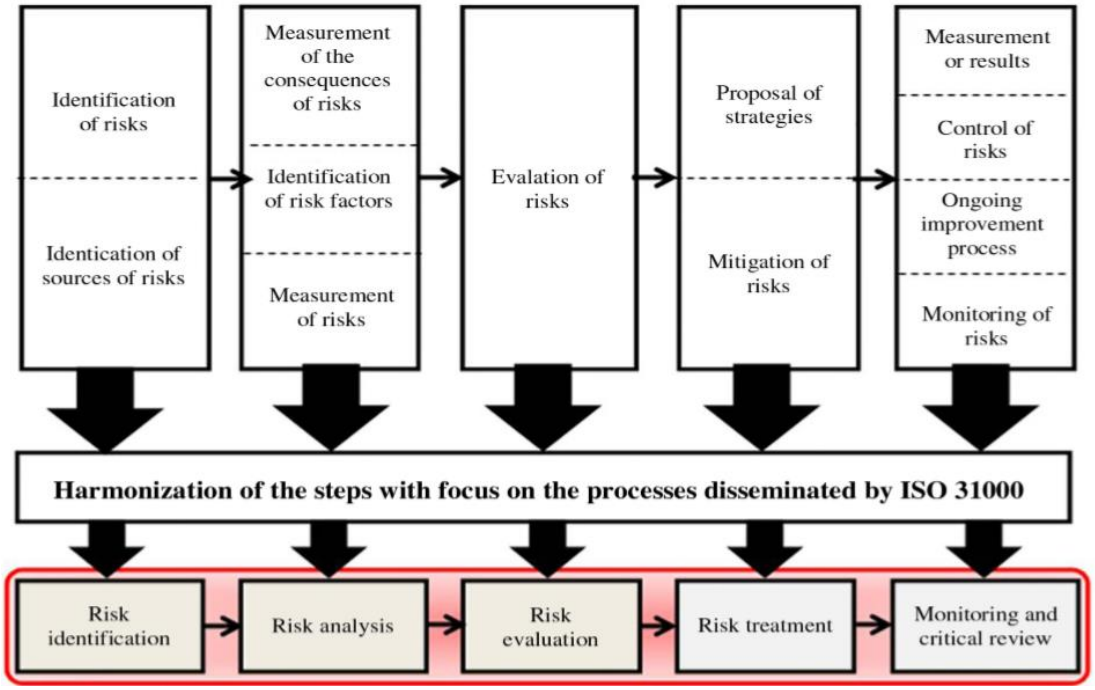


Figure 1.4. Harmonized Risk Management Process.
Source: Oliveira et al. (2017).

1.3 - SUPPLY CHAIN RISK CATEGORIES

When a company is examined in the context of the supply chain, there are five categories which drive risks. As shown in the Figure 5, a possible classification is:

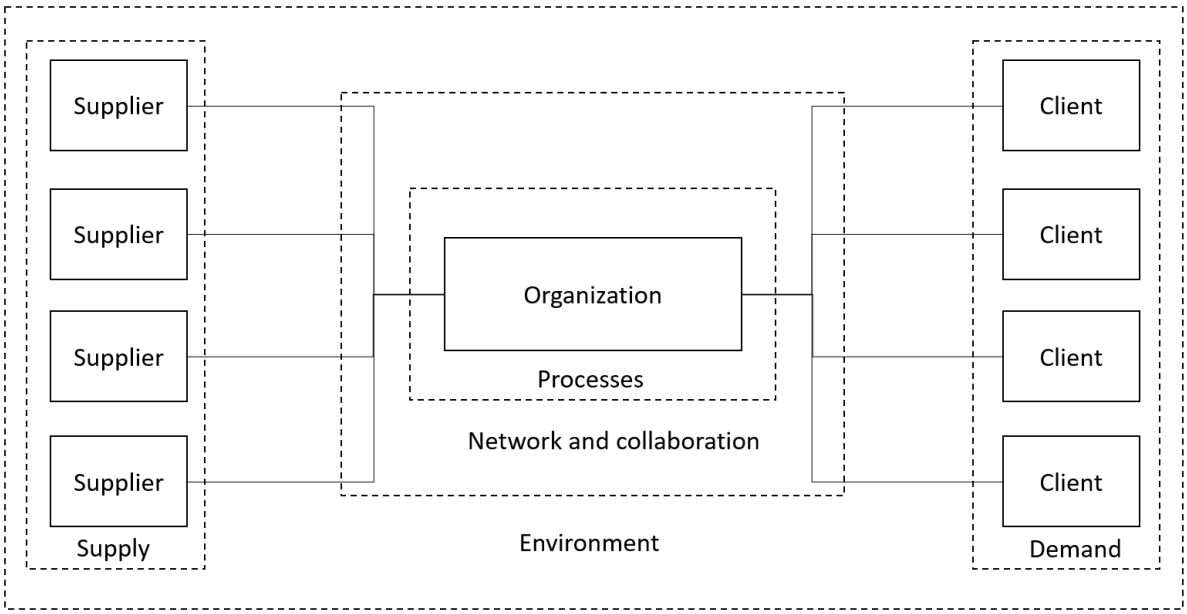


Figure 1.5. Risk drivers in supply chain.

Source: Author.

The first distinction that the chart shows is the type of the risk: external or internal.
External risks are driven by clients, suppliers or the environment. Instead, internal ones are related to process one.
Another distinction could be based on the management horizon of the risks where there are the strategic, tactical and operational risks (Schmidt and Wilhelm, 1999). Strategic decisions determine the network thanks to the processes serve the market; operational decisions are taken to react fast within 45 days, instead the tactical ones have a medium time horizon effect from 1 to 18 months. In the following tables taken by the book "Supply chain risk management: an emerging discipline (2015)" will be considered just the tactical and operational horizons.

The classic literature finds five main risks' categories:

1.3.1 - Demand Risk

Predicting the demand to make it matches with supply is ideal in business but also very difficult to achieve. A weak forecast of customer demand leads to uncovered orders, so a miss of potential revenues, or to over-commitment of inventory which reduce the return on assets of the company. In many businesses such as the fashion ones its management represents a key driver for the competitiveness and the company financial performance. It is directly linked to the uncertainty of customer and end-customer demand. Demand risk is usually driven by

- Customization: very customized product may be a point for the business success thanks to the product shaping on the customer needs, but it has also the drawback of slow inventory turnover and then capital turnover.
- Communication: Forecasting activities are based on the information gathered from the external environment and when the communication is poor or not effective, it may mislead the predicted demand increasing the risk.
- Demand volatility: it generates demand's overestimation or underestimation scenarios. In the case of underestimating the demand increases the risk of loss of scale economies and customer satisfaction because the company will not deliver all the potential orders. On the other case, when there is an overestimation, the company invests too much in products and raw material limiting the achievement of other opportunities and reducing the profitability of the company.

Few factors that influences demand risk which are summarized in the following table.

Demand Risks

Demand Risk	Cause	Horizons	Traditional Remedies
Forecast error	Seasonal issues, lead times, poor information, inadequate systems, poor communications, inadequate skills	Both	Statistically derived safety stock, buffer stock points, excess inventory throughout supply chain
Time delays	Customer changes, systems issues, product issues	Both	Rescheduling, price concessions
Outbound transit times	Carrier issues, acts of God, customers' issues	Both	Carrier discussions, customs calls, freight forwarding follow-ups
Customer pricing	Poor communication, inadequate contract verbiage, poor performance	Operational	Concessions, Rescheduling deliveries
Customer promotions	Poor communications, poor execution on both sides	Operational	Constant conference calls, rescheduling manufacturing and deliveries, stealing product form other customers
Customer bankruptcy	Poor execution, fraud, corruption, sell out by owner	Both	Possible loans, possible merger or partnership
Product failure	Poor quality control, material issues, incorrect specifications	Both	Rescheduling, modifying the specifications, price concessions
Warranty issues	Poor communications, poor specification management, recall of product, death and more	Both	Law suites, litigation, government involvement, fines and penalties
Customer loss	All of the above issues and more	Both	Sell off material designated for customer, write off if specific and scan for new customers
New product introduction	Poor planning, poor communication throughout organization, poor execution, poor assumptions	Both	Ad hoc meetings, excessive overtime, price modifications, new promotions, rescheduling of manufacturing plans
Fraud and corruption	Poor government oversight	Both	Fines, penalties, and operating restrictions

Table 1.1. Demand risks.

Source: Supply chain risk management: an emerging discipline, 2015.

1.3.2 - Supply Risk

It is the interruption of inbound flows of any type of resource that limit the fulfillment of the operational process (Harland et al., 2003). Supply risk is seen also as a multidimensional concept that takes into consideration sources and consequences; so, it is the likelihood of a failure of the inbound process from singular supplier, but it is also the consequently failure in satisfying the demand or the inability to provide a safe product or service (Zsdisin, 2003). Bearing in mind the consequences, managers will be able to define risks deriving from tier 2 and tier 3 suppliers because a shortage of strategic raw materials for these suppliers have a direct impact on the purchaser with a compounding effect.

An example of the typical risks that a company may find in the day-by-day operations are presented in the following table.

Supply Risks

Supply Risk	Cause	Horizons	Traditional Remedies
Supplier lead times	Material/capacity issues	Both	Buffer stock, larger order quantities
Supplier quality	Manufacturing processes	Both	Contract verbiage, penalty clauses, inbound inspection
Transportation lead time	Breakdowns, acts of God, customs issues	Both	Contract verbiage, penalty clauses
Subcontractor availability	Initial source can't deliver	Both	Contracts for potential capacity reservation
Supplier pricing	Performance issues, contract changes, breach of contract	Tactical	Due diligence, phone-fax, and possible visits
Time delay	Customs, lack of performance	Both	Buffer stock, rescheduling final delivery
Disruption	Labor issues, natural disasters, terror	Both	Buffer stock, safety stock, second source capacity
Import delays	Customs paperwork, port strikes, labor issues	Both	Additional freight forward companies, calls to government contacts
Supplier insolvency	Poor management, acts of God, force majeure	Both	Loans, law suites, litigation, and second sourcing
Fraud/ corruption	Poor government oversight	Both	Fines, penalties, and operating restrictions
Counterfeit material	Poor government oversight	Both	Fines, penalties, and operating restrictions
Supplier delivery	Manufacturing issues, quality issues, customer requirement changes	Both	Buffer stock, warehouse inventory, second source

Table 1.2. Supply risks.

Source: Supply chain risk management: an emerging discipline, 2015.

