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**An integrated framework for reputational risk
assessment: modelling reputational risk as an
indirect effect**

Relatore: Chiar.mo Prof. Marco GIORGINO
Correlatore: Dott.ssa Barbara MONDA

Tesi di Laurea di:
Luca PROFESSIONE
Matr. 841275

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Abstract

The objective of the study is to develop an integrated methodology for the assessment of reputational risk. The concept of reputational risk is receiving increasing attention in recent years mainly due to the unrecorded accessibility of information via the internet, the effects of globalization and the increased regulatory pressure. Despite the efforts of the scientific community, no existing method for the assessment of reputational risk manages quantitatively measure reputational risk. The model presented in this thesis uses different methods borrowed from a variety of disciplines. Its major innovation resides in the combination of scenario analysis and judgment analysis to evaluate the potential impact of reputation damaging events. Moreover, the use of phylogenetic analysis is proposed to support the process of identification of reputational risks. Ultimately the method developed, albeit with some limitations, proves to be a feasible tool for the measurement of reputational risk.

Italian extended abstract

Il presente studio si propone di sviluppare un modello integrato per la valutazione del rischio reputazionale. Il modello suggerito combina differenti metodologie mutuare da discipline diverse. La sua innovatività è principalmente legata alla combinazione dell'analisi di scenario e della judgment analysis per valutare il potenziale impatto di eventi negativi dal punto di vista reputazionale. Viene inoltre proposta l'applicazione dell'analisi filogenetica a supporto del processo di identificazione dei rischi reputazionali. La metodologia descritta, seppur con alcune limitazioni, si dimostra uno strumento funzionale alla valutazione *ex-ante* del rischio reputazionale.

Il lavoro si apre con una breve introduzione sui temi della reputazione aziendale e del rischio reputazionale. Si illustrano i dati che testimoniano della crescente attenzione dedicata da esperti, managers e ricercatori a queste tematiche. L'aumento dell'interesse è da ricollegare ad alcuni aspetti che caratterizzano l'ambito in cui le aziende attualmente operano e con cui devono confrontarsi: la globalizzazione dei mercati, la velocità di diffusione delle informazioni attraverso i media convenzionali e non, l'incremento complessivo degli *intangible assets*, la crescente complessità del quadro normativo e dei controlli. La rilevanza dell'argomento è testimoniata dai numerosi eventi e scandali, nei quali si può chiaramente evidenziare un danno reputazionale, che negli ultimi anni hanno avuto pesanti conseguenze sulle aziende interessate fino a causarne l'uscita dal mercato.

La reputazione aziendale è un concetto che ancora non ha trovato una definizione completa e largamente condivisa. Nel secondo capitolo, attraverso un'ampia rassegna bibliografica, si illustrano e si confrontano le diverse definizioni di reputazione e di rischio reputazionale e si approfondiscono i meccanismi sottostanti. Tra le definizioni più condivise si trova quella fornita da Fombrun, secondo il quale la reputazione sarebbe una "rappresentazione basata sulla percezione delle azioni passate e delle prospettive future di un'azienda, che descrive il prestigio complessivo della stessa in rapporto ad altri concorrenti". La reputazione si distingue, anche se in maniera a volte sottile, dai concetti di identità aziendale, immagine e marchio (o *brand*). La reputazione aziendale è qualcosa di relativamente stabile, che viene costruito nel tempo attraverso l'identità interna dell'azienda e le immagini che l'azienda proietta all'esterno. Nonostante la sua relativa stabilità, gravi eventi possono ledere in breve

tempo la reputazione. Una buona reputazione comporta numerose ricadute positive per un'azienda: vantaggi nelle interazioni con clienti e fornitori, capacità di attrarre nuovi investitori, possibilità di assumere e trattenere i migliori talenti.

A partire dalle definizioni che si trovano nella letteratura accademica viene presentato e discusso il concetto di rischio reputazionale. Esso si configura come ogni evento che può avere un impatto (negativo ma anche eventualmente positivo) sulla reputazione aziendale. Il rischio reputazionale viene considerato da molti come rischio dei rischi in quanto emerge come conseguenza di altri rischi (operativi, manageriali, ecc.).

I concetti di reputazione e di rischio reputazionale non possono prescindere dalla nozione di *stakeholders*, in quanto esistono proprio in relazione alla presenza di portatori di interesse. Ogni azienda ha a che fare con una molteplicità di *stakeholders*: i lavoratori, gli investitori, i consumatori, i *partners*, i fornitori, i concorrenti, le istituzioni, i gruppi di pressione, ecc.

L'ultimo paragrafo del capitolo è dedicato agli impatti che gli eventi reputazionali possono avere sulla reputazione stessa e sulle performances aziendali.

Il terzo capitolo illustra le principali tecniche utilizzate per la valutazione della reputazione e del rischio reputazionale. La valutazione della reputazione aziendale e del rischio reputazionale è un compito non facile, con il quale si stanno confrontando da anni gli esperti dei settori dell'economia e della finanza.

La valutazione della reputazione viene spesso affrontata attraverso metodi qualitativi che si basano sulla raccolta di giudizi tramite interviste presso gli *stakeholders*. Agli intervistati viene richiesto di assegnare un punteggio alle aziende in relazione ad alcune caratteristiche che sono considerate essenziali ai fini della reputazione tra cui: la qualità dei prodotti e dei servizi, la leadership, la qualità dell'ambiente lavorativo, la responsabilità sociale e ambientale, i risultati finanziari. In base a queste valutazioni vengono calcolati dei punteggi complessivi e stilate delle classifiche.

Esistono anche alcuni metodi quantitativi per la valutazione della reputazione. Tali tecniche sono relativamente complesse e non molto applicate. Alcuni di questi metodi si basano sulla valutazione delle differenze tra il valore di mercato delle imprese ed il loro valore di libro.

La valutazione del rischio reputazionale è un'operazione estremamente complessa ma essenziale per una gestione efficace dei rischi reputazionali.

Anche la valutazione del rischio reputazionale può essere effettuata attraverso l'impiego di metodi qualitativi come la matrice probabilità-impatto e la *gap analysis*. Questi metodi presentano i limiti tipici dei metodi qualitativi (bias); inoltre non permettono di comprendere l'entità dei rischi reputazionali rispetto agli altri rischi a cui sono esposte le imprese.

La valutazione del rischio reputazionale attraverso metodi quantitativi è un'operazione di elevata complessità e raramente applicata dalle aziende. I metodi attualmente proposti hanno una impronta fortemente accademica e presentano approcci di tipo ex-post ossia analizzano quale è stato l'impatto reputazionale in eventi passati. Tra queste tecniche la più diffusa è la valutazione dei rendimenti anormali di mercato: il danno reputazionale viene valutato come differenza fra la perdita di valore borsistico conseguente a perdite operative ed il valore delle perdite operative stesse.

Va segnalato che attualmente, nonostante gli sforzi della comunità scientifica, non esistono metodi per la valutazione del rischio reputazionale che permettano alle imprese di valutare quantitativamente ex-ante il rischio reputazionale a cui sono esposte. Una delle limitazioni all'applicazione di metodi quantitativi è sicuramente l'assenza di database focalizzati sulla reputazione e sul rischio reputazionale.

Nel quarto capitolo vengono presentati gli strumenti più diffusi per la gestione del rischio del rischio reputazionale: dalla prevenzione del rischio fino alla gestione della crisi nel momento in cui il rischio si concretizza. La prevenzione/mitigazione dei rischi reputazionali si basa su alcune azioni tra cui il monitoraggio, il ricorso ad assicurazioni e le attività che si inquadrano nella cosiddetta *Corporate Social Responsibility*. Quest'ultima può essere definita come l'insieme delle azioni che apportano benefici alla società (e all'ambiente) al di là degli interessi specifici dell'azienda e di ciò che è richiesto dalla legge. La *Corporate Social Responsibility* comporta vantaggi in termini di reputazione e costituirebbe, secondo molti autori, una sorta di autoassicurazione nei confronti delle crisi reputazionali. D'altra parte la stessa reputazione viene considerata un fattore di protezione nei confronti delle crisi.

Il quinto capitolo affronta le basi teoriche del modello integrato che si intende proporre per valutare il rischio reputazionale e per fornire un supporto nella fase di identificazione dei rischi. Il primo paragrafo presenta la struttura del modello e le basi logiche su cui si fonda. I

paragrafi successivi analizzano le varie parti di cui si compone il modello, affrontando sia gli aspetti teorici che quelli applicativi. Diversamente da altri modelli il metodo proposto non parte considera il rischio reputazionale come un unico rischio ma come una componente di ciascun rischio a cui l'impresa è esposta. Allo scopo di valutare il danno reputazionale il metodo scompone il danno nei suoi componenti e si focalizza sulle decisioni degli stakeholder che sono alla base di tali effetti dannosi. Il modello integrato si compone di 4 fasi. Nella prima fase viene analizzata una lista di rischi già mappati con particolare attenzione per la loro componente reputazionale.. Attraverso tecniche di brainstorming applicate alle principali aree di reputazione si cercano gli eventuali rischi non mappati con un potenziale impatto reputazionale. L'analisi filogenetica si propone come strumento per sostenere l'identificazione di rischi potenzialmente non mappati. La seconda fase è rivolta alla mappatura dei principali stakeholders, alla determinazione della loro influenza e del loro comportamento con lo scopo di creare un elenco di “segnali reputazionali” che vengono generati dalla manifestazione di rischi e che sono in grado di modificare il comportamento degli stakeholders. Nella terza fase vengono svolte interviste per capire le reazioni degli stakeholder a diversi set di segnali reputazionali. L'ultima fase esplora quali segnali di reputazione sono generati da ogni rischio specifico e con quali probabilità. Successivamente vengono prodotti molteplici scenari con diverse combinazioni di segnali. Per ogni scenario, le intenzioni degli stakeholder (sulla base dei risultati della fase 3) vengono tradotti in risultati previsti per determinare il potenziale impatto finanziario con l'utilizzo di un modello DCF. Infine viene determinata la distribuzione probabilistica delle perdite derivanti dal rischio reputazionale. L'ultimo paragrafo del capitolo presenta i principali limiti del modello. La limitazione più importante è la mancanza di analisi dell'influenza dei media sulle percezioni degli stakeholders riguardo ad eventi reputazionali.

Nel sesto capitolo viene presentata l'applicazione del modello proposto per verificarne la fattibilità. Le diverse fasi del modello sono applicate in maniera semplificata; in particolare l'attenzione viene focalizzata sulla identificazione e valutazione dei rischi di contaminazione microbica dei prodotti nel settore latte.

Infine nell'ultimo capitolo si propongono le conclusioni sottolineando punti di forza e di debolezza del modello proposto e suggerendo indicazioni su possibili approfondimenti di ricerca per la messa a punto e la validazione del modello.

Executive summary

The study aims at developing an integrated methodology for the assessment of reputational risk. The model is based on a framework that combines different methods, borrowed from various disciplines. Its major innovation resides in the combination of scenario analysis and judgment analysis to evaluate the potential impact of reputation damaging events. Moreover, the use of phylogenetic analysis is proposed to support the process of identification of reputational risks. Ultimately the method developed, albeit with some limitations, proves to be a feasible tool for the measurement of reputational risk.

The thesis begins with an introduction which focuses on the increasing attention devoted by media, managers and academics to the issues of corporate reputation and reputational risk. The major reasons which explain the growing interest for these topics are related to globalization, increasing accessibility to information and rising regulatory pressure.

The second chapter illustrates and compares current definitions of reputation, reputational risk and their underpinning mechanisms, through a wide excursus on the academic literature. Corporate reputation is still a debated notion. According to many authors it could be defined as the perception of stakeholders, based on corporate past actions and future perspectives, of a company's overall credibility and attractiveness in comparison to its competitors. Reputation is considered a quite stable feature but can be rapidly disrupted by severe events. The chapter highlights attributes and benefits of positive reputation in terms of market presence, competitiveness, ability to attract qualified human resources and share price. The concept of reputational risk is presented starting from the definitions provided by the literature. Reputational risk is the risk related to any event that can have an impact (positive or negative) on corporate reputation. It is considered by many authors as a risk of risk because it emerges as a consequence of other risks (operational, managerial, etc.). Corporate reputation and reputational risk are strictly related to the concept of stakeholders. Stakeholders are any group that can affect or can be influenced by the behavior of an organization. Each corporation has relationships with multiple categories of stakeholders: consumers, employees, investors, partners, pressure groups, etc.. In its last paragraph the second chapter illustrates the potential impacts of reputational events.

The third chapter aims at summarizing the most popular techniques used for the estimation of reputation and reputational risk. Assessing reputation and reputational risk are widely acknowledged as a very complex tasks, for which a number of qualitative and quantitative models have been proposed.

The assessment of reputation is usually implemented with qualitative methodologies which assign a numeric score to the level of reputation of an organization. Quantitative methods on the other hand attempt to assess the monetary value of the whole reputation capital or at least of some of its components. The most popular qualitative methods for measuring corporate reputation are survey-based reputation indexes. Stakeholders are requested to assign scores to corporations on the basis of a variety of attributes that are considered to have a reputational dimension: quality of products and services, leadership, work environment, social, ethical and environmental responsibility, financial performances. Quantitative methods to estimate reputation are limited and less used. Some of them are based on the evaluation of the differences between a company's market value and its book value.

Likewise qualitative and quantitative methodologies for the assessment of reputational risk have been proposed. The first ones, which are the only ones presently employed by risk managers, are simple and intuitive, but are biased and do not allow to compare the effects of reputational risk to the effects of other risks. The quantitative assessment on the other had is a very complex process. A number of quantitative models attempt to estimate the reputational damage, mainly by observing the volatility of share prices of companies around reputation-damaging events. These models operate from an academic perspective and provide a rigorous demonstration of the existence of reputational risk with *ex-post* analyses. At the state of the art though they provide no useful tools to conduct an *ex-ante* valuation of the reputational risk to which a company is exposed.

The fourth chapter summarizes the main measures that are implemented to treat reputational risks. The most relevant *ex-ante* measures are represented by Corporate Social Responsibility initiatives. CSR can be defined as actions that appear to further some social good, beyond the interests of the firm and not required by law. Some examples of CSR actions include 'going beyond legal requirements in adopting progressive human resource management programs, developing non-animal testing procedures, recycling, abating pollution, supporting local businesses, embodying products with social attributes or

characteristics'. CSR activities have a positive impact on reputation and provide a sort of partial self-insurance against reputational risks. Among *ex-post* measures, several strategies for crisis management and the Situational Crisis Communication Theory are described.

The fifth chapter explores the theory behind the new model developed to support reputational risk identification and perform reputational risk assessment. The first paragraph presents the structure of the model and the rationale behind it. The following ones analyze the various parts of the model, presenting both its theoretical and practical aspects. This model does not attempt to assess the value of reputation as a whole, but instead focuses on the most tangible effects of the reputational damage stemming from the occurrence of risks. In order to estimate reputational damage the proposed method singles out its components (eg. sales decrease, increased cost of capital, etc.) and focuses on the stakeholders' decisions that generate such effects. The model is structured in four steps. In the first step a list of already mapped risks are analyzed with a focus on their reputational component. Brainstorming teams are created for key reputational areas in order to look for unmapped risks with a potential reputational impact. Phylogenetic analysis is proposed as a tool to support the identification of potentially unmapped risks. The second step is aimed at understanding who are the most relevant stakeholders' for the company and what signals could affect their decisions. The process includes a stakeholders analysis and the identification of the cues through interviews and historical analysis of past risk events within the industry considered. In the third step surveys are carried out to understand the stakeholders' reactions to different sets of reputational cues. Purpose made tools allow to translate the results of the surveys into deterministic or probabilistic relationships. The last phase explores which reputational signals are generated by each specific risk and with what probability. Multiple scenarios with different combinations of signals are then generated. For each scenario the expected stakeholders' intentions (based on the results of step 3) are translated into forecasted results in order to determine the potential financial impact with a DCF model. Ultimately the probabilistic distribution of losses stemming from reputational risk can be determined. The last paragraph of the chapter presents the main limitations of the model. The most important limitation is the lack of the analysis of the influence of media coverage on stakeholders' perception of reputation damaging events.

The sixth chapter illustrates the implementation of the proposed model in order to verify its suitability in supporting the reputational risk assessment. The different steps of the methodology are applied in a simplified way, focusing on identification and evaluation of reputational risks related to microbial contamination in the dairy sector.

The last chapter presents the conclusions of the study and illustrates suggestions for further research.

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1.Introduction

Many argue that the single most valuable asset in the capitalist economy is not cash, stocks or real estate, but trust. Although a shortage of cash can bring a company to the verge of bankruptcy, it is more frequently a loss of reputation that deals the final blow. This is even more so today as the speed with which reputational risks can materialize has become extraordinary high. In a globally connected business world, a problem can emerge in a distant part of the business, virally spread through the social media and escalate into a full crisis in an instant.

The increased relevance of reputational risks goes hand in hand with a more intense public scrutiny of a company general behavior. The increasing importance of corporate sustainability has put pressure on companies to demonstrate strong ethics and changed expectations around their behavior. In a 2008 letter to Berkshire directors, Warren Buffett wrote: ‘we must continue to measure every act against not only what is legal, but also what we would be happy to have written about it on the front page of a national newspaper...’.