1.3.3 - Environmental Risk

With the globalization of the market, environmental risks grow exponentially because companies are subjected to external pressure to which they are not prepared to. Taking as example a company that operates in a foreign country, where it has never been before, the probability to not understand regulations, foreign cultures or the political environment is greater than inside the local market. Environmental risks may be political, economic, social, technological and legislative even if one important distinction should be done between the known risks and the unknown ones because of their different treatments. Known risks such as the economical and legislative ones can be treated with hedging techniques or with experts that can prepare themselves to the regulatory context the company is going to face. The unknown risks, such as geopolitical, natural disasters, competition or counterfeiting products, test the responsiveness of the company to these events.
The next table summarizes the environmental risks.

Environment/Ecosystem Risks

Environment/ Ecosystem Risk	Cause	Horizons	Traditional Remedies
Currency exchange rates	Central banks, country issues, conflicts	Both	Use of financial hedging techniques
Political environment	Conflicts, political upheaval	Both	Calls with country officials, tapping own government contacts
Customs regulations	Improper paperwork, poorly packaged material, terror	Both	Use of 3rd party logistics partners, conversations with customs, enhanced paperwork
Weather/acts of God	Floods, tornados, hurricanes, fires, volcanoes, war	Both	Disaster insurance
Environmental regulations	Lack of discipline, failure of audit, poor management and diligence	Both	Excessive overtime for remedial compliance
Industry regulations	Same as above	Both	Same as above
Country regulations	Same as above	Both	Same as above
Fraud/ corruption	Country policies or lack-thereof, suspect partners, misrepresentation by 3rd party contractors	Both	Fines, penalties, shutdowns and remedial policy enhancements, including discharge
Counterfeiting	Same as above	Both	Same as above, including alternative sourcing and partnerships
Competition	Lack of focus, poor company communication, poor product introduction process, poor execution	Both	Price reductions, marketing promotions, customer visits, enhanced product portfolio and extended warranties

Table 1.3. Environment risks.

Source: Supply chain risk management: an emerging discipline, 2015.

1.3.4 - Process Risk

It is the group that gather all the risks inside the organization. Process risks are under the direct control of the company and the usual distinction of them is between three main categories:

- Known risks: they are also called hard risks and the manager disposes of satisfactory information to take decisions about it. Its evaluation is based on reliable measures but, even if there are these conditions, often the effect is uncertain due to the variability of

the information. Their treatment must be done with permanent solutions because the company is daily subjected to these risks and they can become chronic generating as many negative output than the unknown ones.

- Unknown risks: they are called soft risks and they are more difficult to evaluate than the known ones because usually the risk factor is not determined or very complicated to assess. These risks need more risk analysis than the others because most of the information are not available. The typical treatments to these risks, as it is shown in the table 4, are reactive because of the uncertainty which characterize them.
- Chronic risks: they are low impact disruptions that affect continuously the performance of the company. The small disruptions generated can lead the company to tolerate them instead of managing them. Examples of chronic risks are human mistakes, time delays or capacity issues.

Process Risks

Process Risk	Cause	Horizons	Traditional Remedies
Manufacturing yield	Equipment failure, material issues, human error	Operational	Reschedule run, cut into existing capacity plan
Capacity	Equipment failure, poor performance, poor communications, poor planning	Both	Reschedule runs, reschedule deliveries, possible use of contractors
Information delays	Poor planning, inadequate systems, outages	Both	Backup systems, ad hoc meetings, extreme overtime
Time delays	All of the above and below	Both	Ad hoc meetings and excessive overtime
Disruption	Labor issues, systems, material, inbound material, natural disaster or act of God	Both	Ad hoc meetings and excessive overtime
Systems	Outages, terror, hackers, internal errors	Both	Backup systems, ad hoc meetings, vendor outreach and excessive overtime
Receivables	Poor execution, poor contract verbiage, poor relationships, customer financial issues	Both	Phone calls, e-mails, faxes, visits and possible collection agencies
Payables	Cash flow issues in-house, cash flow strategy, poor relationships with suppliers, poor supplier performance	Both	Phone calls, e-mails, visits and possible contract renegotiations
Inventory	Forecast error, product life cycles, poor planning systems, poor supply chain management execution	Both	Excessive safety stock, write-downs and write-offs
Intellectual property	Outsourcing, contractors, partnerships, and espionage	Both	Vertical integration, contract verbiage, fines and penalties

continued

Process Risks

Process Risk	Cause	Horizons	Traditional Remedies
Human/ process error	Operator issues, fraud, corruption, systems breach	Both	Process revalidation, employee reeducation, law suites/or discharge
Planning	Inadequate systems, inadequate training, poor supervision, poor management style	Both	Systems upgrades, reeducation, additional collaboration, and metrics of success
Product failure	Poor material, poor quality control, poor communication, poor management oversight	Both	Enhance communications, customer visits, supplier visits, contract renegotiations
Equipment failure	Poor maintenance schedules, operator error, material issues, component failure	Both	Perform assessment, revalidation of alternative equipment/routings, vendor visits in-house
Organizational management	Poor performance, poor communication, inadequate measurements, fraud	Both	Ad hoc meetings, assessment of skill sets and possibly enhancement of roles, goals and measurements
Strategy	Poor planning, poor execution, poor communication, competition	Both	Same as above with possible change in strategy

Table 1.4. Process risks.

Source: Supply chain risk management: an emerging discipline, 2015.

Grisi (2010) inserted another group to the classic categorization called networks and collaboration risks. These risks are linked to the collaboration with others and they are related to the confidence and interdependence between partners, the level of collaboration, the design and development of relationships, the degree of integration between them, the service level, the opportunism and asymmetry of the information in the transactions, the individual contractual power, their strategic objectives, their corporate cultures, the business logic, the report and involvement of stakeholders, reliability of information and intellectual property.

Another classification of the supply chain risks could be among four quadrants: hazard risk, operational risk, financial risk and strategic risk (The Institutes Risk and Insurance Knowledge Group). The first two quadrants are considered pure risks, so are risks that contain only the possibility of loss; the latter 2 quadrants are speculative risks and they incorporate also the possibility of gain. The distinction between speculative and pure risks is important to identify the correct countermeasures; for example, pure risks are the only ones that can be covered with insurances.

The following picture taken from the didactical material of The Institutes Risk and Insurance Knowledge Group shows this just explained classification.

Figure 1.6. Risk classification, the four quadrants.

Source: The Institutes Risk and Insurance Knowledge Group

This categorization does not include all the risks that the company faces and there may be an overlap between the quadrants for some risks.

1.3.5 - Hazard Risk

Inside the supply chain, hazard risks refer to unpredictable events which include liability torts, property damages and natural disasters. As shown in picture, traditionally, this class includes credit, political, property, trade disruption and logistics risks. These risks are usually treated with insurances and observing the figure7, the market manages each risk with a determined

coverage after an event that activate the insurance. However, new risks are emerging, and companies must identify them. One upcoming risk that is inside this quadrant is the cyber risk; many companies rely on IT systems to process information, orders or coordinate and perform internal procedures, so when a company receive an attack or for any other reason its IT system has a blackout, the firm and the entire supply chain is damaged. To treat it the insurance market is developing cyber insurance products that will mitigate the loss. Cyber risk falls inside the operational quadrant as well because the risk derives from a failure of the IT and control systems.

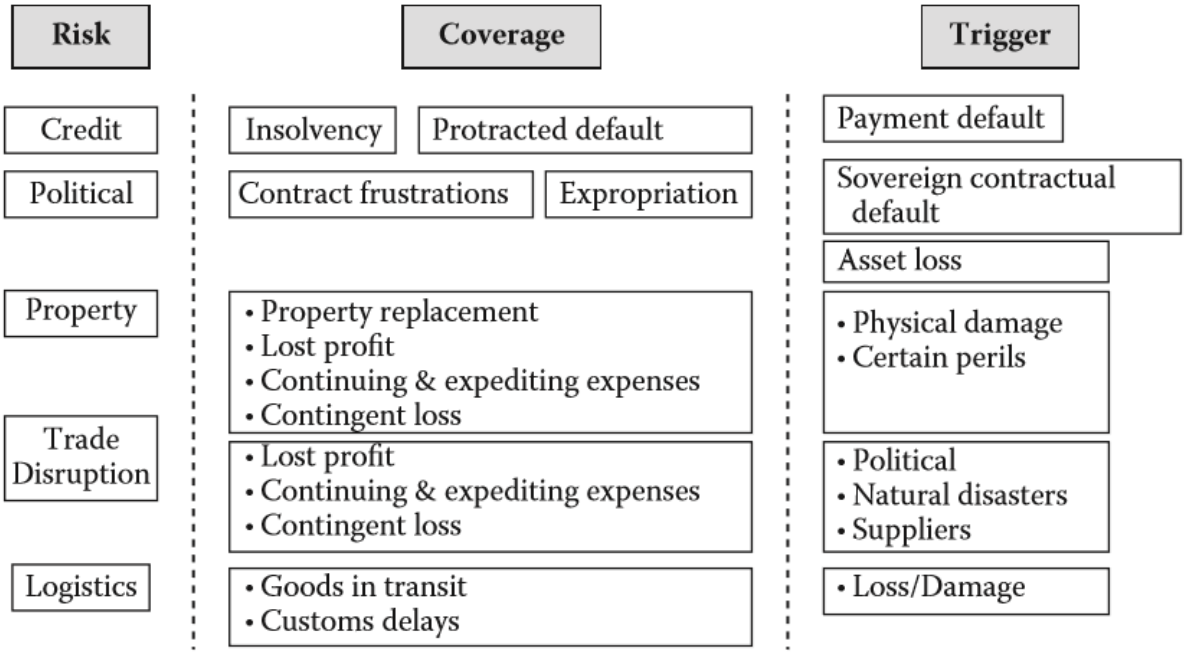


Figure 1.7. Hazard risks.

Source: Eric Wieczorek, MAPI, 2013.

1.3.6 - Operational Risk

Operational risks are the uncertainty deriving from the coordination of the demand flows with the supply ones. In detail, it is the outcome of poor processes, employees and systems (Bhattacharyya et al. 2010). They can rise from the supply, from the demand or from the internal processes (Germain, 2008). These risks which have already been discussed and they can have direct or indirect effect due to bad managed or bad organized operation. Operational risks remedies are briefly explained in the tables 1, 2, 3, 4.

1.3.7 - Financial Risk

Every supply chain event has, someway, an impact at the financial level. To analyze only the relevant effect will be taken into consideration only those events that affect directly the balance sheet. The main analyses are gathered in the financial assessment of clients and suppliers to identify if they are healthy and do not menace the organization, and in the volatility of the supply market because changing in raw materials or commodities price will affect the profitability of the business.

The analysis of the suppliers is mainly done via ratios on the financial performance because they can easily be compared with the industry and they can perceive trends. The ratios that are commonly used are liquidity ratio, activity ratio and leverage ratio. The following table lists some of them.

Liquidity	**Preferred Direction:**
• Current ratio: current assets – current liabilities	Higher
• Quick ratio: (current assets – inventories)/current liabilities	Higher
• Cash ratio: cash/current liabilities	Higher
Activity	
• Asset turnover: sales/total assets	Higher
• Current asset turnover: sales/current assets	Higher
• Inventory turnover: sales/inventory	Higher
• Inventory days outstanding: 365/inventory turnover	Lower
Leverage	
• Debt to equity: total liabilities/equity	Lower
• Current debt to equity: current liabilities/equity	Lower
• Interest coverage: earnings before interest and tax/interest	Higher
Profitability	
• Net margin: net income/sales	Higher
• Gross margin: (sales – cost of goods sold)/sales	Higher
• Operating margin: operating income/sales	Higher
• Return on assets: net income/total assets	Higher
• Return on equity: net income/equity	Higher

Table 1.5. Suppliers' health financial ratios.

Source: Supply chain risk management: an emerging discipline, 2015.

Another useful indicator that has increase its adoption is the Z-score ratio. It is a precise (short-term) predictor of the bankruptcy that needs only the information of the balance sheet. This tool is based on other ratios and it should be used at least quarterly by supply chain manager. The ratio is built in this way:

Private Company

$$\text{Z-Score} = 6.56 \times \frac{\text{Working Capital}}{\text{Total Assets}} + 3.36 \times \frac{\text{Retained Earnings}}{\text{Total Assets}} + 6.72 \times \frac{\text{EBIT}}{\text{Total Assets}} + 1.05 \times \frac{\text{Net Worth}}{\text{Total Liability}}$$

EBIT	Earnings before interest and taxes

where:

Z-Score < 1.1	Red Zone—Supplier is financially at risk
Z-Score between 1.1 and 2.6	Yellow Zone—Some area of financial concern
Z-Score > 2.6	Green Zone—Supplier is financially sound

Public Company

$$\text{Z-Score} = 1.2 \times \frac{\text{Working Capital}}{\text{Total Assets}} + 1.4 \times \frac{\text{Retained Earnings}}{\text{Total Assets}} + 3.3 \times \frac{\text{EBIT}}{\text{Total Assets}} + 0.6 \times \frac{\text{Net Worth}}{\text{Total Liability}} + 1.9 \times \frac{\text{Net Sales}}{\text{Total Assets}}$$

EBIT	Earnings before interest and taxes

where:

Z-Score < 1.8	Red Zone—Supplier is financially at risk
Z-Score between 1.8 and 3.0	Yellow Zone—Some area of financial concern
Z-Score > 3.0	Green Zone—Supplier is financially sound

Figure 1.8. Z-score calculation.

Source: Supply chain risk management: an emerging discipline, 2015.

Manager should include to these evaluation also qualitative criteria. These evaluations are difficult to do because often information is not available or unreliable. However, sometimes the qualitative information that a company collect can be check with its own information. For example, suppliers can be evaluated on the respect of the lead time agreed where if a company is shipping late it is possible that it has issues in its buy side, or if the supplier is delivering early he can lack of business. Other indicators are the quality of the product supplied, rumors, promotion and discount accordance or a reduction in CAPEX. The company must analyze clients too. Their ability to pay and their financial health is as important as the supplier one and the analysis method should be almost the same.

The second key financial risk is due to price volatility. When a company forecast and budget a certain cost and there is a rise on the price due to exchange currency fluctuations or a rise of the commodity price, the company incur in a financial damage.
The main tools to keep the company safe from these fluctuations are the hedging instruments such as future exchange contracts, forward exchange contracts, or future options. These instruments are called hedging tools only when they are used to preserve value and not gaining from them. The other way to manage currency fluctuations may be purchasing in local currency, adding clauses to share the burden of the currency risk if it falls out the agreed range or using other clauses that terminate the agreement when there is a considerable change in the exchange rate.

1.3.8 - Strategic Risk

They are the risks that have the most significant impact on the company's capacity to achieve its objectives and to generate or protect value (Frigo, Mark, and Anderson, 2005).
As suggested by Slywotzky and Drzik (2005), supply chain strategic risk management is essential to companies to protect stability and assure a sustainable growth. They identified seven components for analyzing this risk: industry, technology, brand, competitor, customer, project and stagnation.

- Industry: inside this class identify the risks from the decrease of margins inside an industry. Examples of this danger are the regulation changes or the elimination of barriers at the entrance which increase competition, or it could be due to a decrease of returns from new capital investments inside the industry. All these elements are risks that usually, when the industry is very profitable are not taken into consideration;

however, when it changes, one of the most effective countermeasure is collaboration. This remedy takes many shapes for instance activities like coproduction, coordination in the buy side among companies, joint product development.

- Technology: It represents two major risks, obsolescence and lost of patent protection. These risks create enormous damages to companies and they are very difficult to predict so one way to manage it is the double betting. This method consists in a short-term investment in both the technologies, so once one fails the company will not be cut out the market.
- Brand erosion: it is another risk that generates high value destruction. The factors that influence it can be unpredictable and extremely quick in damaging the image of the company, other times it could be a slow erosion due to lack of investments. The treatments for situations of brand erosion are redefining the scope of brand investment, or a reallocation of brand investments to intervening on the primary sign of danger recognized via persistent monitoring of the brand dimensions. Inside the supply chain the brand reputation can be threatened also by the suppliers hence there should be a great control over the reputation over the global supply chain.
- Customer: Most of the risks are about clients that change companies, or they are about variations on their preferences. These could happen suddenly or progressively and undetectably. The riskiness of these changes depends on the speed extensiveness and penetration. To face these issues companies should analysis information about their clients or doing fast and cheap experimentation to offer their clients the right product. On the new product development process, the supply chain must be a proactive player for the company intelligence to understand suppliers' and competitors' actions or macroeconomic factors.
- New project failure: when a company starts a new project such as a new product development there are several aspects that cannot work; there could be technical issues, minor sales respect to the forecasting, competitors' countermoves or slow in the trends of the market. The methods that companies can adopt to prevent the failure of new projects are the smart sequencing (starting the most manageable and know project), the development of excess options and the employment of the stepping stone method.
- Market stagnation: It is the lack of capacity of a company to identify new sources of growth or conversely when the prices fall reducing the company profitability. The solution to the growth issues is the creation of demand innovation.

Another interpretation of strategic risks, reported by Grisi (2010) but firstly identified by Jensen and Mekling (1976), is based on the fact that supply chains are based on the mutual share of collaborations to increase the total value of the global supply chain and obtain more than a singular element could have done. Inside this context, risks are generated when different firms inside the global supply chain have different goals and they try to maximize their own profit. This condition creates risks that the company would have not faced otherwise. Strategic risks are not the consequence of environmental uncertainty, but it is the danger of strategic behavior of the components inside the supply chain which can harm the others. This is also called agency problem and it affect the company in two ways: moral hazard and adverse selection. These problems will be treated in the second chapter.

Another possible framework to determine risks is proposed by Manuj and Mentzer (2008) which divides risks in two main groups: those that block the inbound and outbound processes and those that influence the whole structure. The first group is synthetized by supply, operating, demand and IT risks, the latter is composed by macroeconomic, political, strategic and resource risks.

CONCLUSIONS

Risk is associated with uncertainty and it has a direct impact on the future outcomes.
All companies are subjected to these risks, no matter the size or the geographical location, because every organization is in an uncertain environment. For this reason, companies should understand their organization and figure out how to bring transparency on the organization of the supply chain; this help to visualize the future problems and critical events in advance having already prepared the contingency plan. Another process that company should implement is the monitoring system to link the supply chain organization to the events that are surrounding it and then to identify the possible disruptive ones. Finally, the company must be proactive to address the risk to the right unit and to adopt the right solution.
Having full transparency, identifying the disruptive events and react to them is extremely difficult and it needs an incredible amount of information; however, if a company can answer quickly than the competitors to the environmental pressures, it will gain a great competitive advantage.

CHAPTER TWO – RISK SHARING AND THE AGENCY THEORY PROBLEM

INTRODUCTION

This chapter proposes a model to analyze the risk shared between the purchaser and supplier giving some insights on how to strategically manage the risk sharing treatment.

The chapter starts with the review of few organizational theories that set the basic framework to analyze the relationships. After this general examination there will be the explanation of the model that identifies the drivers of the risk sharing practices to set the basis for the empirical evaluation in the third chapter.

2.1 - AGENCY THEORY REVIEW

Jensen and Mekling (1976) defines the agency contract as a relation where a person (principal) forces another individual (agent) to perform a duty on his behalf and interest, assuring the latter a reward. Looking at their construction the agency problem has three main characteristics: the existence of a contract, the obligation to complete a task, the allocation of authority to the agent. The agency theory studies the issues originated by the agency contracts since there clearly are asymmetries on the information available to the principal and the agent; the party that fulfills the duty has more knowledge on the task assigned and the productivity that he can achieve.

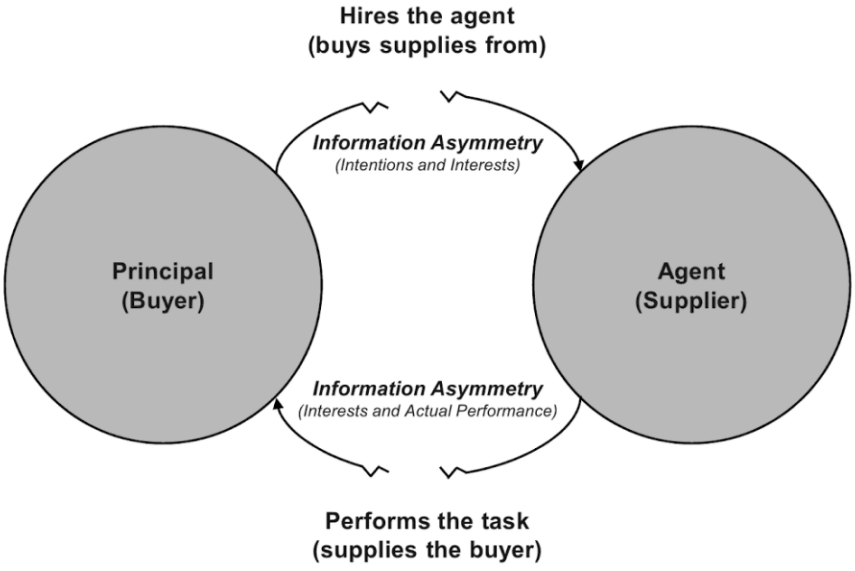


Figure 2.1. Agency theory actors in supply relationships.

Source: Analyzing the effect of sustainability on supply chain relationships, Brockaus, 2013.