According to a study by the World Economic Forum (2012) more than 25% of a company’s market value is directly attributable to reputation.

1.1 - Recent reputational events

In the recent past several events involving large, well known international companies drew public attention on the potential impacts of reputational risk. Among the most relevant ones the following can be mentioned:

- *Peanut Corporation of America* – contaminated products (2008-2009). By repeatedly shipping products known to carry salmonella, the food manufacturer was responsible for at least nine fatalities and the largest food recall in US history. Federal investigations blamed a toxic, profit-at-all-costs culture that led to ignore regulatory compliance requirements to the extent of falsifying food safety certificates. In the face of public and political outrage, the company halted operations and filed for bankruptcy soon afterwards.
- *Arthur Andersen* – *inadequate scrutiny of Enron’s accounts* (2001). Enron’s bankruptcy highlighted Arthur Andersen’s failure to fulfill its core professional

responsibilities and the inherent conflict of interests between the accountancy firm's audit division and its consulting practice. Andersen's conviction for obstruction of justice (later overturned) led to the company surrendering its US licenses to practice and the subsequent unviability of its international operations.

- *UBS – rogue trader* (2011). The announcement of trading losses amounting to more than \$2.3 billion led to a decline in the bank's share price, greater regulatory scrutiny, and the resignation of several top executives.
- *News Corporation – phone hacking* (2011). Widespread outrage following the admission that *News of the World UK* newspaper had accessed the voicemails of hundreds of celebrities and victims of crimes resulted in legal claims and redundancies costing in excess of \$340 million. Additional damages included the closure of the newspaper, a 30%-40% reduction in sales and advertising revenues in the replacement paper, the government block of the parent company's attempt to take full ownership of the broadcaster BSkyB, and increased regulatory control on journalistic practices.
- *BP – oil spill* (2010). The blowout on Deepwater Horizon rig had widespread impact beyond the operational losses from containment and cleanup. In financial terms, it brought to a 50% fall in the share price, the failure to pay dividends for three quarters, litigation with individuals and affected US states involving more than \$42 billion of payouts and the need for \$38 billion asset sales. In strategy terms, the company abandoned the solar and wind sectors and was banned from bidding for new government contracts in the US. The firm fell from being the second to the fourth-largest oil company worldwide in terms of market value.
- *Toyota – defective accelerators and brakes* (2009-2011). The need to recall more than 14 million vehicles worldwide led to an estimated global loss of \$2 billion in repairs and missed sales, in addition to at least \$1.1 billion in litigation, settlements and fines. Toyota's US market share tumbled from a market-leading 17% in early 2009 to a 14,4% third place in 2012, behind Ford and General Motors.
- *Olympus – concealment of losses* (2011). Discovery of the long-term high-level cover-up of major accounting irregularities raised major questions about corporate governance and the quality of the company's assets. The scandal rapidly drained

investor confidence, with the share price falling nearly 80% over one month and not recovering for 17 months.

- *Major banks – Libor market manipulation* (2012). The discovery of secret, longstanding attempts to interfere with the open market rate setting revealed remarkable governance shortfalls in banks such as Barclays and UBS. The systemic effects of such behaviors resulted in senior executives resignations, greater regulatory scrutiny and reform of the Libor rate-setting mechanism.

1.2 - Why reputation and reputational risk have become more and more important in the last few years?

The study of corporate reputation has intensified over the last few years. Figure 1 shows the number of articles devoted to corporate reputation for the period 1980 – 2003 as reported by Barnett et al. (2006).

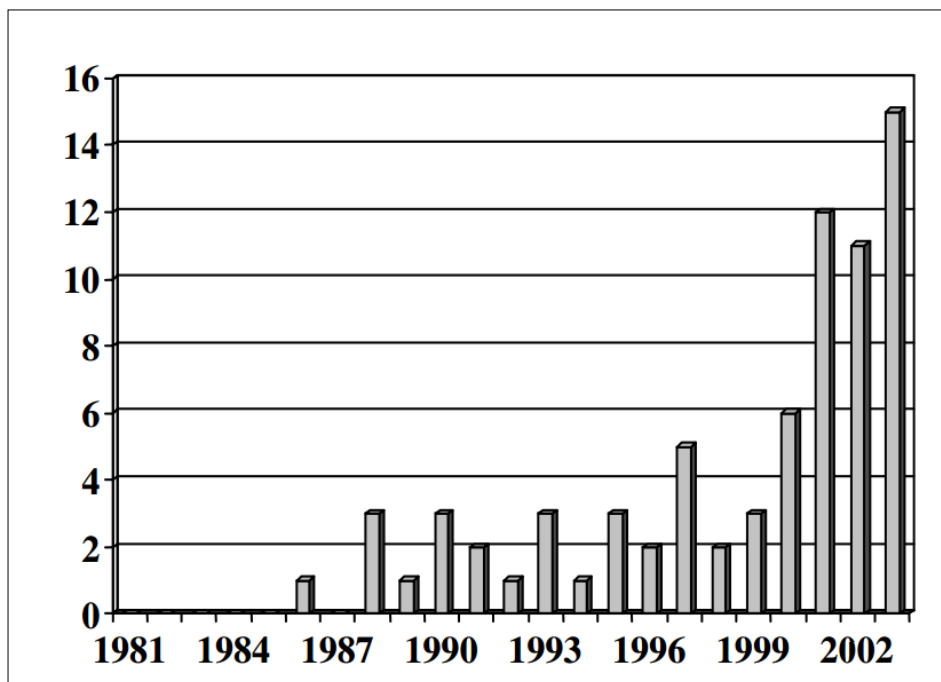


Figure 1 - Indexed peer-review articles containing 'corporate reputation' in title or abstract (Barnett et al., 2006)

As highlighted by the authors, the average number of scholarly articles on corporate reputation published during the period 2001 – 2003 was nearly five times as large as was the average for the period 1990 – 2000.

Figure 2 shows the number of papers dealing with corporate reputation for the period 1995-2015. To determine the trend, peer-reviewed articles containing “corporate reputation” in the title or abstract or key words published in academic journals indexed by SCOPUS were searched (Elsevier, 2015).

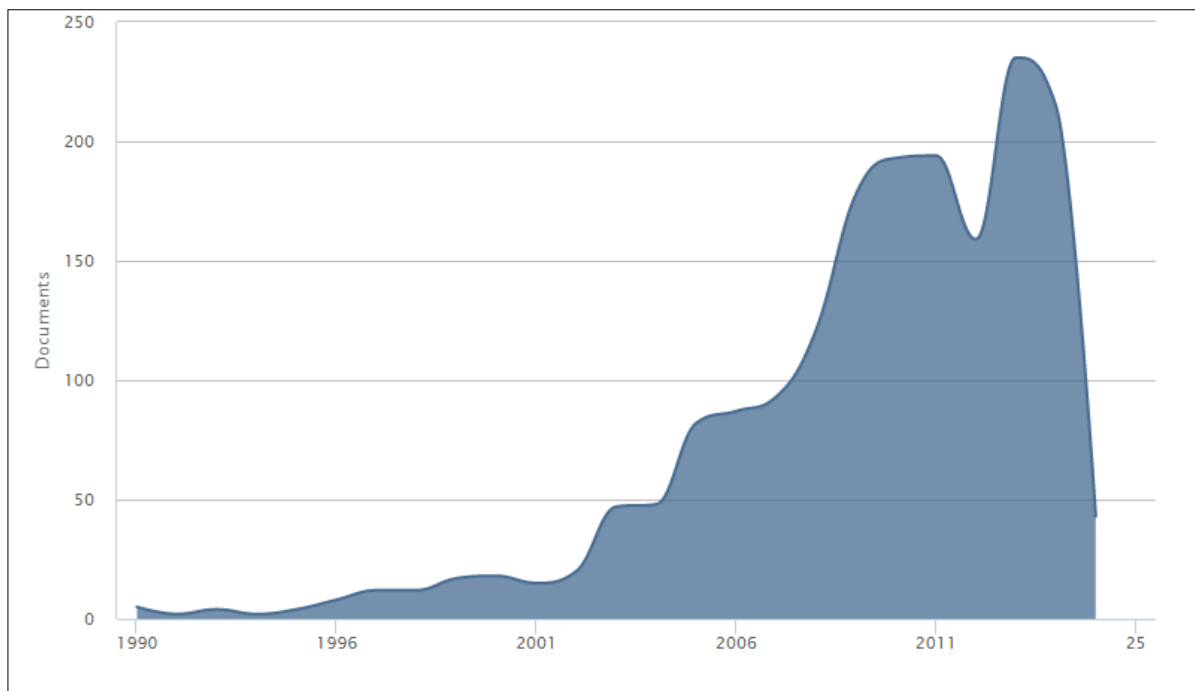


Figure 2 – Number of articles containing ‘corporate reputation’ in title or abstract or key words published in the period 1995-2005 by year (Elsevier, 2015)

The trend of the last 20 years shows a dramatic increase of academic papers on reputation . Among a total of 1814 documents, one third (27,1%) were published from 2013 until now.

Considering the nationality of the corresponding author (figure 3), western countries and Australia published most of the articles but China is increasing its involvement in such topic.

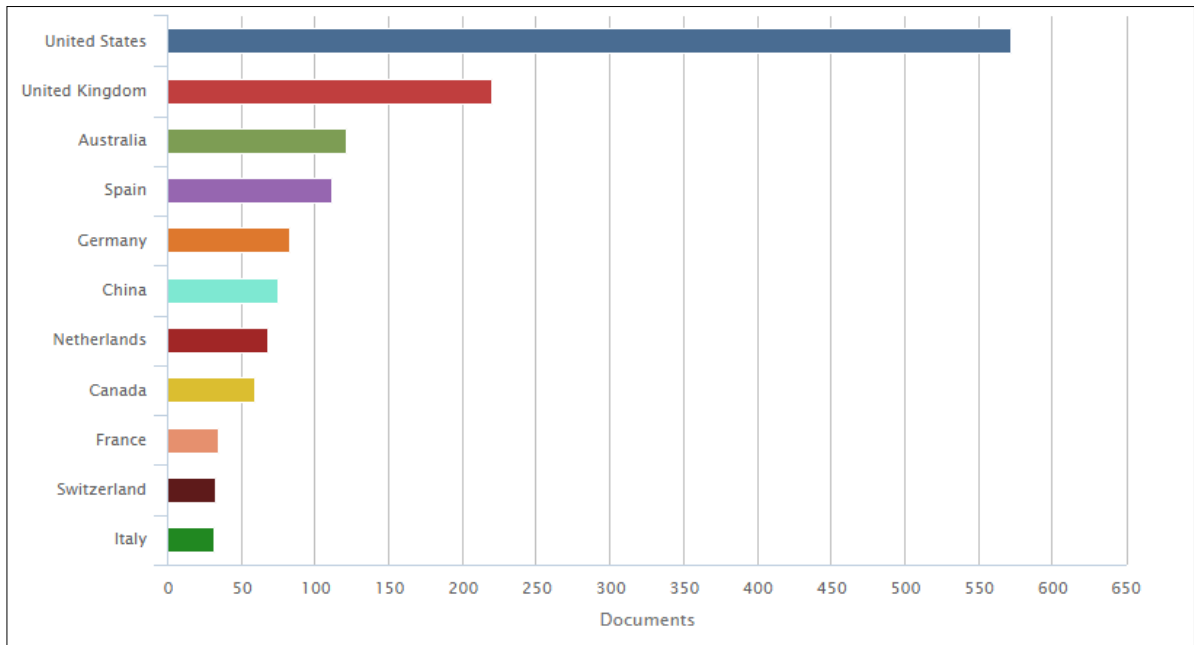


Figure 3 – Number of articles containing 'corporate reputation' in title or abstract or key words published in the period 1995-2005 by country (Elsevier, 2015)

There is a number of reasons why reputation and reputational risk have become a major source of concern for organizations. The most notable ones are:

Globalization - Two aspects related to globalization can have a reputational relevance. The first is represented by poor employment conditions in emerging market factories supplying large multinationals. In recent years, there has been a steady stream of tragedies and controversies related to employment conditions in emerging market factories that supply large multinationals (The ACE Group, 2013).

The second aspect is related to the increased focus on fraud and corruption in foreign subsidiaries. Dealing with fraud and corruption risks has become a major board-level challenge for many multinationals. Investors, regulators and other stakeholders are increasingly seeking evidence that these risks are properly controlled. Managing these challenges across highly complex global supply chains has become a major source of reputational risk.

Internet and media –The unprecedented accessibility of data via the Internet made stakeholders more demanding than ever before. The ability of businesses to provide the right information at the right time has itself become a key business competence and a driver of reputation. At the same time, media are becoming more intrusive and sensational: when crisis hit,

companies have now to operate under the pressure of invasive and often simplifying media reports. Therefore, crisis management has become an even more delicate and complex task, pushing organizations to develop elaborate crisis management policies.

Growth of intangible assets – Ocean Tomo (2011) reported a significant increase of intangible assets from 1975 to 2010 (figure 4): average market value of a Standard & Poor’s 500 company in 1975 consisted only of 17% intangible assets while it has grown up to 80% by 2010.

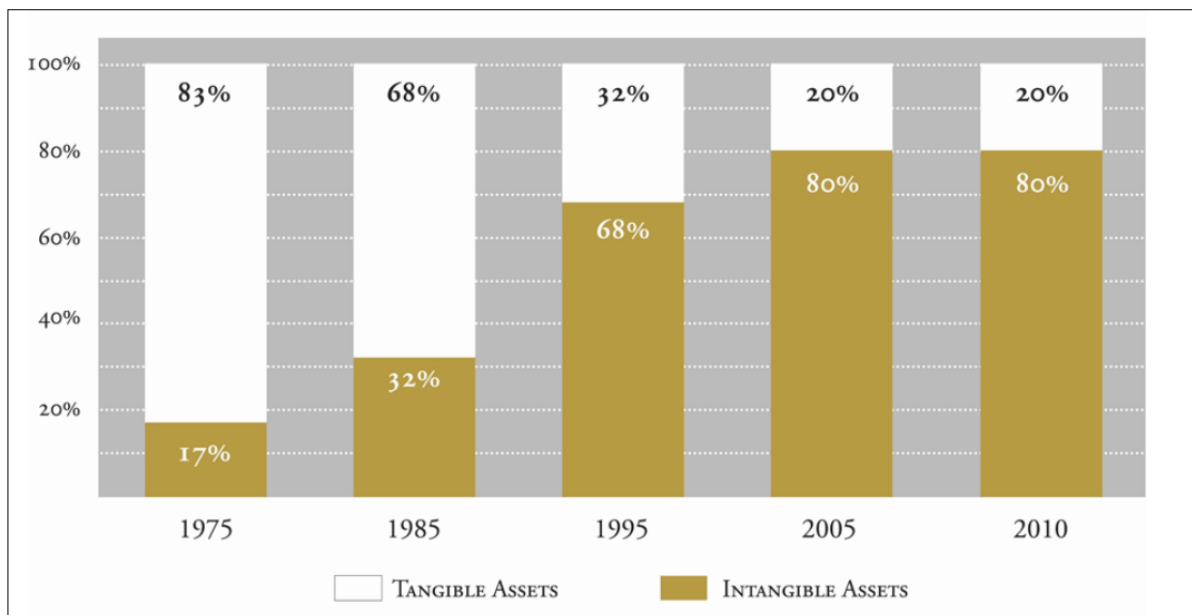


Figure 4 - Components of Standard & Poor’s 500 company Market Value(Ocean Tomo, 2011)

Much of this is ‘off balance sheet’ and does not form part of the business’s quoted net assets. Generally accepted accounting principles are under increasing criticism for their failure to recognize and measure intangible assets. In the US the Financial Accounting Standards Board (FASB) is working on rules that will require US companies to disclose information regarding intangible assets such as customer lists, brands and technology. Having so much of a business’s true value ‘off balance sheet’ implies that the current market valuation heavily depends on investors’ confidence.

Regulation - As companies continue to globalize, and as governments seek to impose stricter controls on corporate behaviors in the wake of the recent financial crisis, the perception among many companies is that the regulatory environment has become more difficult than ever to manage. Compliance has taken on a new importance for many

companies and they are now more aware of its link with their reputation. From a reputational risk perspective, compliance failures send out the message that companies may be failing to manage the broader risks to the company.

1.3 - How do managers see reputational risk

The growing importance of reputational risk is confirmed by top executives and risk managers insights.

The first extensive survey carried out on this topic was conducted by The Economist in 2005. Most respondents agreed that reputation was a primary asset for their organization and acknowledged that the risk to their organization's reputation had significantly increased over the previous five years. They also recognized that reputational risk is harder to manage than other sorts of risk, largely because of a lack of established tools and techniques and confusion about who is responsible for it.

When asked to rank their concern over different risk categories respondents clearly identified reputational risk as their top priority. Regardless of how reputational risk was defined, it was acknowledged as the business top concern. There was however little agreement upon how it should be treated and whether it constituted a "self-standing" risk.

The landscape has not considerably changed in the last decade. Recent surveys by Deloitte (2014) and The Ace Group(2013) found that reputational damage was still the top concern for organizations and that yet most of them have difficulties in managing it due to a lack of quantitative methodologies.