The mismatch of information between the parties leads to opportunistic behaviors because the agent will take advantage of its superior, direct information. This behavioral aspect generates the so called:

- *Adverse selection*, where the agent hides relevant information to the principal before the contractual agreement.
- *Moral Hazard*, which describes the agent's decision to change his actions to behave on respect to his self-interest and to maximize his utility function instead of the principal's.

The theory has been widely applied to analyze real world economic situations and supply relationships are not an exception. As a consequence, a deeper understanding of interfirm relationships and the opportunistic behavior parties are subjected to is necessary given its critical point for firms' risk management.

As previously mentioned, one of the two problems determined by the agency theory is the adverse selection which in the supply chain management occurs before entering the agreement. Between the supplier and the buyer there are various latent information of which a party may take advantage; it could happen when the purchaser screens the market and he has partial information on the supplier financial or operational capability to fulfill the contractual expectations or symmetrically when the purchaser hides information on the final demand. The uncertainty on the buyer or supplier performances generates the adverse selection problem (Akerlof, 1970).

When the adverse selection problem is relevant, the principal opts for less cooperative, short-term contracts. It is due to the fact that lower quality agents will find the continuous renegotiation and assessment by the principal costly (Costello, 2013). Besides, the principal can gather more information and adjust the supply relationships with the subcontractor results.

The second issue, which is specifically treated in the next model, is the moral hazard. The moral hazard issue implies that a determined quality cannot be observed by the principal, so the agent can take advantage of it. Moral hazard is a consequence of the structure of the controls and the alignment of the interest between the actors. Additionally, it is influenced by the technological capability of the supplier, the joint cost reduction initiatives (Chemedikian, 2007) and safeguards such as specific investments (Dyer, 1997).

Jensen and Meckling states that these kind of relationships have relevant costs on the parties. The main expenses are:

- Monitoring costs on the side of the principal;
- Bonding costs on the side of the agent;
- Residual loss.

Monitoring costs are those expenditures that the purchaser must pay to assure control over the agent operations. Some example of these costs are the wages of the employees working for monitoring contractors' performances, procurement employees or integrated IT information systems. Bonding costs are those expenses that the agent bears to assure that he is acting on the principal interest. Instead the residual loss is due to the lack of alignment of the interests of the two actors.

2.1.1 - An Integration Of The Agency Theory With Trust

The agency theory finds trust variables exogenously determined and they are assumed with a very low level. This thesis considers it an oversimplification, so the paper will test whether trust variables have an impact on the level of risk shared between the actors. The idea behind this hypothesis is that trust is indispensable when suppliers make specific investments or when companies operate in uncertainty conditions (Dyer and Chu, 2000). When the purchaser makes the supplier buying a new infrastructure to satisfy the increasing demand or, in the case of the luxury industry, to produce unique products, there is the risk that after the investment the principal may take advantages renegotiating the previous agreement. Or, on the contrary, the supplier may hide information to the principal making the transaction costs more expensive than they could be.

It is needed to highlight that trust is an individual concept and it is not theoretically extendable to the organizational level. However, even if trust is not directly an attribute connected to firms, individuals inside an organization may share a trust orientation to an alternative group (Zaheer et al, 1998). On this line, the thesis considers trust as a collective characteristic and the meaning that best suits the analysis is going to be explained, has been given by Ring and Van de Ven in 1994: trust is one party's confidence in the goodwill of an exchange partner so that it will not take advantages of any vulnerability. Extending this notion with the elements stated by Mayer (1995), a company is considered trustworthy when it is:

- reliable, so it acts with good faith to accomplish the agreements;

- fair because, when there are unpredicted changes, it corrects its actions to be perceived reasonable by the other actor;
- benevolent because it will not excessively exploit the vulnerabilities of the relationship even if it will have the chance.

Considering that trust is a multilevel concept and surely more complex frameworks explain the phenomenon more accurately, this notion sets the right basis to understand the drivers of trustworthiness of an organization. The reason of the choice of this definition is due to the coherence with the following model that analyzes the relationships at an aggregate level. To have consistency in the model, the definition of trust must set the guideline to analyze trustworthiness, which is no more the notion of the singular relationship, but it is an organizational attribute.

Based on the study of Dyer and Chu (2000), trustworthiness and transaction costs are negatively related. As shown by the following figure, profitability increases with the level of trustworthiness between the parties and it is mainly connected to:

- lower companies' investment in contracting and monitoring activities. Benevolent parties spend less resources in building comprehensive contracts and in guaranteeing its compliance. Besides, negotiations are more likely speeded up by highly flexibility given by the expectation that favors may be reciprocal and rewarded in the future (Dore, 1983).
- a post contracting positive effect on the spirit through which companies negotiate over not forecasted issues because they believe that they will be treated with fairness.
- lower information asymmetry due to the fact that there is the confidence that the other party will not act opportunistically. Also, in supply chain systems, a higher degree of information shared increases problem-solving processes instead of the exit practices (Helper, 1991).

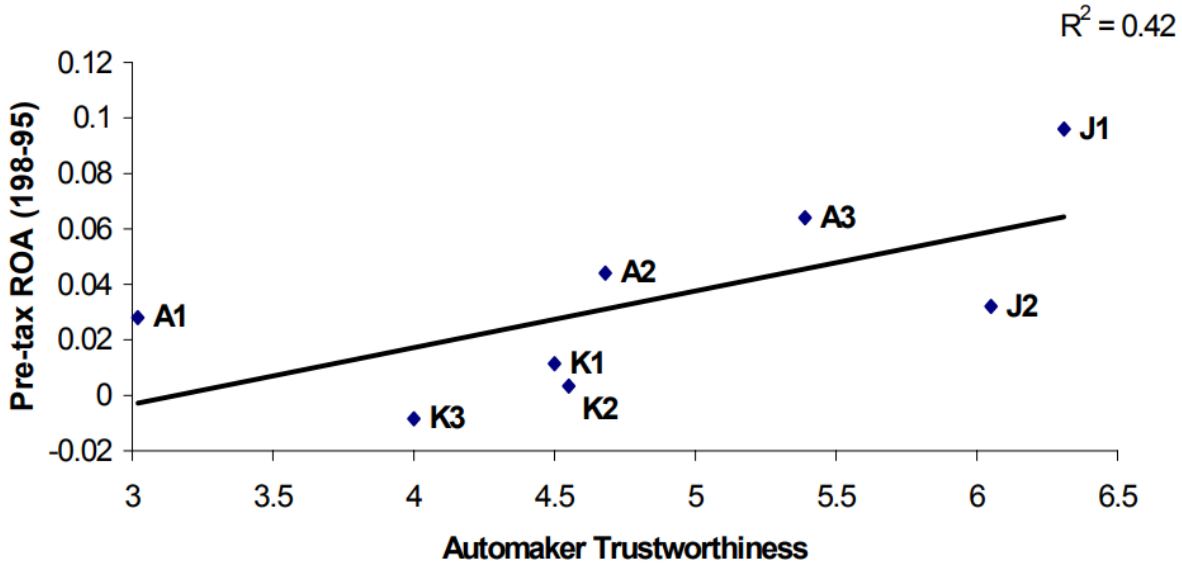


Figure 2.2. Relationship between trustworthiness and profitability.

Source: Dyer and Chu (2000).

2.2 - THE MODEL

The eyewear industry is composed by few big companies which own the licenses of traded brands and a relevant number of small companies which support the large corporations giving them finished products, components or performing the manufacturing activities. With this structure, this industry has considerable operational risks on the management of the suppliers that can be totally absorbed by the purchaser, wholly shifted to the agents or mutually shared.
The model attempts to understand the degree of risk shared by the parties and investigate the nature of these management decisions. The choices made by the supplier and the buyer are finalized by a formal or informal contract which then determines to whom the burden of the unpredicted cost fluctuation will be allocated.
As stated by Kawasaki and MacMillan (1987), the supply agreements could be seen as a repeated game with agency theory problems due to the fact that both parties act based on their self- interest to maximize profits. Thus, the purchaser's interest is buying at the lowest price, instead the supplier benefit is higher, the higher the purchasing price.
The relation between the buyer and the supplier is characterized by an asymmetric information environment where the supplier has all the information about the cost structure of the product and he has direct control over the effort put to push down the costs, instead the buyer does not.

The second characteristic of this relationship is the different degree of risks' tolerance. The purchaser is considered risk neutral because he can diversify its suppliers' portfolio decreasing considerably his risk; the supplier instead may be risk neutral or risk averse.
The model developed by Kawasaki and MacMillan (1987) starts from the contractual agreement and explains it through a linear relationship between the price paid and the target price increased by the charged production cost. The additional production cost depends on the risk sharing parameter which is the result of different conditions assumed as:

- Risk aversion
- Moral hazard

The risk aversion depends on the size of the firm, the portfolio of clients, instead the moral hazard depends on the mismatch of the two parties' goals and the level of monitoring systems. The payment scheme of the model highlights the cumulated cost the subcontractor has incurred till a determined time and the risk shared between the parties as following function:

$$p=b+ \alpha (c-b) \qquad (1)$$

p is equal to the purchasing price, the element c is the cost of production cumulated up to the time of the payment, instead a and b are parameters decided by the buyer at the inception which represents respectively the risk sharing coefficient (α) and the target price (b). With this linear function, we have the first term (b) which indicates the target price and it is fixed, it does not change when there are cost fluctuations. The second one "α (c-b)" variates on the risk absorption tolerance and the efforts of the supplier in reducing his costs.
The parameter a is the discriminant of the type of contracts:

If $\alpha = 0$ there will be a fixed price contract where all the possible risks are born by the supplier. The supplier will receive a fixed sum independently by its costs, so he will be brought to reduce his expenses.

If $0 < \alpha < 1$ the contract is drafted to share the risk giving both guarantees over cost fluctuations and incentives in reducing costs.

If $\alpha = 1$, the contract shifts all the risks to the buyer who will pay all the upcoming costs giving the supplier low incentives to decrease his costs but providing him a full hedge against cost fluctuations.

The cost of the agent is the result of three components

The cost ex ante “c*”
the cost fluctuation “w”
the cost reduction “c**”

At the end of the period, the cost will be equal to the cost determined ex ante summed by the expenditure fluctuations decreased by the cost reduction achieved by that time.

c=c*+w-c**

The expected ex-ante cost (c*) is known to both the supplier and the buyer.
The fluctuation of the costs (w) is unknown and it represents all the unexpected variation of the costs for the supplier during the production period. Even if they are not directly observable by the purchaser, he assumes that it has a gaussian distribution with mean equal to 0 and the variance sigma^2.

w (0; sigma^2)

The cost reduction in the model is the achievement of a series of actions which impose monetary efforts; Kawasaki and MacMillan interpreted the cost reduction effort as an investment that follows a quadratic function where the strictly convex characteristic makes possible to explain the decreasing marginal returns of the efforts. This structure is necessary to avoid negative production costs when the supplier put a certain amount of contribution.
The cost of the effort investment to the subcontractor is explained as followed:

h(c**) = c**^2/2sigma
with sigma >0

The purchaser cannot monitor the actions of the subcontractor, thus, looking at the general formula (1), he is not able to precisely determine the subcontractor’s production cost.
The lack of information available to the buyer allows the supplier to behave opportunistically from which problems of moral hazard and adverse selection in the pre-procurement decisions may derive.