It is curious to note that while tools and techniques for managing monetary risks multiplied, so little has been achieved in the field of managing reputation.

2.Reputation and reputational risk

The objective of this section is to introduce key definitions and mechanisms related to reputation and reputational risk.

2.1 - Definitions of corporate reputation

The first step towards a comprehensive definition of reputational risk is certainly understanding the concept of reputation.

An overview of academic literature and business publications on corporate reputation reveals a lack of consistency in the terminology used by academics and risk managers. This is probably because reputation has been analyzed from a multitude of different perspectives and within a variety of different disciplines: economics, accountancy, sociology, marketing, organizational behavior and strategy.

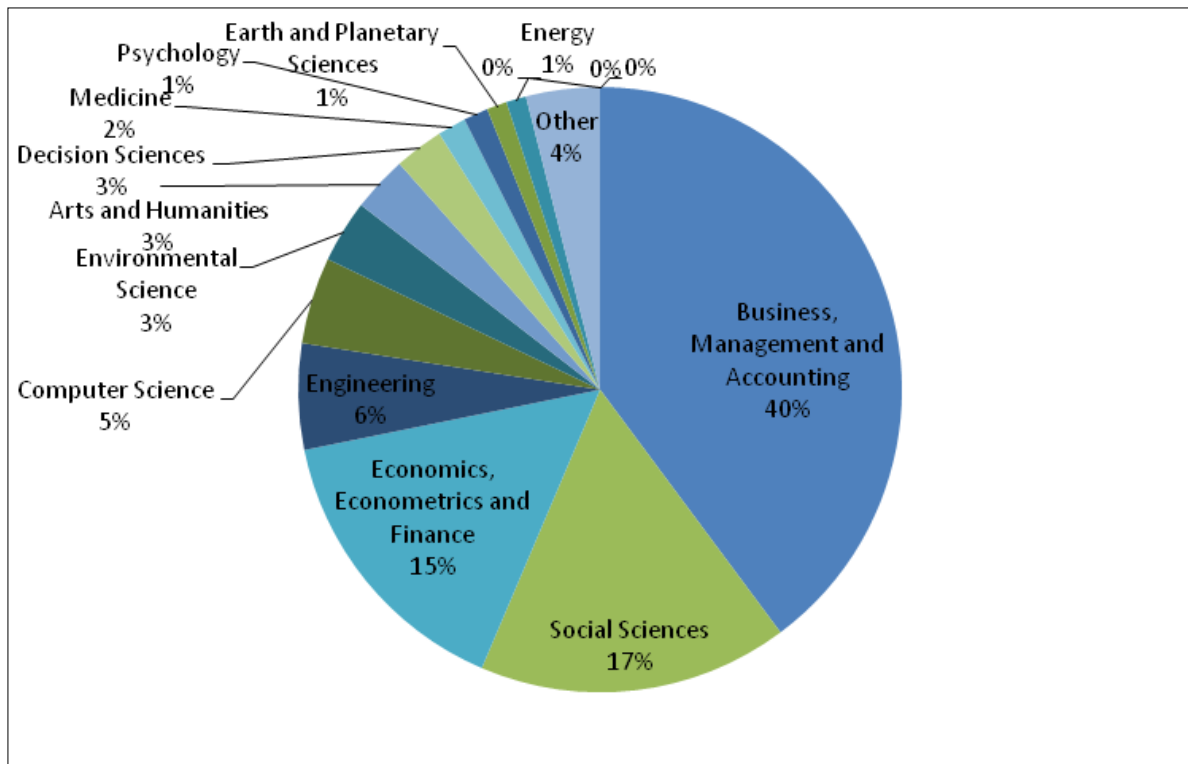


Figure 5 - Number of articles containing 'corporate reputation' in title or abstract or key words published in the period 1995-2005 by discipline (Elsevier, 2015)

Figure 5 shows the number of peer-reviewed articles on corporate reputation published in academic journals and indexed by SCOPUS (Elsevier, 2015) in the period 1995-2015. Most of the papers belong to the fields of economy and finance; however, there is a good number of journals of social disciplines and a certain representation of other different disciplines.

Some of the most remarkable definitions of corporate reputation are mentioned in Table 1.

Table 1 – Definitions of corporate reputation

Author	Definition
Herbig & Milewicz (1993)	‘reputation is an aggregate composite of all previous transactions over the life of the entity, a historical notion, and requires consistency of an entity’s actions over a prolonged time’
Fombrun (1996)	‘a perceptual representation of a company's past actions and future prospects that describes the firm's overall appeal to all of its key constituents when compared with other leading rivals’
Bromley (2000)	‘(. . .) the way key external stakeholder groups or other interested parties conceptualise that organization’ ‘reputation can be defined as a distribution of opinions (the overt expression of a collective image) about a person or other entity, in a stakeholder or interest group’
Schultz et al. (2001)	‘reputation combines everything that is knowable about a firm. As an empirical representation, it is a judgement of the firm made by a set of audiences on the basis of perceptions and assessments’
Gotsi & Wilson (2001)	‘a corporate reputation is a stakeholder’s overall evaluation of a company over time. This evaluation is based on the stakeholder’s direct experience with the company, any other form of communication and symbolism that provides information about the firm’s actions and/or a comparison with the actions of other leading rivals’

Mahon (2002)	‘reputation is an asset in relation to expectations of organizational behavior based on past actions and situations’
Schwaiger (2004)	‘we conceptualize reputation as an attitudinal construct, where attitude denotes subjective, emotional, and cognitive mindsets’
Walsh & Beatty (2007)	‘the customer’s overall evaluation of a firm based on his or her reactions to the firm’s goods, services, communication activities, interactions with the firm and/or its representatives (e.g. employees, management) and/or known corporate activities’

A systematic review of the literature on corporate reputation was conducted by Walker (2010) on a sample of 54 well-cited papers (and one book). Of the 43 articles in the sample that examined corporate reputation, only 19 provided a definition and 5 referenced Fombrun's (1996) definition. According to Walker three key attributes are emphasized in Fombrun's definition: (1) reputation is based on perceptions, (2) it is the aggregate perception of all stakeholders and (3) it is comparative.

The first definitional attribute is that reputation is based on perceptions. This implies that reputation is somehow out of the control of a corporation. As pointed out by Fombrun (1996): ‘because a reputation is not directly under anyone's control, it is difficult to manipulate’.

Second, reputation reflects the aggregate perception of all stakeholders. This highlights two important components of reputation: (1) it is a social/collective concept, (2) it is based on the perceptions of all stakeholders. There are two main problems with viewing corporate reputation as an aggregate perception. The first one is that reputation is often issue specific.

A corporation might have specific and potentially different reputations in each of the following areas: profitability, employees treatment, environmental and social responsibility, corporate governance and product quality. The second problem is that a corporation may have a different reputation for each stakeholder group. Different stakeholders may have different perceptions regarding the organization. An organization may have, for instance, at the same time, a good reputation among its stockholders and a less good one among its employees (Fombrun, 1996; Bromley, 2000; Mahon, 2002).

The third definitional attribute is that reputation is comparative. Fombrun's (1996) definition specifies that this comparison is with 'other leading rivals'. But this comparison is not necessarily with rivals alone, it can be based on a number of different criteria. For example, comparisons can be made with a firm's previous reputation (longitudinal comparison) or against an industry average (Wartick, 2002).

According to Walker (2010) two additional attributes of reputation emerge from the literature. The first one is that a definition of corporate reputation must recognize that it can be positive or negative (Mahon, 2002; Rhee & Haunschild, 2006). The second is that reputation is described as stable and enduring (Rindova, 1997; Gray & Balmer, 1998; Mahon, 2002; Roberts & Dowling, 2002; Rhee & Haunschild, 2006).

2.1.1 - Corporate reputation, identity, image and brand

Part of the confusion around the definition of corporate reputation also stems from the different perspectives regarding the relationship between corporate reputation and its components: identity and image.

As regards corporate image there has even been a debate on whether it differs from reputation. Gotsi & Wilson (2001) analyzed a set of different points of view on reputation and found that there are two clearly defined schools of thought: an "analogous" school of thought and a "differentiated" one. The analogous school considers corporate reputation as a synonym with corporate image. For the differentiated school corporate reputation and image are different, although interrelated (e.g., reputation influences image).

Corporate identity has been defined as one of the attributes of a company that addresses the questions 'What are we?' and 'Who are we?' (Balmer & Greyser, 2003) but its relationship with reputation has been quite disputed.

Fombrun (1996) provides a cohesive and widely accepted framework that clarifies relationships between reputation, identity and image. He suggests that identity may be extended through names and self-presentations and projected through customers, community and employees images, into corporate reputation. Identity serves as a mean of differentiation on the basis of culture, history and operations (including management). Fombrun sees corporate image as sometimes accurately reflecting a company's identity. Hence, corporate reputation begins to emerge as an outcome of image, plus relationships,

plus corporate performance. However, the image can be distorted (a) as the company tries to manipulate its public through advertising and other forms of self-presentation, or (b) as rumors develop from unofficial statements of employees to peers, analysts, and reporters. If the fit is right, suggests Fombrun (1996), between image and the underpinning corporate identity, it will have enduring value. Figure 6 illustrates the Fombrun's construct on the relationship between identity, image and reputation.

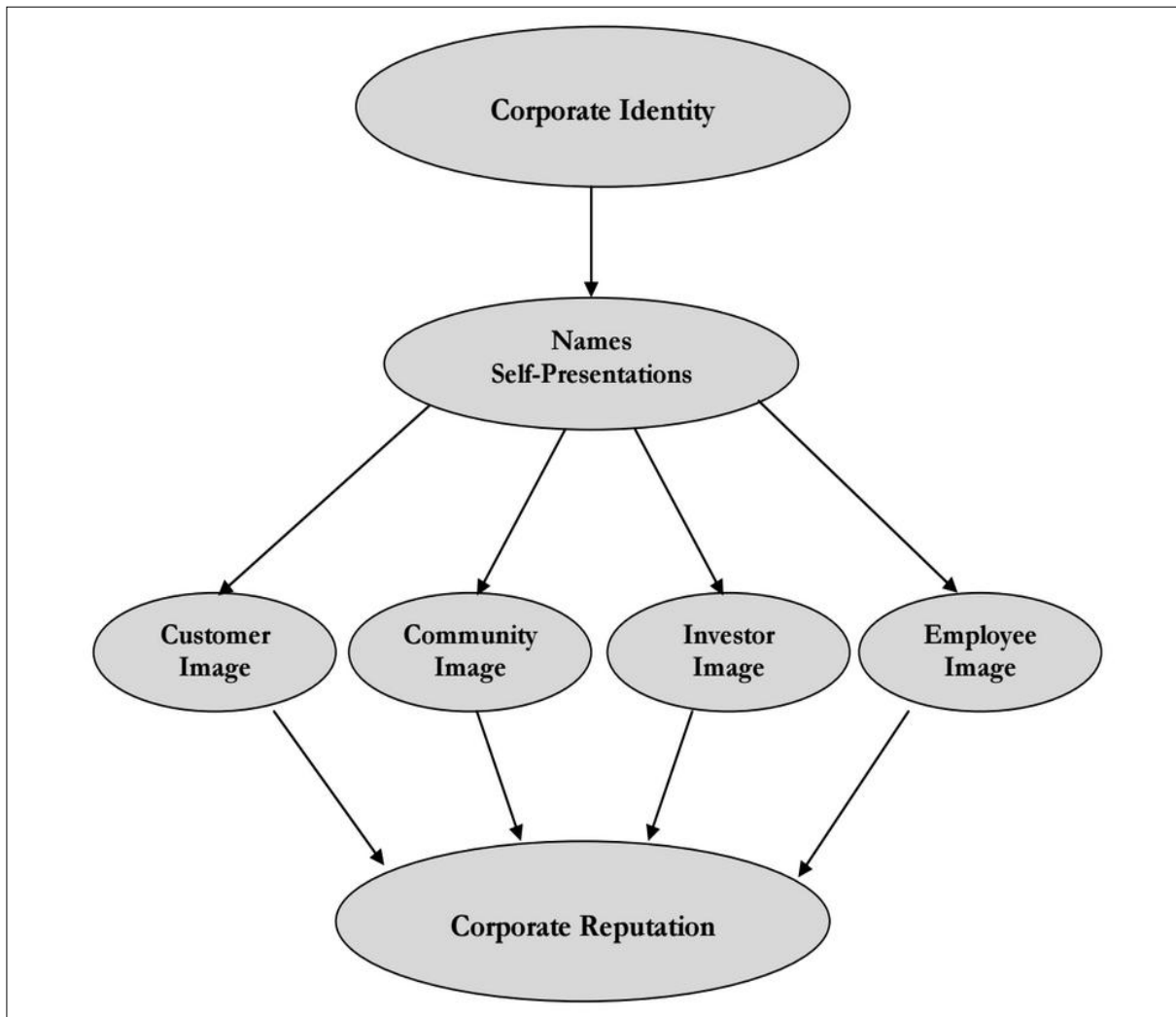


Figure 6 – Fombrun's 'From identity to reputation' construct (Lloyd, 2007)

Warner (2010) analyzed the definitions of the three terms (organizational identity, organizational image, and corporate reputation) in 54 papers. A major point of differentiation between the three terms is whether the concept refers to internal or external stakeholders, or both. There is a clear tendency for organizational identity to refer to internal

stakeholders only, for organizational image to refer to external stakeholders only, and for corporate reputation to refer to both categories.

The most common definition of organizational identity is the one provided by Whetten & Mackey (2002), who define it as ‘that which is most central, enduring, and distinctive about an organization’. Identity has been frequently considered as the ‘core’ or ‘basic character’ (Barnett et al., 2006) of the firm from the employees perspective. Fombrun (1996) described identity as ‘the features of the company that appear to be central and enduring to employees’. Identity takes shape inside the company, based on its organization’s culture. It consists of current practices, history, values and behavior (Melewar et al., 2005).

Image takes shape inside the mind of external stakeholders; it refers to their impression of the organization influenced over time by direct or indirect experiences: in other words, it reflects how they perceive the organization’s identity at a given point in time (Balmer & Greyser, 2002; Melewar et al., 2005). Organizational image, also defined as corporate communications, can be described as ‘the various outbound communications channels deployed by organizations to communicate with customers and other constituencies’ (Balmer & Greyser, 2006). Balmer summarized the concept of corporate image in the following key question: what is the current perception and/or profile? Corporate image is in relation to the immediate mental perception of the organisation held by an individual, group or network.

In contrast with organizational image, definitions of corporate reputation refer to actual stakeholders (both internal and external). Time was an important distinction between image and reputation because building a reputation takes time (Mahon, 2002; Roberts & Dowling, 2002; Rhee & Haunschild, 2006;). Image, on the other hand, changes frequently and may result in quickly obtained perceptions of a firm. Reputation is relatively stable and persisting, it is ‘distilled over time from multiple images’ (Rindova, 1997).

Corporate reputation has been defined as the accumulation of images over the years (Gotsi & Wilson, 2001; Mahon, 2002). Gray & Balmer (1998) discuss how ‘image can be attained relatively quickly but a good reputation takes time to build’. Therefore, unlike image, corporate reputation takes time to build but, once built, it is relatively stable. It is also true that even if reputation is characterized by a certain stability, serious accidents can shake it

thoroughly. A quote attributed to Warren Buffet, a US financier, says: ‘It takes 20 years to build a reputation and five minutes to ruin it.’

Corporate branding emerged as a key concept in the late 90s (Burt & Sparks, 2002). It has clear links with corporate image, corporate identity and corporate reputation but may represent a shift away from Fombrun’s (1996) identity/image/reputation model. From an internal point of view corporate branding is seen to signal messages about a desired culture. Externally it can facilitate customers to look deeper into the corporation and, through building respect and trust with the corporation's offerings, encourage consumers to accept the corporation's promises about other offerings (de Chernatony, 1999; Balmer, 2001). According to Balmer (2001) corporate brand is summarized by the question: what is the promise inferred from/ communicated by the brand? Brand has to do with all the elements of identity, symbols and promises the company develops in order to differentiate its products and services from those of its competitors (Reputation Institute, 2008).

The corporate brand was defined by Knox & Bickerton (2003) as ‘the visual, verbal and behavioral expression of an organization’s unique business model’.

2.1.2 - Reputation benefits

Fombrun (1996) describes reputations as strategic assets that ‘produce tangible benefits: premium prices for products, lower costs for capital and labor, improved loyalty from employees, greater latitude in decision making and a cushion of goodwill when crises hit’.

Good corporate reputations have strategic value for the firms that possess them (Robert & Dowling, 2002). Several studies confirm the expected benefits associated with good reputations (Fombrun & Shanley, 1990; Podolny, 1993; Landon & Smith, 1997). Firms with good reputations benefit from lower costs and can charge higher prices (Podolny, 1993; Deephouse, 2000; Rindova et al., 2005), are better able to sustain superior profit outcomes over time (Roberts & Dowling, 2002), have better ability to communicate the quality of the company’s services (Engert, 2002), enjoy protection against market entrants (Deephouse, 2000), attract better human resources (Turban & Greening, 1997; Morrison & Wilhelm Jr., 2003), have easier access to the capital market (Fleischer, 2004; Smith et al., 2008;) and

experience greater returns relative to actual quality (Roberts & Dowling, 2002) than firms with poor reputations.