The moral hazard is the variable considered in the model since it is the opportunism manifested after the formal agreement. It represents all the actions to reduce the cost of the final output such as the reduction of the raw materials' costs, the new findings in the production system or any other activity that increases the efficiency of the subcontractor.
The model attempts to identify the optimal risk sharing condition which is shown as "a" in the function (1). The best α for the buyer is the one which minimizes the purchasing price "p" with two main constraints:

- an individual rationality constraint where the supplier achieves the best cost reducing effort
- an incentive compatibility constraint (exogenous constraint) where the supplier accepts only if his expected value is at least as much as he could obtain from his best alternative purchaser.

2.2.1 - Resolution

The model is based on a repeated game where the optimal solution of the purchaser is taken via a backward induction. The principal tries to predict the level of effort put by the agent in order to be able to determine the optimal price to pay. To each level of effort, the supplier will put, a payment scheme will follow because the buyer will be able to determine his risk sharing coefficient.
Thus, to decide which contract will be the optimal as a response to the supplier's decision the buyer has to determine the agent's best choice, assuming he is rational.
The supplier's best choice is given by the optimal degree of effort which maximizes his profits. The profits of the agent in this case can be represented by the difference between the payment received by the principal and his costs. Hence Kawasaki and McMillan (page 332, 1987) states that the profit function is represented as:

$$\pi = (1 - \alpha)(b - c^* - w + \xi) - h(\xi)$$

The function that explains the relation among risk sharing, profits and incentives to undertake investments to diminishing costs is:

$C^{**} = \delta (1 - \alpha)$

The maximization of the profits function shows that greater is the value of α, the lower is the incentive to commit resources in reducing costs activities.
Instead, δ is the measure of the moral hazard and it will be at its maximum level when the risk sharing parameter α is 0 and at the lowest when the buyer provides full hedge to the cost fluctuations.
Kawasaki and McMillan (1987) minimized the function with:

$$\alpha = \lambda\sigma^2/(\delta + \lambda\sigma^2)$$

where
-λ is the risk aversion of the supplier
-σ^2 is the uncertainty
-As previously explained, δ is the moral hazard derived by the cost reduction activities engaged by the suppliers.
The thesis investigates on the drivers of risk absorption of the supplier so different hypothesis will be tested.

1- Risk absorption is negatively related to the size of the suppliers (risk aversion proxy).
2- Risk absorption is positively related to the trustworthiness (moral hazard proxy)
3- Risk absorption is positively related to the financial stability (risk aversion proxy)
4- Risk absorption is positively related to the cost fluctuation (risk aversion)
5- Risk absorption is negatively related to technological capability (moral hazard proxy)

2.2.2 - Assumptions

To test the model there is the assumption that the suppliers are all risk averse and that their aversion is negatively related to their size. Kawasaki and McMillan (1987) and Chemedikian (2007) supported this idea with empirical findings that are assumed to hold also in the eyewear industry. They evaluated the risk aversion with a linear regression having as dependent variable the mean of the subcontractors' profits and as independent variable the variance. The following relationship is the formal way that the authors used to identify the risk aversion.

$$\mu = (½\ \lambda)\ s^2 + k$$

$(½\ \lambda)\ s^2$ Identifies the risk premium, instead *k* is the predictor of the residual profits.

2.2.3 - Variables

Dependent Variable

RISK SHARING PARAMETER

The dependent variable is the parameter which measures the risk shared between the parties. As suggested by the study of Kawasaki and McMillan (1987) the risk sharing parameter is determined by the deviation between the fluctuations of the profits and the fluctuations of the costs referred on a specific period.

The general studies use as proxy the following formula

α =1-VARPROFITS/VARCOSTS

In the model the data will be analyzed starting from the public information available since there is no specific client/supplier cost accounting available.

Independent variables

- Subcontractor environment

This independent variable measures the uncertainty strictly connected to the supplier's surrounding. The early study (McMillan, 1987) of the model assessed it with the standard deviation of the subcontractor's general costs. However, the use of the general costs to determine the risk sharing parameter (independent variable) and the environmental uncertainty (dependent variable) generated an endogeneity problem. To face it, the thesis integrates the explained model with the suggestions of Camuffo, Furlan and Rettore (2007) which have used a two-stage least squares with the variation of the raw, subsidiary and expendable materials as dependent explanatory variable.

- Sensibility to the risk

The risk perception of the supplier is driven by several internal factors, so the model explains it through the size and financial stability of the company.

The size of the company is determined as absolute value equal to the average number of employees during the analyzed year and it is negatively related to the risk aversion. The

assumption, therefore, is: the larger is the firm, the lower is the effect of a singular operation in the overall turnover so the company is less risk averse toward it.
The second proxy used to measure the sensibility toward risk of the supplier is the financial stability measured as ratio between equity and assets. The more the company is stable, the more the enterprise is financed with shareholders' capital, the more easily he can face unpredicted cost fluctuations. There is a negative relation between Equity on Total investments and the risk aversion.

- Moral Hazard

Moral hazard in supply relationships is an event that companies cannot ignore. It happens when the principal (purchasing company) is not able to control the agent (supplier) and he can suffer because of his opportunism. Chemedikian (2007) stated that the level of moral hazard is driven by the technological capability of the supplier and the joint cost reduction initiatives. The study follows the idea of Eisenhardt (1989) which examines the ability of the principal on anticipating possible opportunistic behaviors when there is a high task programmability. Hence, when the buyer designs a product and assigns to the manufacturer its production, the purchaser is well informed on the process and on its costs. The design of the product gives to the purchaser detailed knowledge on the components and all technical requirement of it, so the asymmetrical information is reduced, and the buyer is more prepared to bear risks. On the contrary, when the supplier has high technological capability and play a relevant role in the product development, the purchaser is led to shift the risk.
Following the intuition of Chemedikian (2007), the model starts the technological capability analysis with the following products classification:

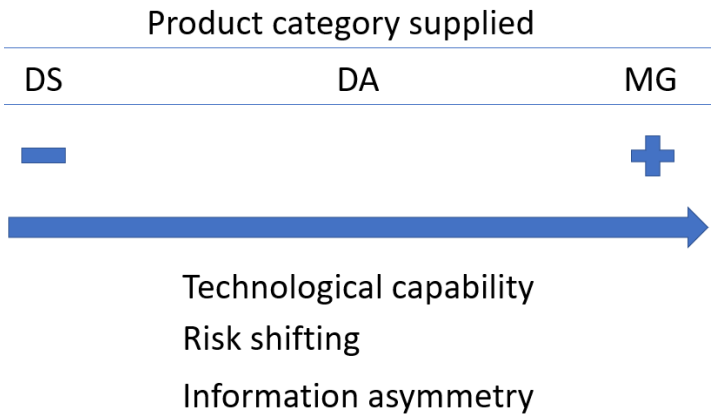
- DS (Drawing Supplied) when the product is wholly drawn by the principal and the supplier just manufactures it, respecting the technical requirements provided by the purchaser.
- DA (Drawing Approved) when the principal outlines the theme or general idea with the technical constraints, but the agent determines the design details and manufactures it.
- MG (Market Goods) when the buyer acquires the product without giving any contribution on the design or production to the supplier.

Once the products sold by the suppliers have been classified into one of the 3 categories, the suppliers are categorized based on their technological capability: if they produce more than one category of product, only the more technologically complex are considered.

The created categories form a variable composed by two dummies (i.e. DA and MG) which acts as the following scheme:

- DS is identified when DA=0, MG=0.
- DA is identified when DA=1, MG=0
- MG is identified when DA=0, MG=1

With this coding, the model shows that DA and MG have decremental outcome in the risk sharing. This propension to avoid sharing risk when there is a high technological capability of the company is supported by Eisenhardt (1989) which states that the subcontractor (agent) is more likely to behave in the interest of the principal (acquirer) when the principal possesses information and could control over the supplier's behavior. The more the information asymmetry, the less the control and the propension to share risk is present.



2.3. Technological capability and drivers of moral hazard.
Source: Author

The second proxy utilized by Chemedikian (2007) to analyze the moral hazard are connected to the trustworthiness of the parties. Trust represents an informal safeguard that enforces the relation (Dyer, 1997) and it has an invisible but concrete effect in diminishing the opportunism when interfirm transactions occur.
The trustworthiness proxy is represented by the share of the same national culture. Based on several researches, national culture represents the starting point of the organizational social culture and it is an element that increases the ease of voluntarily cooperation. Sharing the same culture connects individuals increasing social networks reciprocity and trustworthiness among them (Paldam, 2000).
The other proxy regards the specific investments. They represent the commitment of subcontractors to the relations and it represents a safeguard for the principal (Dyer, 1997).

Besides, it represents also a risk for the subcontractor when the principal acts opportunistically. The model however simplifies the situation considering the hypothesis that only the agents can exploit the vulnerabilities of the relationships.

CONCLUSIONS

The risk sharing is a treatment thanks to which companies can absorb or shift risks to other actors. This chapter has analyzed this practice adopting the agency theory framework and adding some elements that show how trust between parties can incentive it. The framework that has been set suggests the elements that must be analyzed to assess the phenomenon. The main aspects that relationships among different parties are subjected to are the moral hazard and the risk aversion. The moral hazard is a condition that includes inner features of the agent such as the technological capability that has a negative impact on the risk shared between the parties and trustworthiness which is positively related to this treatment. At the same time, risk sharing is influenced also by the risk aversion of the agent which is related to the uncertainty of the environment and the capability of facing these turbulences.

CHAPTER THREE – THE EMPIRICAL ANALYSIS OF KERING EYEWEAR

INTRODUCTION

This chapter analyzes the risk sharing situation of the eyewear industry taking as an example Kering Eyewear. This company has been recently founded and its case of study suits very well to the model because it outsources the entire production to specialized subcontractors. Nowadays it is the only relevant player in the eyewear industry that adopts this strategy and it represents a disruptive changing for the stability of the other players. Firstly, the chapter introduces Kering Eyewear, showing its peculiarities and giving a general outlook of its operations. Secondly, there will be the explanation of the methodology and data collection for the application of the previously explained model. Finally, there will be a discussion of the findings with a particular emphasis on the managerial and strategic use of the risk sharing.