Neville et al. (2005) suggest a relationship between corporate reputation and corporate performance, measured in both financial and social terms. Mukherjee & He (2008) analyze the impact of reputation on performances, making a distinction based on stakeholders' expectations (in particular senior managers, employees and clients). They demonstrate how companies having higher reputation are able to reduce the gap between expectations and results.

Feldman et al. (2014) summarized the main benefits of a strong corporate reputation as:

- Improving the consumer's perception of the quality of products or services (which allows to charge premium prices): sale increases and positive word-of-mouth
- Improving the capacity of hiring and retaining qualified personnel in corporations
- Raising the morale of employees and therefore productivity
- Protecting the value of the enterprise by diminishing the impact of scrutinizing, crisis and/or competitive attacks
- Preceding and helping international expansion, not only in terms of market penetration but also in preparing the scenery in key communities and facilitating alliances
- Attracting a greater number of investors (good credibility): rise of market value (EBITDA) and diminishing risks for the organization
- Differencing the company from its competitors and establishing better market positioning
- Allowing access to cheaper capital.

Good corporate reputation is critical because of its potential for value creation, but also because its intangible character makes replication by competing firms considerably more difficult.

In transactions between buyers and sellers, if buyers are unable to understand the actual quality of the product before purchasing but sellers are fully informed, a situation of asymmetric information is present. In such situations, an organization's reputation serves as a signal of not observable quality, which allows an organization with a high reputation to

obtain more benefits than low reputation organizations of the same quality (Rhee & Haunschild, 2006). Company's reputation provides a solution to the problem of uncertainty in an asymmetric information system (Podolny & Hsu, 2002).

A good reputation could protect firms from the uncertainties of the market because of the inertial properties of reputations. Several theories suggest that status orderings are inertial, or even that success breeds success (and failure breeds failure) (Podolny, 1993). But reputation can be also considered as a "double-edged sword", that is it can have a significant downside: when firms make mistakes, those with a good reputation can suffer more than those with poor reputations (at least in situations of easy product substitutability). Rhee & Haunschild (2006) demonstrated that a good reputation is less advantageous than a poor reputation in absorbing the impact of product defects, and so high reputation firms are more likely to be punished by the market. In some situations good reputation can be recognized as an organizational liability.

Carroll (1979) was among the first researchers to offer a definition of corporate social responsibility and to understand the need to invest on corporate reputation. Reputation becomes therefore a measure of the sustainable value created by a company. Sacconi (2004) provides a definition of social responsibility based on the concepts of social contract, conformism and reputation. Harrington (2003) proposes empirical checks aimed at highlighting such relationship; he shows in particular how companies investing in social and environmental sustainability enjoy higher market values. Similar results were obtained by Johnson & Greening (1999) and Cox et al. (2004).

At the opposite side some theories suggest that corporate image cannot be a relevant factor in determining a company's value and that it has no impact on the investment risk premium. According to Gabbi & Patarnello (2010), some authors believe that management has no incentive to invest on reputation, because such investment would not produce returns, at least not in terms of market value.

2.2 - Definition of reputational risk

Textbooks and papers which explicitly refer to the concept of reputational risk are relatively recent.

Analyzing scientific articles containing ‘reputational risk’ in the title, abstract or key words, a total of 227 papers were found in SCOPUS (Elsevier, 2015), most of which were published in the last ten years (Figure 7).

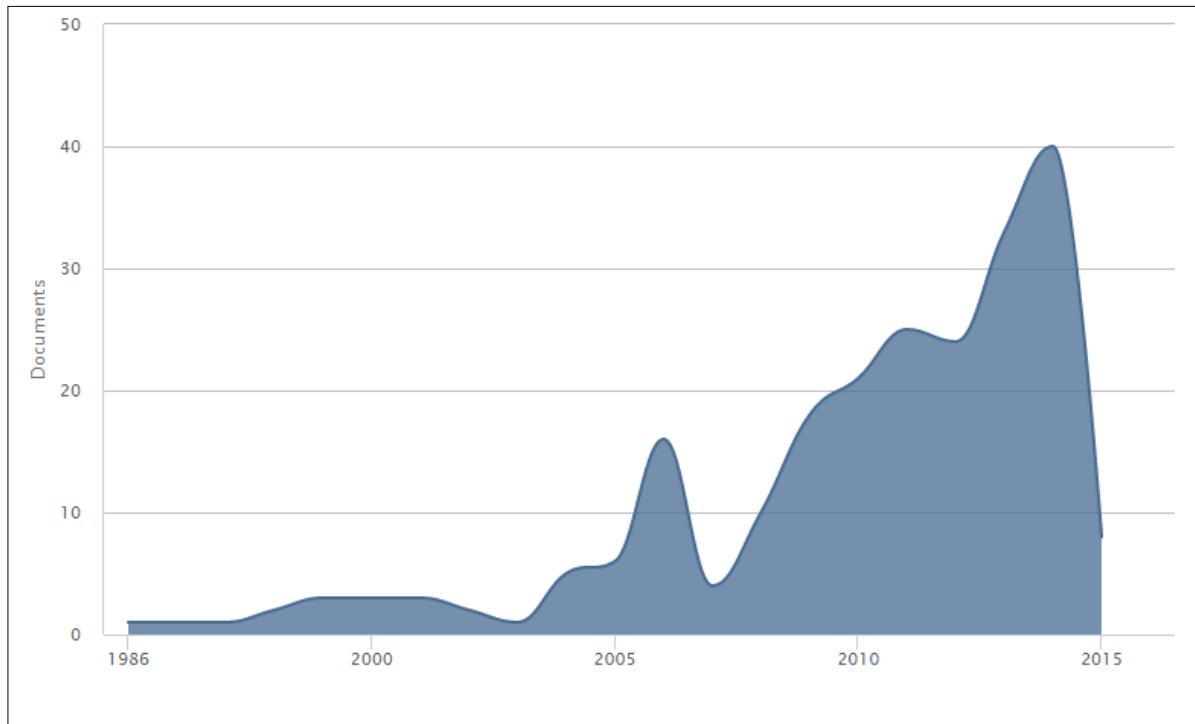


Figure 7 - Number of papers on “reputational risk” published on journal indexed by SCOPUS (Elsevier, 2015)

There is not a universally accepted definition of reputational risk (Soprano et al., 2009).

According to Fombrun et al. (2000), the fluctuating value of a company’s reputation has been defined as reputational capital and calculated as the market value of a company in excess of its liquidation value and intellectual capital. It constitutes the residual value of a company’s intangible assets over and above its stock of patents and know-how. A company’s reputational capital is therefore the portion of its value that is at risk in everyday interaction with stakeholders. As a consequence, Fombrun et al. (2000) define reputational risk as the range of possible gains and losses in reputational capital for a given firm.

Other definitions of reputational risk provided by other authors are listed in Table 2.

Table 2 - Definitions of reputational risk

Author	Definition
Rayner (2003)	‘reputation risk is any action, event or circumstance that could adversely or beneficially impact an organisation’s reputation’
Board of Governors of the Federal Reserve System (2004)	‘reputational risk is the potential that negative publicity regarding an institution’s business practices, whether true or not, will cause a decline in the customer base, costly litigation, or revenue reductions’
Perry & de Fontnouvelle (2005)	‘in general a reputational risk is any risk that can potentially damage the standing or estimate of an organization in the eyes of third-parties’
Basel Committee on Banking Supervision (2009)	‘reputational risk can be defined as the risk arising from negative perception on the part of customers, counterparties, shareholders, investors, debt-holders, market analysts, other relevant parties or regulators that can adversely affect a bank’s ability to maintain existing, or establish new, business relationships and continued access to sources of funding’
Young (2010)	‘reputational risk is a set of material consequences that arises when stakeholders’ opinions influence their decision making outcomes’

One of the disputed aspects about reputational risk is whether it should be considered as a self-standing risk. According to the white paper of the Economist Intelligence Unit (2005), there is a dispute over the very nature of reputational risk. Some consider it a specific risk with clear drivers and tangible business consequences, even if these are difficult to quantify. For others it is a “risk of risks” that does not exist on a standalone basis. A third point of view is that reputation risk is not at all a risk, but only an outcome of other risks. All together, these three views grasp the essence of reputation risk. There are few reputational threats that are not interconnected with one type of business problem or another.

Respondents to the survey of the Economist considering reputational risk as a category of risk on its own or viewing it as stemming from a variety of other risks are virtually equally weighted. Nevertheless, most companies participating in the survey see reputational risk as a problem which requires its own, specific solutions. Approximately three-quarters of the companies disagree with the statement, ‘a well-run business doesn’t need to invest extra resources into guarding against reputational risk’.

2.3 - Stakeholders

As previously seen, definitions of reputation and reputational risk cannot ignore the concept of stakeholders: they have meaning only when considered in relation to stakeholders. Stakeholders are any group that can affect or be affected by the behavior of an organization (Bryson, 2004).

An organization’s reputation resides with a wide range of interested parties. The most important ones are customers and investors. At a second level, regulators play a key role, setting and enforcing standards. Employees’ motivation directly influences productivity and service quality, and they represent the human face of the organization.

The general public may be affected by the organization’s actions, directly or indirectly, and may respond unfavorably if they feel their interests are endangered. These groups are neither mutually exclusive nor independent from each other. Indeed, the mechanisms of feed-back between them require special attention.

A global study by the World Business Council for Sustainable Development (Holme & Watts, 2000) identified nine categories of stakeholders:

- Company owners/shareholders/investors
- Employees
- Customers
- Business partners
- Suppliers
- Competitors
- Governments/regulators
- NGOs, pressure groups/influencers
- Communities.

The list includes those groups that have a clear, direct and legitimate financial or other 'stake' in the business (such as its employees and investors), as well as groups that have an indirect interest (such as NGOs, pressure groups and other influencers). These latter groups often see themselves as representing voiceless or disenfranchised communities, the general public, animals or the natural environment.

According to Rayner (2003):

- employees have expectations from the organisations they work for. Research has shown that a good reputation for responsible behavior is a significant factor in recruitment, particularly of graduates. If reputation is poor, the company is likely to have difficulty both recruiting and retaining high-quality staff. If it is good, the company can enter into a virtuous circle attracting high-quality recruits who, through their presence, further enhance reputation.
- consumers, moved by ethical awareness and an abundance of supporting data (provided by the media, pressure groups and the internet) are faced with a wide choice of products and services (Rayner, 2003). They are in an ideal position to switch brands or boycott products if they have concerns about the reputation of the supplier. However, it would be unwise to assume that consumers always do as they say. Previous studies have identified a so called 'Ethical Purchasing Gap' (Nicholls & Lee, 2006), or 30:3 syndrome, whereby approximately a 'third of consumers declare to care about companies' policies and records on social responsibility, but ethical products rarely exceed a 3% market share' (Cowe & Williams, 2000). This evidence suggests that while ethical awareness and commitment might be widespread, most of the time this is not translated into purchasing action.
- pressure groups and NGOs have an increasing power. These organisations have learned how to mobilise public opinion by skilful and timely use of the media, and how to work, when necessary, with other stakeholder groups to maximise impact. The growing influence of NGOs is recognised by businesses and major investor groups. Working in collaboration with an NGO could convert your most violent critic into your best fan. Of course, real life is not always as straightforward. The ethos and approach of some pressure groups may preclude any form of discussion or collaboration with the 'enemy'.

The various stakeholders are often not discrete, mutually exclusive groups; they frequently have overlapping interests. An individual may wear a number of stakeholder ‘hats’ in relation to a single organisation. An individual may be an employee, customer, supplier or shareholder of a specific business as well as a member of the local community in which the business operates (Rayner, 2003).

The different groups of stakeholders have a specific relation with companies. These relationships were classified in the Report of the Conference Board (Tonello, 2007) as:

Enabling relations - Shareholders, bondholders, banks, institutional investors, suppliers, and employees are key stakeholders because they provide and control resources enabling the organization to exist and operate.

Customer relations - Customers are key stakeholders because they provide demand for business output.

Normative relations - Professional associations, trade unions, legislatures, governmental agencies, financial analysts, rating agencies, and other self-regulatory organizations may be key stakeholders as they function as standard-setters and determine the boundaries of the company’s business activities.

Peer relations - Other business organizations (including competitors) may be key stakeholders if they participate in a joint venture, a non-compete agreement, or other strategic relationships with the company.

Special interest relations - Local communities and a number of activist groups (such as social and environmental organizations) may be key stakeholders as they have widespread interest in and claims on the company.

2.4 - Impacts

Enjoying a good reputation has several rewards, among which the continuing trust and confidence of customers, investors, regulators, employees, suppliers and other stakeholders, the ability to differentiate the business and to create competitive advantage. On the contrary, a bad reputation can result in a loss of customers, low employees’ motivation, shareholders’ dissatisfaction and ultimately the fall of the business itself (Gaultier-Gaillard et al., 2009).

According to Gaultier-Gaillard et al. (2009) reputation may impact the relationships of the company with its stakeholders:

- Stockholders' decisions to hold onto their shares
- Customers' desire to buy products and services
- Suppliers' desire to establish partnerships
- Competitors' eagerness to enter the market
- Media coverage
- Pressure groups/NGO activity
- Control and regulatory authority attitudes
- Cost of capital
- Recruitment of high potential individuals
- Motivation of current workforce
- Inclination of stakeholders to grant the benefit of the doubt when a crisis emerges.

As a consequence there are several paths by which reputational risk can induce losses for a firm (Perry & de Fontnouvelle, 2005; Soprano et al., 2009):

- Loss of current or future customers
- Loss of employees or managers within the organization, an increase in hiring costs, or staff downtime
- Reduction in current or future business partners
- Increased costs of financial funding via credit or equity markets
- Increased costs due to government regulations, fines, or other penalties"
- Fall in the company's share prices
- Increased costs to recover image and branding (advertising strategy, market communication policy).

According to a recent survey by Deloitte (2014), when a reputation risk spirals out of control, there can be a wide range of negative impacts. However, revenue and brand value are key. In the survey, 41% of respondents (C-Level executives, board members or specialized risk executives) who experienced a reputational risk event say loss of revenues was the biggest impact. This was particularly true for consumer goods and energy companies. The same number of respondents (41%) say loss of brand value was the key impact. This was especially true in the life sciences and technology sectors.

Regarding organizational aspects, Desai et al. (2006) analyze sanctions for top managers who infringed accounting and financial standards. Their research shows how such situations have a negative impact on career development opportunities and bring to higher management turnover. Chalmers & Godfrey (2004) show how news related to improper behaviors in the field of derivatives have a positive correlation with reputational impact, for both corporations and managers.

Thies (2002) shows how a meaningful sample of companies audited by Arthur Andersen in the period following the Enron fraud significantly underperformed their reference index and comparable companies audited by other firms (Price Waterhouse, Ernst & Young, Deloitte & Touche, KPMG, Coopers & Lybrand). Such conclusion suggests that in sectors characterized by a significant fiduciary component reputational damage has systemic implications and can transfer to the stakeholders of the company involved.

2.5 - Upsides and downsides

Reputational risk should be viewed as a generic term encompassing the risks, from any source, that can have an *impact* on reputation, and not as an independent category of risk. Non compliance to regulations, unethical employee behavior, loss of customer data or an unexpected profit warning can all damage reputation and stakeholders' confidence.

Reputational risk not only regards downside threats, but also upside opportunities. Climate change, for example, is a potential business threat. However, many firms have spotted and exploited the opportunity for gaining a competitive advantage by developing green technologies and promoting themselves as environmentally friendly, enhancing in this way their reputation. Reputation risk can therefore be defined as follows: anything that could impact reputation, either negatively (threats) or positively (opportunities) (Rayner, 2008).

Rayner (2003) highlighted that there is a rising expectation for business behavior which presents new opportunities to enhance corporate reputation by being reliable, trustworthy, accountable and transparent. Organizations that actively rise to the emergent challenges presented by the new demands and expectations have a unique opportunity to enhance their reputation.

3. Reputation and reputational risk assessment

The objective of this chapter is to present the most significant techniques proposed and implemented for the estimation of reputation and reputational risk.

Assessing reputation and reputational risk is widely acknowledged as a very complicated task. Both for reputation and for its risk numerous qualitative and quantitative models have been proposed.

3.1 - Measuring corporate reputation

Empirical efforts aimed at measuring reputation value have for long time been very limited (Fombrun & van Riel, 1997; Barnett et al., 2006) showed the exponential increase from the beginning of the 80s of articles having the words “corporate reputation” in their title or abstract. Such trend intensified after a few cases of reputational damage which produced significant losses for the investors and had a devastating impact on the reputation of the companies involved.

The theory is simple: an organization enjoys a good reputation when it consistently meets or exceeds the expectations of its stakeholders. A bad reputation results when the organization’s words or deeds fall short of stakeholder expectations. However, effectively assessing its monetary value or even its qualitative level is definitely a complex procedure.

As previously mentioned there are both qualitative and quantitative methods to measure reputation. While the qualitative methodologies purpose is to assign a numeric score to the level of reputation of an organization, quantitative methodologies attempt to assess the monetary value of the whole reputation capital or at least of some of its components.

3.1.1 - Qualitative methods

The most common qualitative method for assessing the level of reputation is represented by reputation indexes.

In the past twenty years, several qualitative-index methodologies to measure reputation have been suggested and implemented. The common feature of these models is that they are all

survey-based methods: they ask to a pool of respondents to express their opinion of a company with reference to a specific set of reputational dimensions and subsequently translate such views into a synthetic score.

Some of the numerous reputation indexes are:

- Fortune' Overall reputation quotient (AMAC and GMAC)
- The reputation Institute's Reputation Quotient (from 2006 RepTrak System)
- Merco's rating (Business Monitor of Corporate Reputation).

The main difference between these ratings are the different classifications of the determinants of reputation.

This phenomena can be observed in literature as well: a wide array of reputation taxonomies has been proposed by a number of researchers (Fombrun & Gardberg, 2000; Schwaiger, 2004; Honey, 2009).

The most notable reputation indexes are the Reputation Institute's "Reputation Quotient" and Fortune's "Overall Reputation Score" (ORS).

Fortune magazine compiles an annual survey America's Most Admired Companies (AMAC) via a poll among executives, managers and financial analysts. The rating is based on evaluation of 500 largest U.S. companies. From 1997 Fortune extended the rating to the rest of the world publishing yearly a survey named GMAC (Global Most Admired Companies).

Table 3 – ORS dimensions

-
1. Quality of management
 2. Financial soundness
 3. Quality of products or services
 4. Ability to attract, develop, and keep talented people
 5. Innovativeness
 6. Responsibility for the community and the environment
 7. Long-term investment value
 8. Wise use of corporate assets
-

The Fortune magazine annual surveys provide an index based on scores obtained by the companies in eight dimensions each with an 11-point scale (table 3).

The Reputation Quotient (CR) was developed by the Reputation Institute jointly with Harris Interactive in 1998. The questionnaire they use to measure reputation consists of 20 items divided into 6 pillars (Table 4).

Table 4 - Pillars and Items of the RQ scale

Pillars	Items
1. Emotional appeal	<ul style="list-style-type: none"> • Have a good feeling about the company • Admire and respect the company • Trust the company a great deal
2. Products and services	<ul style="list-style-type: none"> • Stands behind its products and services • Develops innovative products and services • Offers high quality products and services • Offers products and services that are a good value for the money
3. Financial performance	<ul style="list-style-type: none"> • Has a strong record of profitability • Looks like a low risk investment • Tends to outperform its competitors • Looks like a company with strong prospects
4. Vision and leadership	<ul style="list-style-type: none"> • Has excellent leadership • Has clear vision for its future • Recognizes and takes advantage of market opportunities
5. Workplace environment	<ul style="list-style-type: none"> • Is well managed • Looks like a company to work for • Looks like a company that would have good employees
6. Social and environmental responsibility	<ul style="list-style-type: none"> • Supports good causes • Is an environmentally friendly company • Maintains high standards in the way it treats people

The Reputation Quotient (RQ) is a measure for comparing the reputations of firms in different fields of operation (Fombrun et al., 2000), but among customers only and not across various stakeholder groups. Companies were given an overall rating on a set of attributes, than those ratings are used to calculate a ratio between the rating of a selected company and the rating of the average company.

The RQ has been successively substituted by a new index to assess reputation: the RepTrak Index. The RepTrak System has been developed by the Reputation Institute in 2006. This index shares most of the RQ dimensions; the main difference relies on the different weights assigned to different stakeholders. In fact since each stakeholders considers the drivers differently (e.g. for customers product quality is more important than other financial performances), different weights are assigned to the dimensions.

Alternative index methodologies

According to Bromley (2002) some of the main corporate reputation indexes that currently exist present a biased nature. The source of the bias can usually be tracked to the selection of respondents and selection of the evaluation criteria (Feldman et al., 2014). Most rankings lack a representative sample of stakeholders as respondents; they focus only on the perceptions of managers and business consultants, or only on the perception of consumers. Also the items chosen and the weights assigned reflect the nature of respondents. He therefore proposes some alternative methods that should produce more robust results.

One approach is to assess corporate reputation with a benchmarking method (Bromley, 2002). A benchmark is defined as a surveyor's mark indicating a point of reference for levelling. The concept of a reputational benchmark implies setting up a standard (ideal or average) reputation against which other reputations are compared. A benchmarking system would involve a representative sample of comparable companies in a particular business sector. Well-informed respondents would rate those companies on a set of operationally defined scores. The scores would have to be normalized, that is, made to fit a normal distribution.

An alternative approach to constructing a table of reputation based on a standard rating scale would be to use a free description method (Bromley, 2002). This enables respondents to list various attributions, based on their personal interests and experiences. Respondents would

be drawn from selected stakeholders, depending on the purpose of the research. The more frequently mentioned attributions could then be used to construct a league table of merit using a methodology similar to that associated with the Fortune surveys. Differences in the frequency of occurrence of attributions in a free-description exercise could indicate their relative importance, or at least their familiarity or salience at the time.

The case comparison method (Bromley, 2002) tries to assess which combination of qualitative factors determines how cases (companies) can be classified into types, and which combination of factors determines a particular outcome, such as the success or failure of a business enterprise, a substantial change in corporate reputation, or a relatively high or low level of public esteem. The method is made more rigorous by applying Boolean procedures. The case comparison method allows to take into account the difference between the average score and the score profile. Two or more companies may achieve the same average rating even if they differ, possibly substantially, on some or all of the attributes. They would therefore have rather different reputations. The mean scores do not reveal differences in the score profiles, which may be important in classifying cases or in identifying causal processes. The mean can be derived from a profile, but not vice versa.

The Quasi-Judicial case method is modelled on judicial procedures for dealing with individual cases. The pattern of argument revealed by substantive logic may permit findings to be generalized to a class of similar cases. Applying the QJ method to a set of recorded (completed) business cases may enable one to collect cases that seem to show a common logical/causal pattern, and to categorize them as cases of a certain type. This is analogous to the way case law is established in jurisprudence.

3.1.2 - Quantitative methods

None of the previously mentioned approaches provides a monetary measure of reputation. Gabbi & Patarnello (2010) describes three different approaches to quantitatively assess the value of reputation: the organizational approach, the accounting approach and the marketing approach.

The organizational approach

Reputation is an immaterial asset, strictly connected as such to the most important among intangible assets: intellectual capital. This explains the increasing efforts aimed at its measurement.

The value of intellectual capital can be split between its internal and external components. The internal component includes human and structural (or organizational) capital, while the external one encompasses relational capital.

A reliable measurement of intellectual capital requires a full understanding of a company's value creation mechanisms. These can in be in their turn influenced by the company's sector, market, business model, organizational culture and strategic objectives. Once value creation mechanisms have been understood, variables explaining their effectiveness and efficiency need to be identified. This allows to select proper indicators of intellectual capital, which can be classified into three categories: growth, efficiency and stability.

One major problem in measuring intellectual capital relies in the partial and subjective nature of its valuation process. This is especially true in comparison to the rigorous criteria applied to the preparation of a company's balance sheet.

The diffusion of intellectual capital measurement reports has been in particular thwarted by difficulties related to the complex measurement of intangible assets, the identification of standard indicators and calculation methods, their consistency and comparability, the assessment of the economic return and the uncertain relation between theory and practical applications (Gabbi & Patarnello, 2010)

The accounting approach

According to Gaultier-Gaillard and Louisot (2006) when considering how to assign a value to reputation, the most sensible approach is probably to compute it as the difference between the market value of the stock and the total of tangible assets and those intangible assets already assessable (e.g. lease, licenses).

Immaterial resources represent a relevant portion of a company's net worth. Their definition and measurement is therefore required for their proper posting in the balance sheet. IAS 38 defines immaterial assets as "non-monetary, identifiable, non-physical assets". A resource can be classified as an immaterial asset if the following conditions are met: i) its use will generate future economic benefits, that is higher revenues or lower costs, ii) the company controls it; this implies that the company can benefit from a resource and prevent others from taking advantage from it (i.e. personnel skills cannot be considered as immaterial assets), iii) it can be clearly distinguished from goodwill: this happens when, based on existing legal rights or contractual agreements, the resource can be sold, transferred, licensed, rented or swapped; among clearly distinguishable resources are for instance brands, patents, non-competition agreements, licenses, copyrights.

IAS/IFRS international accounting standards do not give a full representation of a company's net worth immaterial components. As a matter of facts they exclude intangible resources like personnel loyalty and motivation (and in general human capital), image and client relationships. For all these categories of resources only acquired goodwill can be posted in the accounts, while internally generated one cannot be quantified. The same applies to immaterial assets like internally developed brands.

It should also be underlined that the impact of reputational damage goes far beyond accounting profits or losses. The need therefore exists for a reporting system providing a comprehensive view of a company's reputational value and supporting the distinction between its book value and market value (Gabbi & Patarnello, 2010).

The marketing approach

A peculiar representation of reputation is the one provided by the so called marketing approach. This is mainly focused on brand value measurement, which is seen as strictly related to a specific reputational level.

Brand value can be for instance measured by assessing the investments a company has made to increase its intangible assets. The royalty rates method is among the most interesting ones for the assessment of brand value. It is based on the assumption that the benefits a company gets from its intangible assets cannot be lower than the price the company should pay to obtain the right to use them.

According to Larkin (2003) “...one estimate of the value of a company’s reputation is the present value of all expected royalty payments over a given period”. Alternatively a DCF model can be applied to the cash-flows expected from the future exploitation of the immaterial asset.

Practical problems related to the use of this method include the identification of meaningful and homogeneous royalty rates in the reference markets. The reliability of the approach is also influenced by i) the volatility of brand value when based on market criteria and ii) the fact that the concept of reputation goes far beyond the concept of brand, as the former is shaped by the judgements and perceptions of all the stakeholders regarding various aspects and levels of a company’s activity (Gabbi & Patarnello, 2010).

3.2 - Reputational risk measurement

As previously mentioned there are two main classes of methods proposed to assess reputational risk:

- Qualitative methods: the aim is to order risks relying on a qualitative measure of their severity. Within this class we find the Likelihood-Impact matrix and the gap analysis.
- Quantitative methods: their aim is to find ways to measure “scientifically” the severity of reputational risk. Within this class we find the abnormal returns methods, the scenario analysis and the analysis of share price volatility.

While there have been numerous proposals for quantitative assessment methods, qualitative approaches are much more used. Most companies admit they find it very difficult to quantify the financial impact of reputational risk (The Ace Group, 2013).

Qualitative methods are more intuitive and easy to implement without the need of elaborate tools and vast databases. However, they have some important downsides. The first, and more intuitive one, is that by relying on a purely qualitative analysis they allow for valuation biases. Secondly they only allow the comparison between reputational risks while they convey little information on the value of such risks in comparison with other kinds of risk the organization is faced with.

3.2.1 - Qualitative methods

Qualitative methods of risk assessment are very common for risks that are difficult to quantify.

As far as reputational risk assessment is concerned there are two qualitative methods found in literature: the likelihood-impact matrix and the gap analysis method.

The first method consists of a qualitative assessment of two dimension for each risk and the consequent charting of all the risks on a two dimensional matrix.

The gap analysis method, rather than focusing on singular risks, focuses on the relationships between the organization and relevant stakeholders, trying to understand whether there is a gap between stakeholders' perceptions and reality.

The Likelihood-Impact Matrix

This method's core is the definition of two scores for each risk identified: a probability score and an impact score. Such rankings are assigned with the support of specifically designed qualitative scales.

The complexity of this model depends on the detail with which these scales are described. The result can in fact range from a simple three-by-three matrix, ranking each risk by High, Medium or Low for both the likelihood of its occurrence and its impact if it does, to more sophisticated models which rate impact and likelihood on a 10-or 12-point scale.

Table 5 – Example of qualitative impact metric (Rayner, 2008)

Reputational impact	News diffusion
1. Insignificant	Minor local diffusion
2. Minor	Local media coverage
3. Moderate	National media coverage
4. Major	International short term media coverage
5. Catastrophic	International adverse media coverage over more than one year

As far as the likelihood is concerned the measures are the same as the ones of any other risk. Meanwhile for the impact one can device specific scales for reputation. For instance according to Ryaner (2008) the impact could be linked to the level of diffusion of the harmful news (figure 5).

Soprano et al. (2009) suggest that the best instrument to support this kind of qualitative analysis are scoring-cards. In the author’s opinion “weighted lists of questions, to be filled in by managers, process owners, customers, or business specialists, could prove particularly useful and indicate the value of the multidimensional impacts of reputational type events”.

Gap analysis

The other most common qualitative approach to assess reputational risk is the one that focuses on the analysis of gaps. Honey (2009) suggests that the best way to measure reputational risk is to assess the gap between stakeholders’ expectations and the actual company behavior.

The starting point is to conduct a stakeholders’ analysis (see chapter 5) which should result in a classification of the most relevant stakeholders (fig. 8).

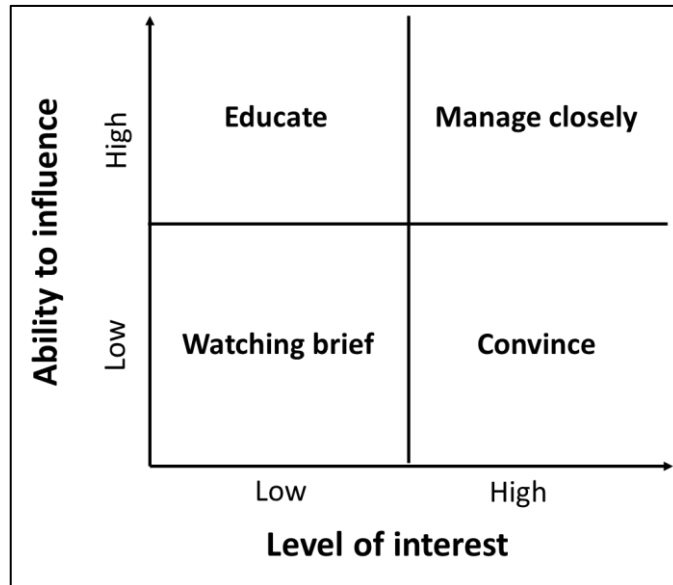


Figure 8 – Stakeholders’ prioritization

Once the most relevant stakeholders have been identified, one should consider their expectations along a series of reputational drivers.

Within this grid one can start to mark up those aspects which are of critical importance to each stakeholder group and which are of less importance to them (tab. 6). It soon becomes clear that failure to ‘perform’ in key categories represents a higher risk to reputation among certain stakeholder groups compared to others.

Table 6 – Example of stakeholders’ priorities

Drivers of reputation	Investors	Customers	Suppliers	Employees
Financial performance				
Delivery of product and services				
Vision and leadership				
Corporate responsibility				
Workplace environment				
Knowledge skills				
Emotional appeal				

This analysis helps designing surveys to probe for expectation in specific business critical areas for each relevant stakeholder group.

The next step is to compare these expectation surveys among stakeholders with known current and future performance data: this, according to Honey (2009) represents a consistent measure of reputational risk (fig. 9).

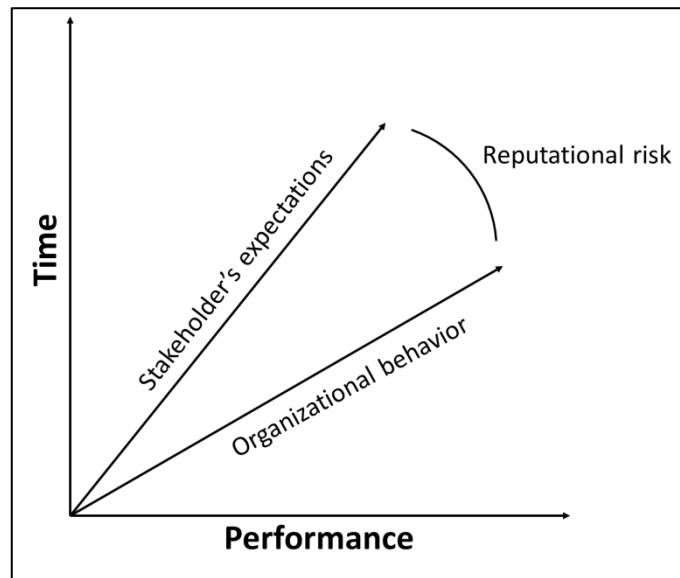


Figure 9 – Reputational risk as gap

It is interesting to notice that considering this definition of reputational risk there are only two options to reduce it. The first one is to improve the organization's performances in the business areas with the greatest gaps. Alternatively the relationship owners will have to gently manage the stakeholders expectations downward.

3.2.2 - Quantitative methods

As previously mentioned quantitative methods are rarely implemented by organizations due to their complexity and unproven reliability. However there have been numerous proposals for quantitative models. The aim of this paragraph is to analyze the most relevant ones found in literature.

The methods presented are the share price volatility analysis, the abnormal returns models and the policy-capturing survey method. While the first two models involve an ex-post valuation of past reputational events the latter proposes an interesting approach for an ex-ante assessment of reputational risk.