3.1 - KERING EYEWEAR

3.1.1 Luxury Eyewear Industry Overview

Based on Exane BNP Paribas research (2016), the eyewear sector is a market with an estimated value of 90 Billion dollars in 2016. One of the most impressive elements of the eyewear industry is the expected growth of 55% over the next 4 years, which is equal to 140 forecasted Billion dollars in 2020. This considerable enhance of the market value is mainly connected to the ageing of the population and the increase of middle class customers in emerging countries.

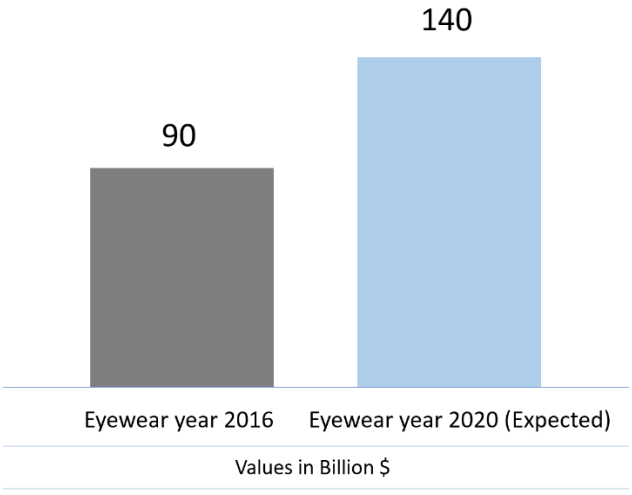


Figure 3.1. Eyewear industry's expected growth

Source: Personal interpretation of the Author from data found in the on Exane BNP Paribas research (2016).

Inside this market, Kering Eyewear operates in a specific niche that consists in high-end frames and sunglasses. Looking at the internal report of Kering eyewear (2017), this segment gathers all the products with the sales retail price over 180€ in Italy and 190€ in the rest of the world. As it is shown in the following graph, the high-end premium glasses which were worthen 3 Billion dollars in 2016 represents a substantial strategic sector for luxury brands due to its high potential and markup value of the products. Considering the affordable entry price as high-end product, and their role as an aspirational fashion accessory, the relevance to the global luxury brands of this segment is furthermore increased by the opportunity to attract new customers.

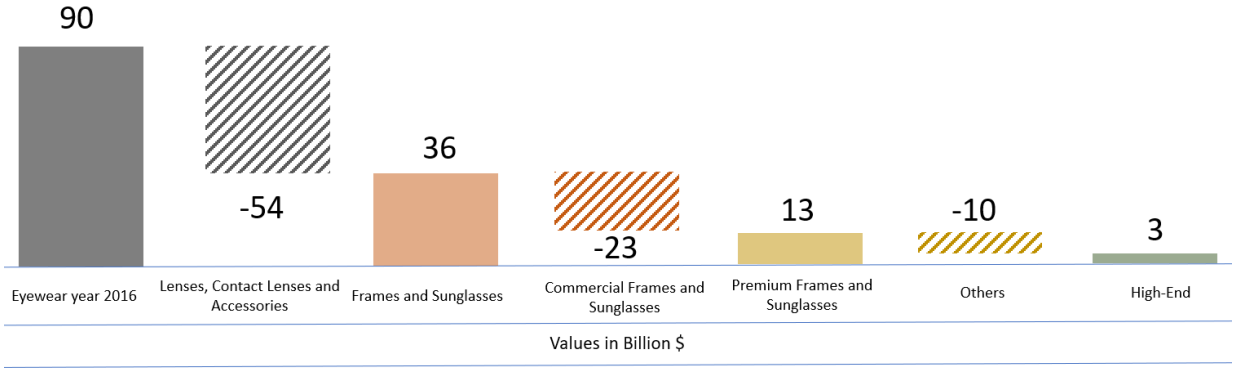


Figure 3.2. Segment value of the eyewear industry.
Source: Personal elaboration of the Author based on the article Business of Fashion (15 may, 2015)

Observing the 3 Billion Kering Eyewear's market segment, it is characterized by strong competition since there are more than 70 brands and more than 20 players. These companies can be gathered in different groups based on their production structure and brands composition. There are 5 traditional eyewear companies (Luxottica, Safilo, Marcolin, Marchon and De Rigo) with the 60% of the high-end market share that have a mix of owned and licensed brands; there are independent niche brand companies with around the 25% of the total luxury high end market; then there is Kering Eyewear, a company that has been defined disruptive for its new concept of business model and vision. Indeed, Kering Eyewear is focused only on the luxury segment and it is "not just another company in the luxury segment, but a luxury company in the eyewear" (Kering Eyewear internal report). This new way to interpret the market led Kering S.A. to revoke the licenses to Safilo Group and different countermoves by the other big luxury

groups of the globe: LVMH created a Joint Venture with Marcolin to take in-house the production of Céline and in the future the other brands of the luxury giants; and Richmond built a strategic partnership with Kering Eyewear buying the 30% of the company and assuring them the internal eyewear production of Cartier.

Figure 3.3. Competitive arena in the high-end eyewear industry.

Source: Internal report of Kering Eyewear (2017).

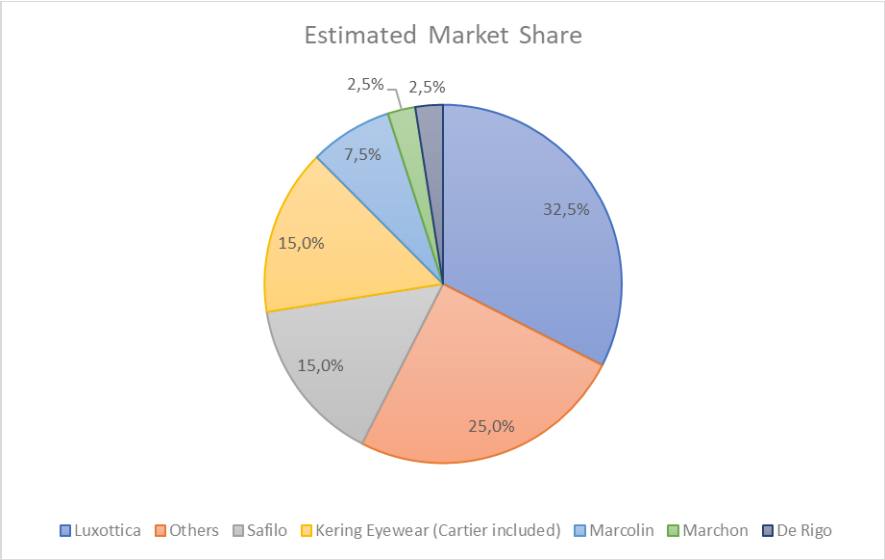


Figure 3.4. Estimated market share in high-end eyewear industry per company.

Source: Personal elaboration of the author based on the data found in "Internal report Kering Eyewear (2017)"

3.1.2 Kering Eyewear – Company Overview

Kering Eyewear is an Italian company under the control of Kering S.A.: a French holding founded in 1963 and led by Francois Henri Pinault. Kering S.A. was born as a timber trader, then, after successful acquisitions, it became one of the most relevant players in the luxury industry. Nowadays, Kering Group owns 19 brands diversified in the luxury and sport & lifestyle sector and its growth is sustained by several sectors such as the textile, jewelry or eyewear products.

The internal management of the eyewear production is one of the most current strategic projects of this holding; traditionally, the eyewear production was licensed to the big players of the market, then, in 2014 Kering S.A. decided to take back control of its eyewear business value chain thanks to the collaboration with a group of eyewear experts leaded by Roberto Vedovotto (ex-CEO of Safilo). The setting up of Kering Eyewear has been the only disruptive case to date in the mature eyewear industry. Kering Eyewear's objective is to sustain the group brands, quickening their development in the eyewear category and helping them to achieve their full growth potential while leveraging the unique appeal of each of them (Roberto Vedovotto, 2014). The activities of this new company based in Padova are all the creative, design, marketing and selling operations and they help the brand building with a long-term view. The internalization of these operations contributes to:

- Exploit the advantages of the direct control over the product design that is still on the hand of a team with proven experience, but it is improved by a constant communication with the brand creative teams. This better coordination between the creative team and the design team is a key competitive advantage because it diminishes the time of response to the market trends and it makes the eyewear consistent with the brand DNA from the briefing to the final execution. To make the realization of the eyewear quicker compared to the licensing agreements the inclusion of the industrialization team since the initial drafting of the eyewear makes a substantial part because it simplifies the technical approbation of the model.
- Increase the adverting and communication activities for all the group brands keeping consistency with Brand DNAs. In the traditional system, the investment in these activities was limited to licensing agreements and the big companies that trades eyewear focus mainly on their own brands and the bestselling licensed brands. Trading only internal brands, Kering Eyewear focuses also on the niche brands that previously had

not been fully exploited by the external entities. This activity gives mutual benefits to both the singular brands and to Kering Eyewear itself. The group brands will attract new customers while Kering Eyewear will gain from the till now unexploited potential of the high-end niche brands.

- Have a strict control over the distribution with direct salesforce and not anymore through agents driven by minimum sales targets achievements. A direct salesforce is extremely important to monitor the market trends and competitors and build strong relationships with the retailers. At the inception, revoking the licenses to the well-established companies such as Safilo represented a risk in the demand side: it is true that brands like Gucci have a strong reputation and relationships with their clients and it has its own boutiques, but Kering Eyewear revoking the licenses had to renounce also to the established capillary distribution of these companies. Nowadays, this situation has been partially overcome thanks to the collaboration with all the top clients (Luxottica included) and heavy investments in building a high-quality distributors network.

Instead, the manufacturing process has not been internalized and it is entrusted to a multitude number of highly specialized suppliers in Italy, Japan and China (mainly for Puma and the cases). The choice of outsourcing the production has been driven by the necessity to firstly focus the company's effort on the core business activities previously explained and to be instantly ready on the market with the level of quality required. The outsourcing adopted by this company is based on the concept of flexibility, quickness and cohesion with strong partnerships only with the best manufacturers in the world. A key success factor of this supply chain strategy is the experience of the managers that exploited their industry knowledge to select the best companies and negotiate the necessary clauses to eliminate the loss of know-how required and the production time.

Combining the advantages of an intense focus on the core activities and having outsourced the production to the best manufacturer in the industry Kering Eyewear has two more strength points against its competitors:

- A very low time-to-market thanks to the concentrated commitment in the core business activities such as the "realize": the design of the frame. Time-to-market means the period of time that elapses from the launch of the creative input to the actual marketing of the finished product. With the speeding up of this process Kering Eyewear is able to intercept the preferences from the market before the competitors and fill any defects with an effective after sales unit. In addition, the low time-to-market makes it possible

to hold the company's statement of "luxury business in the eyewear world" as it makes possible to introduce products in the market in conjunction with the seasons dictated instead by the fashion world.