Abnormal returns models

In this approach reputational losses are evaluated by examining a firm's stock price reaction to the announcement of a major operational loss event. Loss percentages are computed as losses divided by the firm's market capitalization, and a market model is used to determine abnormal returns for each organization. The abnormal return for a firm is defined as the difference between the firm's actual return and the expected return based on a one-factor market model. Any decline in a firm's market value that exceeds the announced loss amount is interpreted as a reputational loss (Perry & de Fontnouvelle, 2005).

In order to demonstrate such thesis the first step is to calculate the abnormal returns for each event i for each day within the time period considered $[\tau_0, \tau_1]$. The abnormal returns can be computed with a simple market model:

$$AR_{it} = r_{it} - (\hat{\alpha}_i + \hat{\beta}_i r_{mt})$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ have been previously estimated in order to account for the behavior of each individual stock.

The following step is to calculate the cumulative average abnormal return for each event i

$$CAR_{i[\tau_0, \tau_1]} = \sum_{t=\tau_0}^{\tau_1} AR_{it}$$

Finally the average reputational impact can be computed using a simple regression model:

$$-CAR_{i[\tau_0, \tau_1]} * (mkt\ cap)_i = \rho * l_i + \varepsilon_i \quad i = 1 \dots n$$

where l_i is the cumulated operational loss associated to the event i , ρ is a parameter that represents the average reputational impact factor of loss announcements on the market value for firms given the sample of n events, and ε_i is the disturbance term for event i .

A different approach is to directly compute the reputational impact an expansion factor applied to each loss event. This is usually done by associating the reputational impact to the normalized cumulated abnormal return computed as:

$$NCAR_{i[\tau_0, \tau_1]} = \frac{CAR_{i[\tau_0, \tau_1]}}{l_i} \quad i = 1 \dots n$$

A number of applications of this methodology emerged in the last years in the literature. Karpoff and Lott (1993) in a sample of corporate fraud announcements from 1978 to 1987, found that the initial announcements of frauds correspond to average stock declines of about 1.3% and 5.1% respectively. They also found that the actual court-imposed costs, penalties, and criminal fines amount to less than 10% of the total market value loss. Murphy et al (2004) examined the market impact on firms suspected to have committed acts of misconduct such as antitrust violations, bribery, fraud, and copyright infringements. They found that of these types of misconduct, fraud has the greatest negative impact on stock prices. They reported that firm size is negatively related to the percentage loss in firm market value. Cummins et al., (2004) analyzed the price impact of operational loss announcements by US banks and insurance companies. Their results revealed that equity values respond negatively to operational loss announcements, with insurance stocks having a larger reaction than bank stocks. They found some evidence that market value losses are more severe than the announced losses, implying a negative impact on company reputation. Palmrose et al. (2004) assessed the market reaction to earnings restatement announcements. They found that over a 2-day window surrounding the announcement, average abnormal returns are approximately -9%. Their most interesting finding is that the market reaction is more negative for restatements involving fraud. The authors suggested that investors are more concerned about restatements that have negative implications for management

integrity than for restatements due to “technical accounting issues.” Perry and de Fontnouvelle (2005) assessed the stock price reaction to announcements of major operational loss events of financial institutions. They found that market values decline slightly when losses were determined by external events, but fall on average between 2.5 and 3 times the loss amounts when involving internal fraud. They concluded that losses due to internal fraud have a negative impact on reputation, while externally caused losses have no reputational impact. The study of Gillet et al. (2010) tried to separate the effect from the operational loss and the damage to reputation by examining the stock market reaction to operational loss events. The authors found significant, negative abnormal returns at the announcement date accompanied by increased volumes of trade. In cases involving internal fraud the loss in market value was greater than the operational loss amount announced, which the authors interpret as a sign of reputational damage.

The major limitation of this methodology is that it can only be used for listed financial institutions. Moreover at the state of the art these models do not offer any predictive capability: they are only used as an academic ex-post tool to assess the existence of reputational risk and its average impact.

Share price volatility method

This approach proposed by Soprano et al. (2009) is a simpler version of the abnormal returns method. It is grounded on the same assumption of the market efficiency: that the volatility of company’s share will reflect the new information announced, including reputation damaging events.

Like the abnormal returns method it is based on the observation of share price fluctuations but instead this model does not consider the direct losses stemming from the events considered but instead it exclusively focuses on the share price volatility. It constitutes a straight extension to the simple market model.

The simplest market model (arbitrage pricing theory) calculates the expected returns as:

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \varepsilon_{it}$$

Where $\hat{\alpha}_i$ is the part of R_{it} that cannot be explained by R_{mt} , $\hat{\beta}_i$ measures the sensitivity of R_{it} to variations of R_{mt} and ε_{it} is the residual term of the stock

This model instead embeds two other variables: $R_{Sect,t}$ representing the institutions industry sector and $R_{Rep,t}$ mirroring the hypothetical reputational events that are then included. $R_{Rep,t}$ is a dicotomic variable. The return R_{it} is then described by the equation

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_{i1}R_{mt} + \hat{\beta}_{i2}R_{Sect,t} + \hat{\beta}_{i3}R_{Rep,t} + \varepsilon_{it}$$

Where each element of the vector β_i explains the sensitivity of R_{it} to variations in the corresponding factor.

The probability distribution function can be estimated with a probit model:

$$F(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{1}{2}t^2} dt \quad z = (\beta'x_i)$$

Where z is a generic dicotomic variable, x_i are a vector dependent variables and β' is the vector of unknown coefficients.

Once the model has been statistically verified the reputational value at risk can be computed.

$$VaR_{Rep} = \delta \cdot Y \cdot \beta_+$$

Where

Y is the market value of the company

$$\delta = \beta'x_i$$

$$\beta_+ = t_{\frac{\alpha}{2}} \cdot \sigma \cdot (\hat{\beta}R_{Rep,t})$$

The quantity δ is computed considering R_{Rep} as the dependent value in the first model. The primary limitation to this model is that it can only be applied to listed institutions.

While being obviously easier to implement the decision not to consider the actual operational losses of the events constitutes a major simplification that drastically reduces the explanatory potential of the model. As a matter of fact Soprano et al. (2009) presents a case study employing this methodology which produces “unsatisfactory statistical results”.

Policy-capturing survey methodology

This method, presented by Young (2010), applies a policy-capturing survey to generate insight into reputational risk from the perspective of a variety of stakeholders.

Even though this methodology does not provide an actual quantitative assessment of reputational risk it provides an interesting perspective as to how to analyze this risk. While the other methods presented in this chapter involve inference from market data this approach is grounded on the direct engagement of the stakeholders.

Young considered an insurance company and built a model aimed at understanding how the company’s stakeholders would react to different scenarios. He constructed 60 different scenarios combining 12 cues about the companies reputation. Such cues were defined with the support of industry experts.

The study engaged over 500 respondents to express their intentions about three different purchase decisions (New Policy, Renewal, and Investment) in several scenarios. The survey was structured with multiple choice questions (fig. 10).

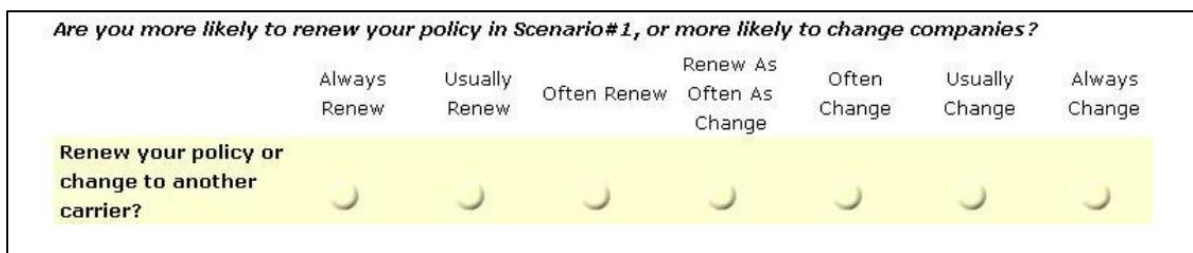


Figure 10 – Example of survey question

The results of the survey were then analyzed using a multinomial logit model to estimate coefficients corresponding to the influence of the Reputational Cues on each decision category.

The output of this methodology is therefore a relationship between a particular reputational scenario and the stakeholders’ behavior. While it does not represent an actual assessment of the reputational risk, it definitely constitutes a very innovative and stimulating approach to the matter.

Reputation and reputational risk assessment

This methodology will be revised and expanded in the framework presented in the chapters 5 and 6.

4. Reputational risk treatment

Reputational risk treatment is a component of risk management. Treatment actions can be distinguished between *ex-ante* measures and *ex-post* measures.

4.1 - *Ex-ante* measures

Among the *ex-ante* measures an increasing importance is attributed to Corporate Social Responsibility.

Ex-ante measures can include also actions to avoid the risks, to reduce the risks in terms of likelihood or impact, to transfer the risks by sharing them with a partner or by insuring the risk or to accept the risks.

4.1.1 - Corporate Social Responsibility

Definitions of Corporate Social Responsibility (CSR) proposed by the academic literature and by a variety of institutions, underline the characteristic of voluntary involvement in the solution of a variety of social issues (McWilliams & Siegel, 2001).

The European Commission in its communication of 25 October 2011 (no. 681), ten years after the Green Paper of 2001, reviewed the notion and provided a new definition of CSR: “The responsibility of enterprises for their impacts on society”.

According to McWilliams & Siegel (2001) CSR can be defined as ‘actions that appear to further some social good, beyond the interests of the firm and that which is required by law’. Some examples of CSR actions include ‘going beyond legal requirements in adopting progressive human resource management programs, developing non-animal testing procedures, recycling, abating pollution, supporting local businesses, embodying products with social attributes or characteristics’.

The definition of CSR offered by Aguinis & Glavas (2012) stated: ‘context-specific organizational actions and policies that take into account stakeholders’ expectations and the triple bottom line of economic, social, and environmental performance’.

The 2014 Global CSR RepTrak study's findings highlighted the growing importance of CSR and sustainability issues for consumers. It should be underlined that some of the dimensions that drive reputation (citizenship, governance, and workplace) are included into the CSR categories.

The core of CSR is ensuring that social, ethical and environmental impacts and risks are identified and managed so that organisations focus not just on the generation of profits and on meeting targets but also on how such results are achieved (Rayner, 2003).

Many agencies attribute ethical ratings or create indexes on Corporate Responsibility. The first case of a sustainability rating agency was the London based Standard Ethics agency.

'Business in the Community' publishes yearly a ranking of the best companies on the basis of an index on Corporate Responsibility, that considers four key areas: community, environment, marketplace and workplace (tab. 7).

About the benefits of implementing CSR actions, Aguinis & Glavas (2012) reviewed the CSR literature based on 588 journal articles and 102 books and book chapters. A consistent finding regarding the outcomes of CSR initiatives is an improvement in a firm's reputation (Fombrun & Shanley, 1990; Turban & Greening, 1997; Brammer & Pavelin, 2006). Such a positive effect has been found on the part of consumers, who respond to CSR through favorable evaluations of the company and its products (Ellen et al., 2000; Sen & Bhattacharya, 2001) as well as through increased loyalty (Maignan, Ferrell, & Hult, 1999). In a meta-analysis of CSR-outcomes relationships, CSR was found to improve a firm's reputation and goodwill with external stakeholders, which resulted in increased financial performance (Orlitzky et al., 2003).

Minor & Morgan (2011) argued that a firm's Corporate Social Responsibility activities have the effect of providing a partial self-insurance against reputation risk.

An essential aspect for the success of CSR initiatives is the communication with stakeholders. It is necessary that stakeholders are informed in the right way and the right time of the initiatives of companies. Businesses need to demonstrate that they understand the issues, have policies in place to deal with them, monitoring systems to track performance, evidence of consultation with key stakeholders (to inform the debate and avoid surprises) and robust reporting and communications (Rayner, 2003)

<p style="text-align: center;">MARKETPLACE</p> <ul style="list-style-type: none"> ▪ Impact of core products and services ▪ Product safety ▪ Full and reliable customer information ▪ Provision for customers with special needs ▪ Anti-competitive or unfair practices ▪ Prompt and fair payment of suppliers ▪ Fair and honest advertising and direct sales 	<p style="text-align: center;">WORKPLACE</p> <ul style="list-style-type: none"> ▪ Fairness and honesty in overall employee relations ▪ Fair pay and conditions ▪ Health and safety ▪ Diversity – achieving it and managing it ▪ Ensuring fundamental human rights respected in all areas of operation ▪ Training and life-long learning ▪ Work–life balance
<p style="text-align: center;">ENVIRONMENT</p> <ul style="list-style-type: none"> ▪ Environmental impact of core products in use ▪ Energy and water consumption ▪ Emissions to air, land and water ▪ Solid waste production ▪ Risk of accidents impacting upon the environment ▪ Raw materials sourcing ▪ Impacts upon biodiversity 	<p style="text-align: center;">COMMUNITY</p> <ul style="list-style-type: none"> ▪ Impact on the community of day-to-day operations (such as nuisance, noise, visual amenity, traffic congestion) ▪ Impact on the local community of positive community involvement (employee volunteering, charitable support, mentoring partnerships, etc.) ▪ Impact on national society, for example through lobbying activities designed to influence or initiate legislation <p>© Business in the Community</p>

Table 7 – Areas of potential CSR impacts considered in the Corporate Responsibility Index (Business in the Community).

4.1.2 - Other ex-ante measures

Risk avoidance is one of the *ex-ante* measures (fig. 11) and represents the more drastic solution. It consists in not performing an activity that could carry risk but avoiding risks also means losing the possibility of earning profits.

Risk reduction consists of decreasing the exposure by reducing the impact and/or likelihood of the threat (Rayner, 2003). The likelihood of the threat could be reduced by improving training, implementing new policies and procedures, tightening up contract terms or by checking that controls are working through self-assessment or audit. The risk's impact could be reduced by contingency planning (such as disaster recovery and crisis management plans) and by promoting strong relationships with the relevant stakeholders. For threats or opportunities the cost of any actions taken must be justifiable.



Figure 11– Ex-ante risk treatment strategies

Risk transfer consists in sharing the risk in whole or in part with another party (e.g. with a subcontractor, joint venture partner or by outsourcing the activity) or by insuring all or part of the risk. Transferring the risk to another party does not necessarily avoid from being blamed when things go wrong (Rayner, 2003). Insurance is considered a way of risk transfer but the buyer of the contract generally retains legal responsibility for the losses.

The concept of risk transfer can apply both to threats and opportunities.

Risk retention involves accepting the loss, or benefit of gain, from a risk when it occurs. Risk retention is a suitable strategy for small risks where the cost of insuring would be greater than the total losses sustained. All risks that are not avoided or transferred are retained by default.

4.2 – *Ex-post* measures

Ex-post measures are represented mainly by methods and theories of Crisis Management.

4.2.1 - Crisis management

A crisis is an incident that has the potential to disrupt organizational operations and to destroy the organization (Coombs & Holladay, 2006). Many define crises as threats to reputation (Barton, 2001; Davies et al., 2003).

According to Pearson & Mitroff (1993) crises have five dimensions, which are that they are highly visible, require immediate attention, contain an element of surprise, have a need for action, and are outside the organization's complete control. Adams & Roebuck (1997) pointed out similar characteristics most crises seem to share. The first is surprise, which may be surprise at the timing as much as at the event itself. Next is a trigger: an unexpected event, action or incident that alters the public's view of the organization. Third is a threat, which could include human lives, property, or the environment. A crisis also includes an uncontrolled event that brings turbulent circumstances placing the situation out of management's control. Lack of control can be for a brief or extended period of time. Last is a quick response. If the first three elements of surprise, trigger, and threat are present, the organization must respond immediately to protect itself and others, as well as to regain control.

Crises can harm stakeholders physically, emotionally and/or financially. The news media and the internet play a critical role. Most stakeholders will learn about a crisis from news reports. In a smaller number of crises, stakeholders learn about crises through online social media. The exceptions would be victims or potential victims who are more likely to

experience the crisis or to be informed directly by the organization about the crisis (Coombs, 2007).

A basic model of crisis management (Mitroff et al., 1987) identifies four phases:

- *Detection* consists in the organization's early warning systems (including computerized process control systems, plant/equipment monitoring systems, management information systems, etc.) that scan the external and the internal environments for signals of imminent crises. Detection is fundamental to prevent or prepare for crises. Most crises are preceded by early warning signals. To prevent some major crisis, organizations need only to learn to read these warning signals and respond to them effectively.
- *Crises* is the second point because no organization can prevent every crisis from occurring. Indeed, prevention of all crises is not the basic purpose of planning and crisis management.
- *Repair* represents the major structures and mechanisms an organization has in place for guiding recovery. These include emergency plans, public relations plans, crisis management teams, etc.
- *Assessment* corresponds to the evaluation of lessons learned from the past crises and the application of the new knowledge to improve crisis management for the future.

Mitroff et al. (1987) distinguished between crises that arise within the organization and those that arise outside it (Figure 12). This differentiation is critical because the warning signals will be different for different types of origin. The authors also differentiated between crises caused by technical/economic breakdowns and those caused by people/organizational/social breakdowns.