- A flexible production. Kering Eyewear producing luxury eyewear with unique characteristics and materials often not attributable to the most commercial brands, has the possibility of entrusting production to the most skilled producers in the world. Not having its own production plant Kering Eyewear is not forced to keep them operational or invest in manufacturing innovations and specialized machinery that may be insufficient compared to other players in the market. So the company can rely on incredible diversified techniques of production that are more and more required by the luxury world.

The only exception for the outsourced production is represented by MCL (Manufacture Cartier Lunettes). This company has been integrated with Kering Eyewear on March 2017, after the strategic partnership with Richemont, in order to create a center of excellence for precious material that actually develops, produces and distributes the Cartier eyewear collections.

3.2 - RISK SHARING: THE ANALYSIS

The decision to carry out the analysis on the risk shared among the companies is due to the fact related to the particular Kering Eyewear's business model that, currently, outsourced the totality of the production activities. Outsourcing involves a partnership with suppliers where both get mutual benefits from the skills of others: Kering obtains benefits from high specialization and the recognized expertise and quality of the subcontractors; while suppliers have access to the know-how, unique designs and the market generated by Kering Eyewear.

This streamlined and at the same time effective structure is the perfect example for the analysis and identification of risk sharing drivers.

3.2.1 - Data Collection

To check the model presented in the previous chapter and analyze the risk shared with Kering Eyewear, a database was created based on the companies with which Kering Eyewear shares supply relationships. The tier-one suppliers analyzed in this model correspond to 27 suppliers and these suppliers are in Italy, France and China. Data that are both qualitative and quantitative

were collected during the 6-month internship at the Kering Eyewear headquarters and they derive from a questionnaire submitted to suppliers, interviews to the senior management and extractions directly from the company's ERP.

The suppliers which were interviewed for the collection of information about their degree of technological competence and the quality of their relations with Kering, have reached a 55% participation and represent the 77% of Kering Eyewear's purchasing. The financial data used to test the model considers the period from 2011 to 2016.

Given the company's policy of not weighing more than 30% on the suppliers' turnover, this analysis will use the Kering Eyewear's supply network as sample and finally the degree of risk sharing will be considered as general attribute of the suppliers with which Kering Eyewear interfaces.

3.2.2 - Findings And Discussion

The risk sharing in a partnership is not easy to evaluate, but the results coming from an aggregate identification of this value α=1-VARPROF/VARCOST give the impression that inside the industry the suppliers are almost full hedged against cost fluctuations to a non-negligible degree. Recalling the theoretical framework explained in the previous chapter, when α moves toward 1 it means that the purchaser absorbs risks, while, in the case of α moving toward 0 the purchaser pays a fix price and the supplier has no protection against cost fluctuations.

This result is supported by the data collected through the interview of the senior manager of the supply chain which confirmed that, even if there are no formal contracts with the suppliers (with the exception of Safilo), they are making as much as possible to reduce the exposure of their suppliers to cost fluctuations linked to the raw materials or to the warehouse which is a cost mainly supported by Kering Eyewear. This information has been confirmed by the questionnaire filled in by the suppliers which stated that the majority of the suppliers deliver the products to Kering Eyewear at least once every 2-7 days. Another interesting data that supports this result is represented by the currency hedging procedures. All the companies in the sample are hedged against currency fluctuations, the smaller ones that operate in the national market are hedged avoiding operations in foreign currency, the largest and those which operate internationally adopt financial hedging practices or clauses to share the burden of the currency fluctuations.

Risk sharing parameter (α)			
MEAN	SD	MIN	MAX
0,9784	0,04476	0,7642	0,9992

Table 3.1. Risk sharing parameter

Source: Personal elaboration of the author

The analysis carried out shows consistency with the drivers identified in previous studies about the automotive companies. Even if the linear regression in the figure 3.1 suffers of a small number of observations which make the analysis limited, the model can show few insights of the dynamics behind the risk sharing treatments.

The linear regression model that is the result of a logarithmic manipulation of the variables is:

$\ln(1/\alpha-1)=\alpha_0 + \alpha_1 MG + \alpha_2$ CULTURE $+ \alpha_3$ EMPLOYEES $+ \alpha_4$ SPECIFICINVESTIMENT+ $\alpha_5 \ln(1/VARCOST) + \alpha_6$ DEBTONEQUITY

	lnlalp~l	mg	cultura	employ~s	de	invest~i	lnlvarc
lnlalphal	1.0000						
mg	0.3797	1.0000					
cultura	0.0511	-0.4781	1.0000				
employees	0.2363	0.3821	-0.4023	1.0000			
de	-0.4167	-0.2693	0.0768	-0.1901	1.0000		
investimen~i	-0.1495	-0.2229	-0.0410	-0.0270	0.1496	1.0000	
lnlvarc	0.0512	-0.3762	0.1308	-0.5698	0.2628	0.2092	1.0000

Table 3.2. Correlation matrix.

Source: Personal elaboration of the author.

Source	SS	df	MS		
Model	26.3082163	6	4.38470271	Number of obs	= 27
Residual	24.8864819	20	1.24432409	F(6, 20)	= 3.52
				Prob > F	= 0.0152
				R-squared	= 0.5139
				Adj R-squared	= 0.3681
Total	51.1946981	26	1.96902685	Root MSE	= 1.1155

lnlalphal	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mg	1.402923	.5495516	2.55	0.019	.2565787	2.549268
da	0	(omitted)				
cultura	1.430582	.6334824	2.26	0.035	.1091607	2.752003
employees	.0005838	.0002622	2.23	0.038	.0000369	.0011306
investimentispecifici	-.1974627	.4706915	-0.42	0.679	-1.179308	.7843825
lnlvarc	.2735536	.0996743	2.74	0.012	.0656367	.4814704
de	-.3058643	.1397161	-2.19	0.041	-.597307	-.0144217
_cons	1.806612	2.860125	0.63	0.535	-4.159506	7.772729

Table 3.3. Linear regression of the risk sharing model

Source: Personal elaboration of the author

Using the suggestions of Camuffo, Furlan and Rettore (2007), the model solved a problem of simultaneous endogeneity of the independent variable VARCOST which is considered in the identification of α and in the proxy estimator for the risk aversion. To solve this problem, it has been used the variation of the cost for raw material as instrumental variable in a two stage least square regression. This analysis is shown in the following table.

Instrumental variables (2SLS) regression

Number of obs	= 27				
Wald chi2(5)	= 16.02				
Prob > chi2	= 0.0068				
R-squared	= 0.3956				
Root MSE	= 1.0705				

lnlalphal	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnlvarc	.2200735	.0982294	2.24	0.025	.0275474	.4125997
mg	1.576351	.5204798	3.03	0.002	.5562298	2.596473
da	0	(omitted)				
cultura	1.464255	.6080961	2.41	0.016	.2724082	2.656101
employees	.0005664	.000254	2.23	0.026	.0000686	.0010643
investimentispecifici	-.2466835	.4510881	-0.55	0.584	-1.1308	.6374329
_cons	-.6352496	2.720616	-0.23	0.815	-5.967559	4.69706

Instrumented: lnlvarc
Instruments: mg cultura employees investimentispecifici lnlvarcr

Table 3.4. Two stage least square model.

Source: Personal elaboration of the author.

The results show that the VARCOST is significant with p greater than 0.05 and that its impact affects positively the risk shared between the parties. Even if the model is limited by the observation the results seems to support the hypothesis 4.

The analyzes conducted undoubtedly suffer from a subsampling problem, however the results obtained show that the main drivers of risk sharing are significant. Among the moral hazard variables there is an evidence of how the technological capacity of the company and the national culture influence the cooperation between the subjects. With special reference to the "culture" variable it should be emphasized that this incorporates an effect due to the sharing of values, history and artefacts but also the effect from the eyewear district given that almost all the Italian companies with whom Kering Eyewear has relationships dealers are located in the Belluno district. From a joint analysis with the questionnaires we can see how relations with Chinese companies have greater investments in terms of number of visits to factories. These take place on a regular basis while in Italy, Kering has contacts with companies with a lower frequency. This is in line with the theory of Paldam (2000) which identifies a reduction in business costs as a result of cultural affinities.

In the model MG, DA and DS has been treated as a singular dummy variable because inside the sample there is not presence of observation containing drawing supplied (DS). The model accepts MG=1 and DA=0 and the results are significant with a positive impact.

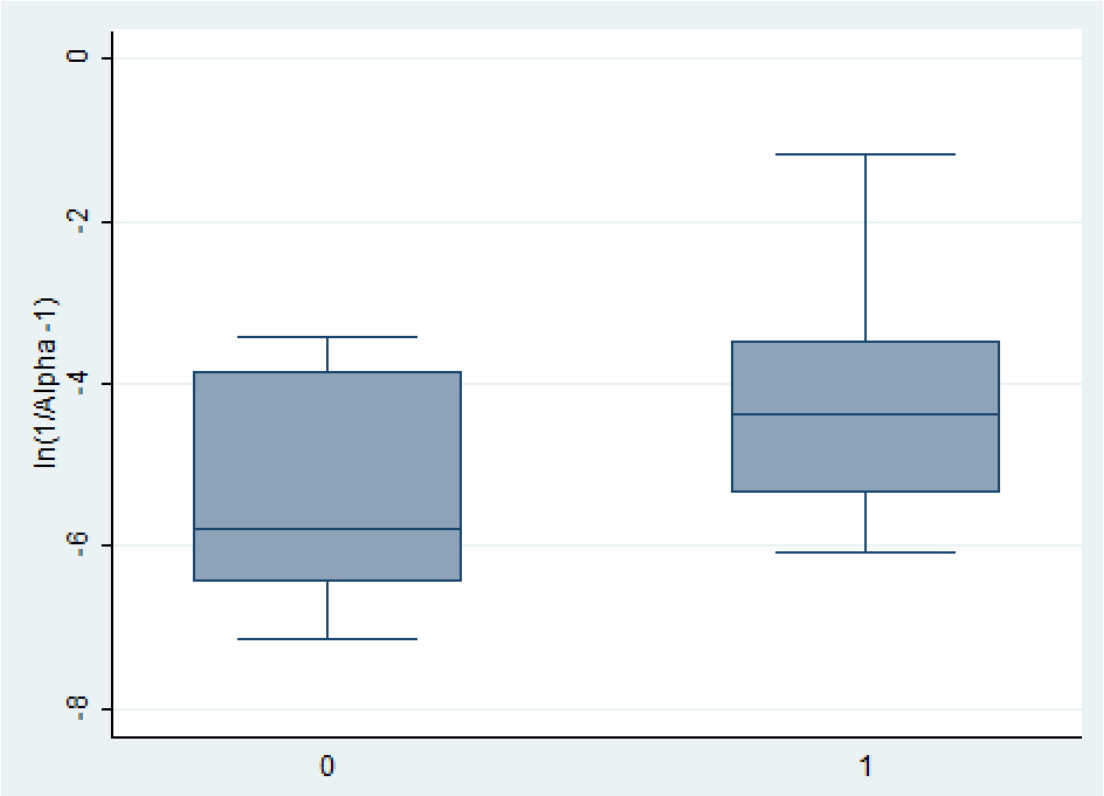


Figure 3.5. Box plot of risk sharing parameter grouped by technological capability.
Source: Personal elaboration of the Author.