Reputational risk treatment

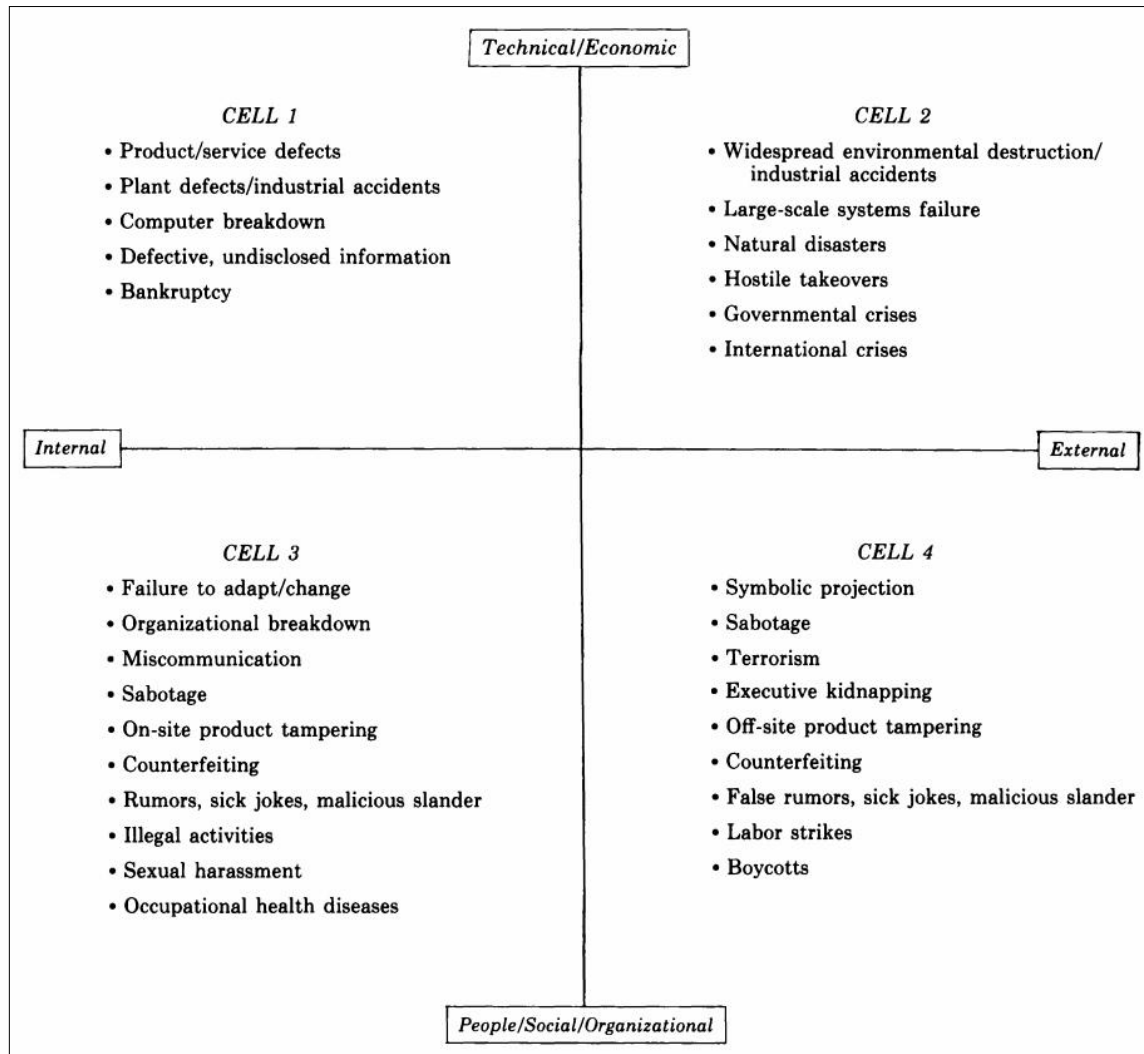


Figure 12 – Types of corporate crises (Mitroff et al., 1987)

Starting from an analysis of reputation damage to corporations over recent years, CIMA (2007), proposed a categorisation of causes under three groups: cultural, managerial and external. Cultural risks include legal and ethics risks; both can be avoided and should be identified. Managerial risks consist of executive risk and operational risk; these are risks that cannot be avoided or transferred and must be managed. External risks include association risk and environment Risk; both origin from outside the organization. The common thread is that these risks can neither be controlled nor avoided, so they must be mitigated.

Damage to reputation will differ depending on the nature of the business and the basis for stakeholder trust, in the financial services sector reputation damage would result from a

financial irregularity. For manufacturers of consumer and retail brands the greatest risk to reputation is customer safety.

Figure 13 shows the variety of actions organizations can take to prepare for, cope with, reduce the effects of, and recover from the various kinds of crises.

Mitroff et al. (1987) suggested that organization should select a minimum of one crisis from each of the cells to prepare for. This is important to avoid the tendency to prepare mainly for one typology of crises and to form a comprehensive portfolio of coping and recovery mechanisms.

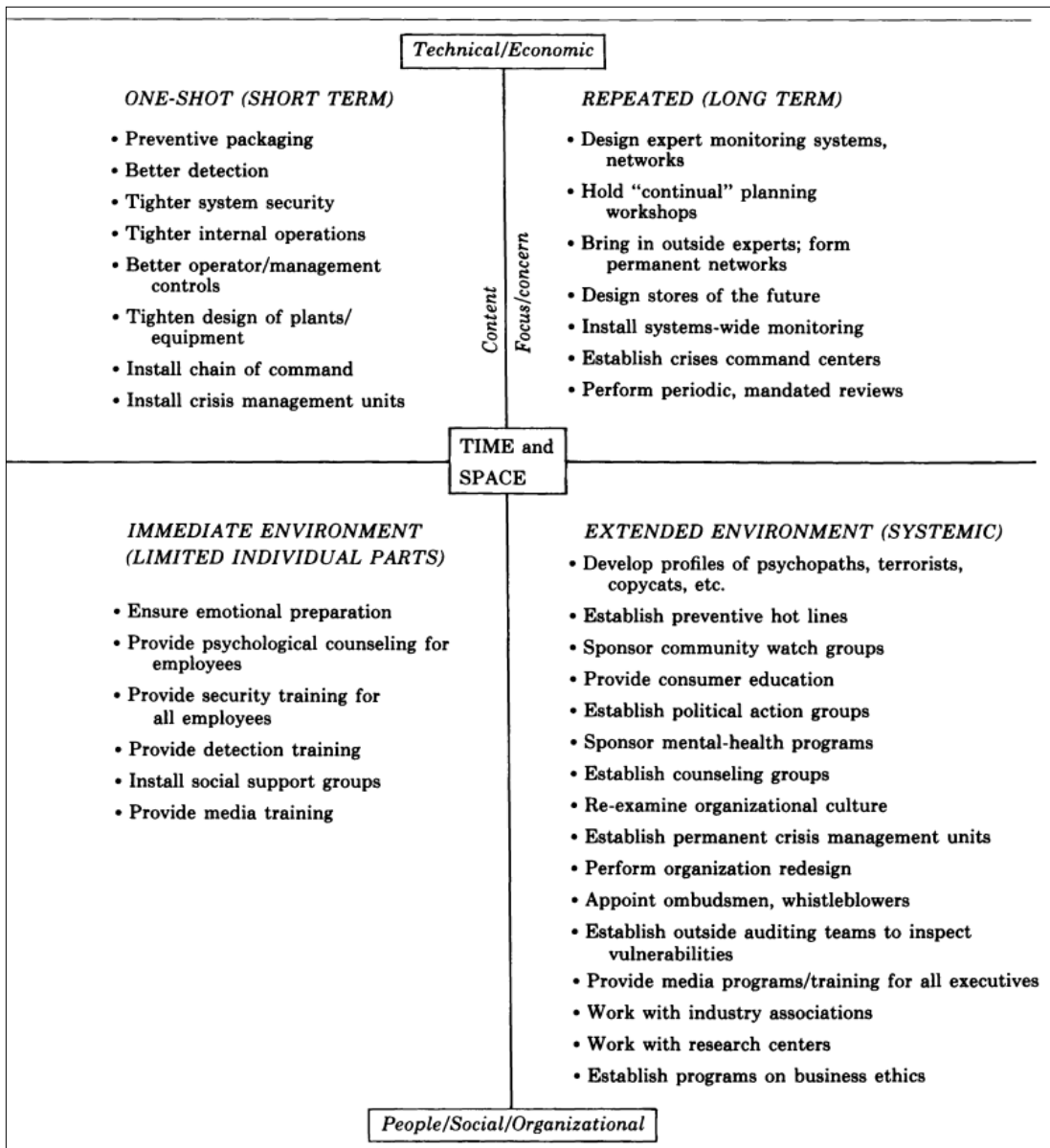


Figure 13 – Preventing actions for corporate crises (Mitroff et al., 1987)

4.2.2 - Crisis and reputation

Prior reputation is assumed to be a factor in protecting the reputational assets during a crisis and helping to facilitate their repair. An organization with a more favourable prior reputation will still have a stronger post-crisis reputation because it has more reputation capital to spend than an organization with an unfavourable or neutral prior reputation (Coombs, 2007). As a result, a favourable prior reputation means an organization suffers less and rebounds more quickly after a crisis. The prior reputation can create a “halo effect” that protects an organization during a crisis (Coombs & Holladay, 2006). A favorable prior reputation might shape how stakeholders make attributions about an accident when a cause is not given (Klein & Dawar, 2004); it might encourage stakeholders to give the organization the benefit of the doubt in the crisis (reduce attributions of crisis responsibility). As previously reported, Rhee & Haunschild (2006) demonstrated that in some situations good reputation can be recognized as an organizational liability.

Conversely, a series of minor bad news stories can have a cumulative effect whereby a ‘tipping point’ is reached, after which stakeholders suddenly lose confidence, the business’s share price plummets and current and all past misdemeanours are raked over in the ensuing media frenzy making it very difficult to recover (Louisot & Rayner, 2011).

4.2.3 - Situational Crisis Communication Theory

The Situational Crisis Communication Theory (SCCT) was developed recently to investigate which crisis response strategy could be applied in specific crisis situations to protect an organization’s reputation during a crisis and restore reputation thereafter (Coombs, 2006 and 2007). But, as highlighted by Coombs (2007) the first priority in any crisis is to protect stakeholders from harm, not to protect the reputation.

The SCCT divides crisis types into three crisis clusters (Coombs, 2007) showed in table 8. The more responsibility that is attributed to the organization with respect to the crisis, the more negative is the impact on the organizational reputation

Table 8 – Clusters of crisis type (Coombs, 2007)

Crisis type	
Victim cluster	The victim cluster is defined as crises with weak attributions of organizational responsibility.
Natural disaster	
Rumor	
Workplace violence	
Product tampering/Malevolence	
Accidental cluster	The accidental cluster involves crises in which a certain, but low, level of responsibility is attributed to the organization
Challenges	
Technical-error accidents	
Technical-error product harm	
Preventable cluster	The preventable cluster includes crises for which the organization is perceived as being responsible.
Human-error accidents	
Human-error product harm	
Organizational misdeed with no injuries	
Organizational misdeed management misconduct	
Organizational misdeed with injuries	

Within the range of response strategies, several clusters have also been detected (Coombs, 2007). Deny strategies claim that no crisis exists (denial) or declare that the organization has no responsibility for it (scapegoat). Diminish strategies argue that a crisis is not as serious as people think (justification) or minimize organizational responsibility (excuse). Rebuild crisis strategies offer compensation for the crisis or apologize.

Benoit (1997) in a review on strategies for image restoration identified a varied landscape of responses to the crisis (table 9).

Table 9 – Typologies of image restoration strategies (Benoit, 1997)

Strategy and sub-strategies	Explanation
<i>Denial (simple denial and shifting the blame)</i>	In both cases the responsibility for the act is avoided, either because the subject is not responsible or because someone else has been specifically identified as being responsible. Silence with regard to impacts may also be seen as a variation of denial
<i>Evading responsibility:</i>	
Provocation	Offensive act has been undertaken in response to another offensive act. As a result, the provocateur should be held accountable not the subject
Defeasibility	Responsibility cannot be assigned because of lack of information, volition or ability on behalf of the subject means that it would be unfair for them to be held to account
Accident	Responsibility is reduced due to lack of control over the offensive act
Good intentions	While the outcome of the act is negative it may be that the motives of the subject were good and the outcome could not have been anticipated
<i>Reducing offensiveness of event:</i>	
Bolstering	Subject may provide information about other aspects of their behaviour or character which are positive and thus are in contrast to the negative event
Minimization	The impact of the negative event may be downplayed, although responsibility is acknowledged
Differentiation	The particular offensive act is distinguished from other acts of this type. So while there may be, for example, a pollution incident is not of the type of incidents which would be seen as serious
Transcendence	The context in which the offensive act emerges is redefined or a rationale for the action is offered so that its offensiveness is transcended. For example, providing a financial return in a competitive business context may be used to explain laying off

	employees
Attack accuser	The offensiveness of the act can be reduced if an impression can be created that the accuser is somehow responsible for or deserves what has befallen them
Compensation	While the offensiveness of the act is not challenged, the subject reduces its impact by offering compensation to those affected. For example, investment in community programmes in areas affected by corporate activities may be used to boost reputation
Corrective action	Corrective action is promised either to make good the impact of the offensive act or actions are taken to ensure that it cannot happen again. This strategy may or may not include accepting responsibility of the act
Mortification	Responsibility is acknowledged as is the offensiveness of the act and the subject asks for forgiveness

Research has shown that apology leads to more effective reputation restoration than deny or diminish response strategies (Coombs & Holladay, 2008). Results of Claeys et al. (2010) showed that the reputations of organizations using rebuild crisis response strategies are more positive than the reputations of organizations using diminish strategies.

The appropriate response to a risk affecting reputation will depend on its source (safety, project management, acquisition, IT security, and supply chain labour practices), its expected impact, whether the risk is treatable and the cost of treatment (Gaultier-Gaillard et al., 2009).

Coombs & Holladay (1996) found that when crisis communication responses match the crisis type in terms of responsibility attribution, this leads to a more positive reputation perception than either no response or a mismatched response. Their research found that organizational reputation benefits when diminish strategies are used in response to accidental crises and when rebuild strategies are matched with preventable crises. Deny strategies are advisable only in case of victim crises.

However, Benoit (1997) suggests that the use of a combination of strategies can increase the effectiveness of image restoration. The SCCT advises crisis managers to combine crisis response strategies from the same cluster (Coombs, 2007).

Lyon & Cameron (2004) studied the conditioning effect of reputation on message strategies. Corporations with a bad reputation prior to the news story in the experiment were more damaged by the apologetic response messages than the defensive message style.

Stephen et al. (2005) explored message strategies that are used by organizations during 154 crises. The findings suggest that in this sample representing six types of crisis situations, the top strategy category was mortification because it accounted for 40% of the total data. Within the mortification category, the subcategories of rectification, remediation, and repentance accounted for 61%, 26%, and 13%, respectively. The second most frequent strategy category was ingratiation, because it accounted for 23% of the total data. Within the ingratiation category, the subcategories of bolstering, transcendence, and endorsement of an outside expert accounted for 43%, 29%, and 23%, respectively. The third most frequent strategy category was distance because it accounted for 21% of the total data.

5. Model description

The model presented in this chapter is intended as a practical tool for the quantitative assessment of reputational risk. The model consists in an integrated framework that combines different methods, borrowed from various disciplines, to assess the impact of reputational risks. In particular, the model includes aspects from the complex systems, scenario analysis and judgment analysis. The ultimate objective of the model is to measure the Value at Risk determined by reputational risk.

The main features of the framework are an exclusive focus on the effects of reputation-damaging events and a decomposition of the singular elements that determine such effects.

This model does not attempt to assess the value of reputation as a whole, but instead focuses on the most tangible effects of the reputational damage stemming from the occurrence of risks.

In order to estimate such reputational damage this method singles out its components (eg. sales decrease, increased cost of capital) and focuses on the stakeholder decisions that generate such effects.

This chapter explores the theory behind the model. The first paragraph presents the structure of the model and the rationale behind. The following paragraphs instead analyze each part of the model presenting both theoretical and practical aspects. The last paragraph presents the main limitations of the model.

5.1 - General framework

As previously reported (see chap. 1), according to the white paper of the Economist Intelligence Unit (2005) there is still a dispute over whether to consider reputational risk a self-standing risk or a “risk of risks”. This model is grounded on a definition of reputational risk as a “risk of risks”, or as an indirect risk generated by other risks. Therefore the objective of the model is to assess the reputational impact of other risks rather than assessing the reputational risk as a risk of its own. In other words the model does not

Model description

estimate reputational risk as a whole but separately assesses the reputational component of each individual risk to which the company is exposed.

In order to assess the reputational component of each risk the reputational damage is modeled as an indirect effect (fig. 14). Each risk will have some direct and tangible consequences (e.g. direct losses, product recalls, prosecutions, fines, sanctions etc.).