As the box plot shows, the logarithmic level of the risk sharing parameter increases with the technological capability of the subcontractor, being coherent with the study of Chemedikian (2007).

The model suggests that the specific investment variable is not relevant hence it is not possible to make assumptions about it.

Looking at the variable "de" which identifies the Debt to Equity ratio, the result shows that there is a negative impact on "α": the more indebted and consequently the more unstable the less likely to accept the risk of others the companies are. On the contrary, companies that are larger in size and which, in the case of this industry, have more employees seems to have a very low effect on the risk shared.

3.2.3 - Limitations

The limitations of the model are due to the limited participation of suppliers, whose contribution would certainly have given the opportunity to make more relevant analyzes and not being subject to the problem of subsampling. A further limitation is given by the lack of availability

of information related to the specific relationship between buyer and supplier. This lack of information has been overcome through an analysis of the data present in the corporate financial statements with a subsequent integration made through questionnaires. For reasons of consistency, the assessment of the risk-sharing coefficient remains however a datum to be read as an attribute of the company and not as a specific element of the relationship. This, in the analysis, was integrated with the interviews conducted to senior management to then draw conclusions on the management of the Kering Eyewear report.
Moreover, the model is based on operating costs, so it does not give details of the risks shared but provides a generic parameter to be interpreted on a case-by-case basis.

3.2.4 - Proactive Use Of Risk Management

Having a clear understanding of the dynamics of risk transfer among the parties must be an extremely clear concept for Kering Eyewear because it completely transfers production risks through outsourcing strategies.
This study includes key elements and drivers for risk management and supply chain design. From the results obtained it is possible to identify how the strategic choices to invest in certain technological aspects of companies can change the perception of risk between the parties. Following the path indicated by Camuffo, Furlan and Rettore (2007), in the development of the supply chain it is important to take into consideration the characteristics of the counterparts and the evolution of the relationship. Their study suggests that risk sharing is not only a concept to mitigate risks, it is a strategic asset for the company that, with the definition of its drivers and a proactive use of them, can generate a competitive advantage. For example, in the early years of a relationship with a supplier the buyer should be more willing to take on the risks of the small supplier to favor and protect him from possible external risks. Over time, however, the size of the supplier and its technological capacity increases with the appeal of opportunism (negativities) and the ability to absorb the purchaser risks (positivity). Furthermore, opportunism can be mitigated with activities aimed at increasing trust between the parties that generates lower transaction costs and higher resiliency to the risks thanks the cooperation between the actors.
To improve business performance, supply chain managers must also take into account aspects related to culture: investing in relationships with cultural affinities is more likely to bring benefits in cooperative risk management as well as lower transaction costs. Lowering transaction costs must be one of the priorities of Kering Eyewear which, to transfer the risks of production, has taken on coordinating activities which increase the transaction costs of the

company. To improve the company performance, the model recommends implementing systems that increase trust between the parties and invest in tools that improve corporate transparency with a global supply chain concept. An enhance of the transparency, with an increase in the infrastructures linked to the exchange of information, would reduce the company's information asymmetries and the risks connected to the business.

CONCLUSIONS

This chapter dealt with the case of Kering Eyewear explaining the characteristics that counteract it and the environment in which it operates. The business model of Kering Eyewear is based on the integration of core activities such as design, industrialization, sales and distribution, while keeping production outside. The decision to outsource the construction of eyewear was driven by the need for flexibility and reduced realization times. Fully entrusting production to bodies outside the company implements a transfer of manufacturing risks to other parties but also the emergence of other problems related to agency costs or other risks that would not have emerged otherwise. These unique characteristics in the eyewear sector have made the analysis of risk sharing an important step for the management of the company that can identify as main drivers of the cooperation to risk management risk aversion and the moral hazard of suppliers. The empirical evidence found in this paper lay the groundwork for a proactive approach to risk management that not only provides for mitigating negative events but also for using them strategically. Helping smaller suppliers to reduce external uncertainty through adequate supply contracts and relational investments can lead to a competitive advantage over the competition.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The purpose of this thesis was to provide the appropriate knowledge for the practitioners in order to manage risks in supply relationships with a proactive perspective, thus avoiding a merely passive response management.

In the first chapter the risk has been interpreted as being the uncertainty of the damage of future events and an emphasis was given to the fact that all organizations are subject to them: the only difference is the way these are managed. In the chapter are taken several frameworks suitable for identification of supply chain risks such as the one presented by the ISO 31000: 2009. This is one of the latest and most recognized set of guiding principles through which to identify, analyze, assess and treat risks. Furthermore, the chapter emphasizes how the appropriate use of risk management combined to transparency and collaboration in the global supply chain can become a competitive advantage.

The second chapter explains supply relationships through agency theory and structures a data-based analysis method that companies which already practice monitoring actions can easily implement inside their investigation. Despite having limitations, this model can help different risk managers in determining the situation in which their company operates by offering insights into supply chain risks mainly related to outsourcing. Specifically, the model has identified as a proxy for moral hazard technological capabilities, specific investments and trustworthiness. Technological capability has a negative impact on the risk shared among the parties while, trustworthiness is positively related to this treatment. At the same time, risk sharing is influenced also by the risk aversion of the agent which is related to the uncertainty of the environment and the capability of facing these turbulences.

The third chapter aimed to apply the model to a concrete case with data collected directly from the source. More specifically, Kering Eyewear was analyzed, showing how the predictors hypothesized in the previous chapter were effectively significant. The identification of the drivers is essential to build agreement strategically. The findings confirm that structuring supply contracts in the first years of relationship with the aim of favoring the supplier and giving it the financial stability necessary to grow may be a strategic manipulation of the risk. As the relationship evolves the subcontractor will be able to accept greater risk and thus favor the buyer. A further strategic use deriving from the study is to increase trust between the parties. Moreover, the study suggests that being part of the same national culture or being within districts has a positive influence on the performance of this treatment.

The dissertation integrates the previous studies of the supply chain risk management with an original dataset. Furthermore, it reports the insights on the risk drivers which were little analyzed in the literature as technological capabilities and determinants of trust among the parties.

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APPENDIX

Appendix 1. Questionnaire.

GENERAL INFORMATION

COMPANY NAME: _____

REGISTERED OFFICE: _____

NUMBER OF EMPLOYEES: _____

TYPE OF SOLD PRODUCTS: Complete the following table in with the percentage on the total revenues.

Description	% on total revenues
Products entirely designed by the clients, you only manufacture them.	
Products where the buyer defines the concept and the functional parameter domains while you work out the design details and manufacture them.	
Products fully designed and manufactured by your company.	

REVENUES:

	2011	2012	2013	2014	2015	2016
Revenues in euros						

EXPENDITURES:

	2011	2012	2013	2014	2015	2016
Operating costs in euros						
Raw, subsidiary and expendable material costs						

PROFITS:

	2011	2012	2013	2014	2015	2016
Profits in euros						

	2016
Total debt in euros	
Total equity in euros	

1) Does the company work solely in the eyewear industry? (If not, please specify the other industries)
    a) Yes
    b) No
    Others: _____

2) Have you committed resources to specific investment?
    a. Yes
    b. No

3) How do you define your company?
    a. International company
    b. Domestic company
4) How do you scale your technological level compared to your competitive environment?
    a. Very high technological level
    b. High technological level
    c. Average technological level
    d. Low technological level
    e. Very low technological level
5) Have you invested in the industry 4.0 technologies in the last 5 years?
    a. Yes
    b. No
5) If the answer to the question 4 is Yes, please define which investment you have done:
    a. ERP and system integration platform
    b. Technologies to enhance the interaction between human and machines
    c. Technologies to increase the quality of the output
    d. Technologies to automatize the production system
    e. Other: _____

6) Do you sell your product in your local currency?
    a. Yes
    b. No

7) Do you adopt any clauses or use any financial instruments to eliminate the risks on the exchange rate?
    a. Yes
    b. No

QUESTIONS ON YOUR RELATIONSHIP WITH KERING EYEWEAR S.p.A.

8) Which product do you supply to your client?
    a. Sunglasses
    b. Optical frames
    c. Glasses case
    d. Components
9) In the last years the commercial activity with your client:
    a. Has diminished
    b. Has increased
    c. Has been stable
10) Did you make specific investments due to unique product features?
    a. Yes
    b. No
11) The interest of your client in your RD ability is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
12) The interest of your client in your personnel abilities is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
13) The interest of your client in training on quality issues of your personnel is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
14) The interest of your client in your financial situation is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
15) The interest of your client in the agility of the communication channels with you is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null

16) The interest of your client in your cost structure is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
17) The interest of your client in your design abilities is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
18) The interest of your client in the standardization of the processes is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
19) The interest of your client in your quality control process is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
20) The interest of your client in the controls you realize on your suppliers is:
    a. Very high
    b. High
    c. Average
    d. Low
    e. Null
21) The orders are fixed with anticipation of:
    a. Less than one week
    b. Between one week and three weeks
    c. More than four weeks
22) Do you receive any information on the future demand that helps you to plan your production?
    a. Yes
    b. No
23) The delivery conditions on quantity, time, transport used, type of packaging and other logistic conditions are fixed by:
    a. Your client
    b. Your enterprise
    c. Negotiation and mutual agreement

24) The deliveries are:
    a. More than once per day
    b. Once per day
    c. Every two days
    d. Between 2 days and one week
    e. Every 2 weeks
    f. More rarely
25) Employees by your client visit your plants:
    a. Never
    b. Sometimes but it is not normal
    c. Regularly
    d. Daily
26) Your clients' employees that maintain contact with you are from:
    a. Buyers
    b. Quality
    c. General management
    d. Planning and control of production
    e. Others: _____
27) On average, how many days payable outstanding do you have for the supply of Kering Eyewear S.p.A.?
    a. _____
28) Do you exchange information with your client?
    a. Yes
    b. No
29) How do you define this exchange of information?
    a. Mutually exchange information
    b. One-way exchange
    c. No exchange at all
30) The economical information exchange is:
    a. Mutually exchange information
    b. One-way exchange
    c. No exchange at all
31) At the technological level, your client and you:
    a. Mutually exchange information
    b. Your client asks for information
    c. There is no exchange at all
32) Have you ever started or suggested to your client initiatives directed to the development of new products?
    a. Yes
    b. No