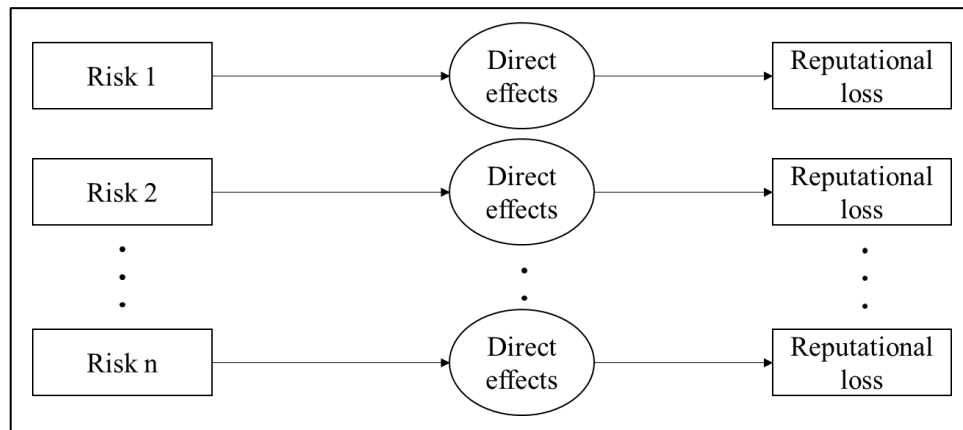


Figure 14 – Reputational damage as indirect effect

Such direct effects are understood as signals or cues that are then acknowledged by the company's stakeholders'. The stakeholders' reactions to these signals are what ultimately determines the reputational loss. The reputational impact is therefore modeled as the combination of the reactions of the stakeholders to the signals stemming from a materialized risk (fig. 15).

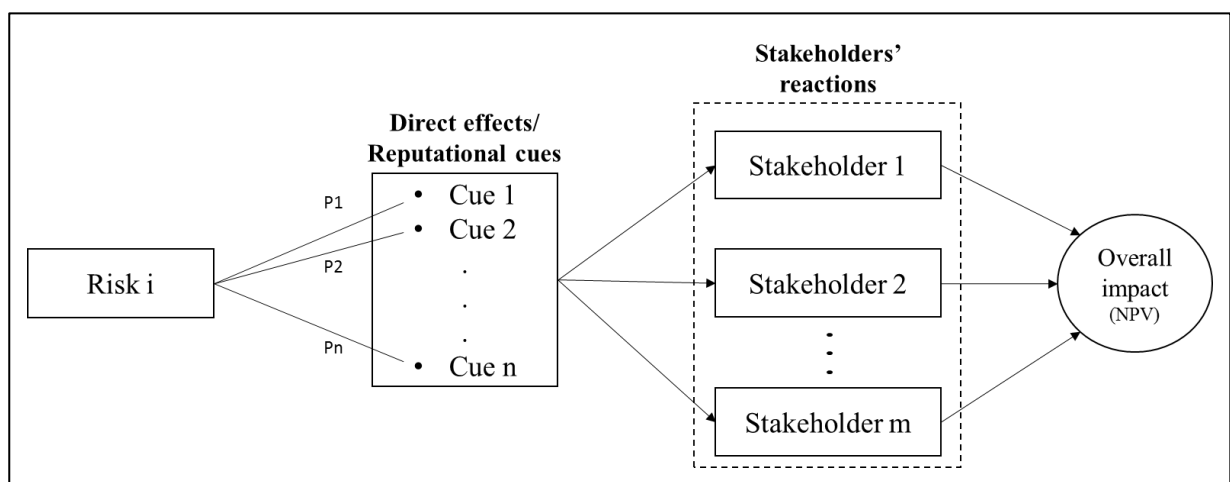


Figure 15 – General framework

The core of model is thus comprised of two analyses:

- an historical analysis of which signals are generated by each risk upon manifestation
- a survey based analysis to understand what are the reactions of the stakeholders to such signals

Moreover the model embeds a preliminary analysis to integrate the risk identification process and a final simulation to determine the probabilistic distribution of losses. More precisely model is structured in four steps:

1. *Risk map integration*: the aim of this first step is to understand which risks that have a major reputational component and should therefore be the focus of the rest of the analysis. This is mainly achieved through a qualitative analysis of the already mapped risks. However specific tools are proposed to support the identification of potentially unmapped risks with a major reputational component. The output of this process is the list of risks that can impact reputation (fig. 16).
2. *Mapping stakeholders and reputational cues*: this step is aimed at understanding who are the most relevant stakeholders' for the company and what signals could affect their decisions. The process includes a stakeholders analysis and the identification of the cues through interviews and historical analysis of past risk events within the industry considered. The output of this process are a list of the most relevant stakeholders and a list of the most relevant reputational cues (fig. 16).
3. *Understanding stakeholders' reactions*: in this step surveys are built to understand the stakeholders' reactions to different sets of reputational signals. Purpose made tools allow to translate the results of the surveys into deterministic or probabilistic relationships (fig. 16) between the cues and the stakeholders' reactions (e.g. reduced purchase intention, increased cost of capital etc.).

Model description

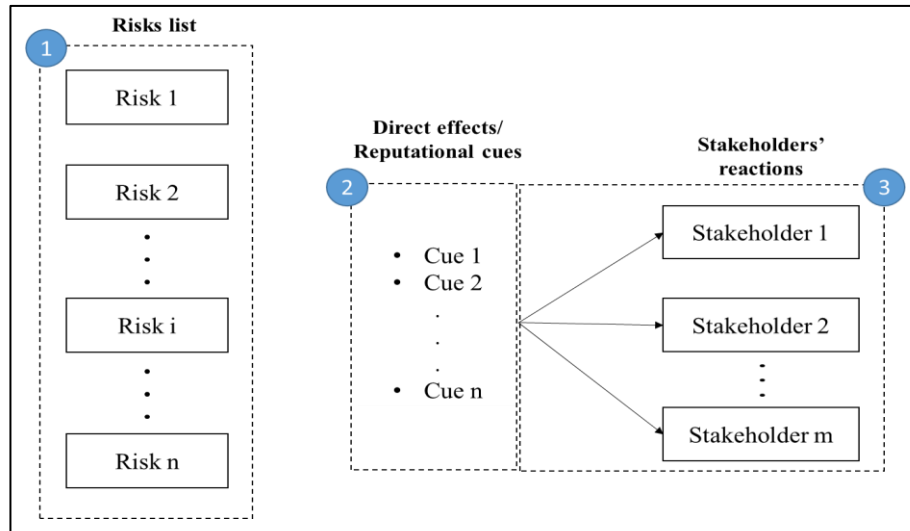


Figure 16 - Outputs of the first three steps of the framework

4. *Analyzing the generation of cues and drawing the conclusions*: this final phase initially explores which reputational signals are generated by each specific risk and with what probability. Afterwards multiple scenarios with different combinations of signals are generated in a Monte Carlo simulation. For each scenario the expected stakeholders' intentions (according to the results of step 3) are translated into forecasted results with a DCF model in order to determine the financial impact. Ultimately the probabilistic distribution of losses stemming from reputational risk can be determined (fig. 17). From this distribution synthetic measures, such as the Value at Risk, can be derived. This final step of the framework has to be repeated for each risk that has a potential reputational impact.

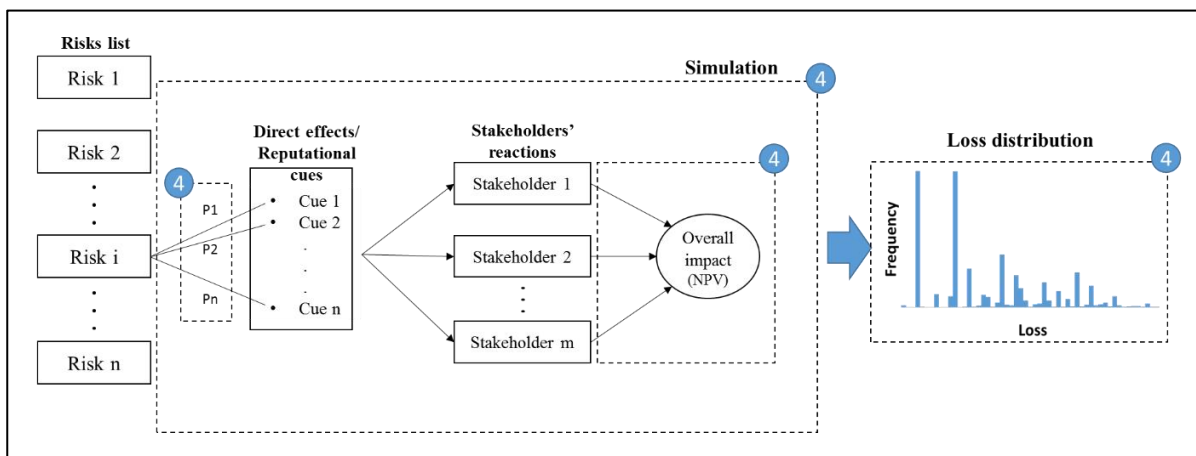


Figure 17 - Outputs of step four of the framework

5.2 - Risk map integration

This first step of the model has two goals:

1. To consider the list of already identified risks and assess which ones might have a reputational impact and therefore require a more detailed analysis.
2. To identify unmapped risks with a potential reputational impact. As a matter of fact reputational risk can sometimes stem from marginal risks that the organization had not adequately mapped

As far as the first goal is concerned, the job comes down to a simple qualitative analysis. It is sufficient to build a probability-impact matrix as described in the previous chapter.

The second objective requires a definitely more complex work, which should be carried out by focus groups with the backing of structured tools.

One specific set of tools which is proposed to support this process are the techniques currently employed to identify emerging risks.

According to a report presented by the International Actuarial Association (2008), emerging risks are ‘developing or already known risks which are subject to uncertainty and ambiguity and are therefore difficult to quantify using traditional risk assessment techniques. They are problematic because they are not well addressed and tend to come as a surprise.

Some of the defining characteristics of an emerging risk are (Allan et al., 2011):

- Uncertain definition
- Uncertain frequency and severity
- Difficulty in quantification especially in monetary terms
- Uncertain causality between risk source and resultant losses
- Absence of available insurances for the risk
- Absence of clear regulation concerning the risk

Reputational risks clearly share most of these characteristics, it seems therefore appropriate to employ similar techniques for their identification.

The following paragraphs will present three techniques currently employed for the identification of emerging risks. It will provide an in depth description of the phylogenetic analysis: a complex systems' technique which will ultimately be implemented within the case study in the next chapter. Moreover, two other alternative methodologies (scenario planning and disaster causation theory) will be shortly described.

5.2.1 - Complex systems theories and phylogenetic analysis

Complex systems theories make use of an integrative approach to explain phenomena that defy explanation through more traditional mechanistic and linear theories.

Allan (2011) suggests the use of complex systems techniques to identify emerging risks. The author considers the applicability of: *Concept Mapping, Systems Dynamic Modelling, Chaos Theory, Fuzzy Theory, Neural networks, Genetic Algorithms, Phylogenetic Analysis, Bayesian Networks, Cellular Automata, Agent Based Modelling and Network Theory*. He assigns scores to each method based on eight different dimensions: rigor, expert interaction, adaptation, computability, data requirement, operability and application availability. On the basis of such scores he comes to the conclusion that the technique which best applies to emerging risks assessment is the Phylogenetic Analysis.

What is Phylogenetic Analysis

In biology, phylogenetics is the study of evolutionary relationships among groups of organisms. Phylogenetic analysis utilizes molecular information, i.e. DNA, to meet the data requirements, and assigns equal weights to characters (Mishler, 2005).

The outputs from phylogenetic analysis are tree-like shapes, often called 'evolution trees', 'phylogenetic trees' or 'cladograms'. A phylogenetic tree is essentially a connected graph that is composed of nodes and branches and does not contain any closed structures. The nodes symbolize the organisms under investigation, whereas the branches that connect all the nodes represent the relationships among different organisms, in terms of their ancestry

and descent relationships. The application of the phylogenetic trees, which is composed of nodes and branches that link nodes, is not restricted to organisms. Indeed all individual entities with taxonomic characters, such as species, populations, individuals, genes, or even organizations (McCarthy et al., 2000), can be analyzed with this method.

All phylogenetic trees can provide the same basic information, including a historical pattern of ancestry, divergence, and descent, all of which can be interpreted from their structure (Lecointre & Le Guyader, 2007). The links between the nodes are called the branches and the lengths of these are proportional either to the evolutionary time or the number of mutations occurring along that branch (Li et al., 2000).

The three most common methods to construct phylogenetic trees are: the distance matrix method, the maximum likelihood and the maximum parsimony method. After considering the advantages and drawbacks of each algorithm and their experience of applying and interpreting the resulting trees in a risk context, Allan (2011) concluded that the parsimony method is the most suitable for risk analysis.

The principle behind the parsimony approach is that ‘a tree is more preferable if it involves fewer evolutionary changes’. In other words, the one with the fewest evolution changes is termed a parsimonious tree, as the term ‘parsimony’ implies as few changes as possible.

Why should this analysis be applied to risks

According to Allan (2011) risks bear considerable similarities to organisms: they exist in a particular environment, change over time and have uncertain outcomes. The evolution of a risk is partly determined by its uncertain nature and partly by the environment and human intervention. A phylogenetic tree can reflect the evolutionary relationship between risks, why they are similar or not, how these risks might adapt, mutate and evolve in the future. It also provides a powerful classification system of the risks and the connections between them. Risks can change and evolve in many ways but this does appear to happen in some predictable ways. Predicting the most likely future evolution of a risk will not only allow better risk mitigation but also help to prevent new risks from emerging. The methodology identifies small groups of highly related risks which share a common root. The evolutionary history of each of the groups can then be accurately traced. By understanding the phylogeny

of the risks it is possible to determine where evolution is most prolific and create focused scenarios for emerging risks modelling.

In the same manner, this method can be applied to the risks that determined reputation-damaging events. This kind of analysis should therefore allow to understand what kind of risks could most likely have a reputational impact in the future and should point out on which themes to focus the brainstorming groups.

What inferences can be made from phylogenetic trees

A risk tree is studied from left to right. As we move to the right, the tree branches to indicate points where the risk characteristics are separating in evolutionary terms. The evolution risk trees show the origin on the left hand side with the branches separating at bifurcation points caused by a change of common risk characteristics.

Figure 18 below shows a section of a tree with two legs representing risks A & B ‘lost intellectual property rights’ and ‘claims infringement of intellectual property rights’, respectively. The risk characteristics are indicated by the numbers on the branches: 22 – ‘inadequate legal framework; 7 – ‘crime’ and 25 – ‘human error or incompetence’. This tree shows there was an earlier risk with hazard 22 from which emerged the two new risks, A & B, with additional characteristics, 7 and 25 respectively.

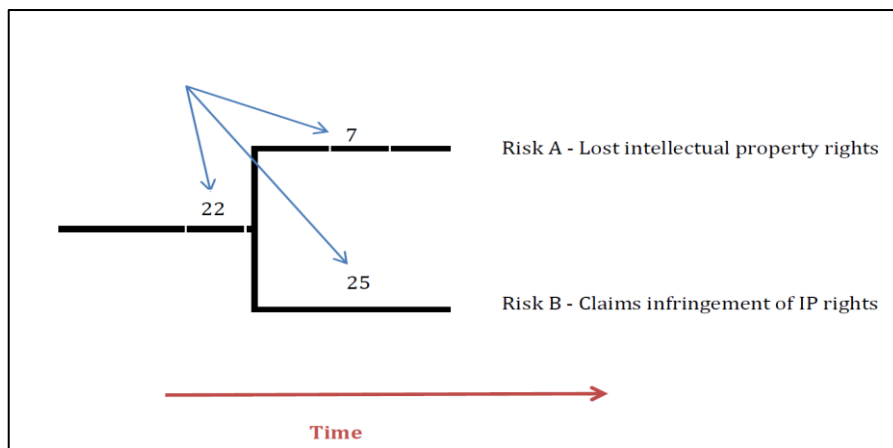
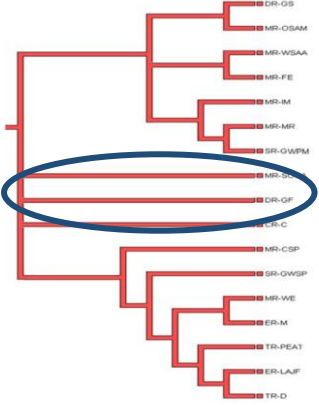
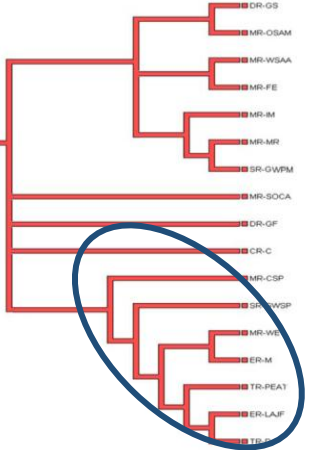
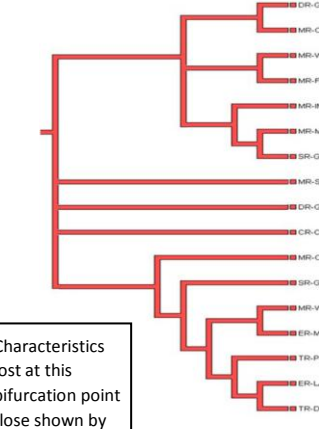


Figure 18 – Example of tree section (Allan, 2013)

Model description

There are many patterns formed within the trees which indicate where evolution is most likely, thus helping with the monitoring and prioritization of risk mitigations. These common patterns are captured in Table 10 below:

Table 10 – Common patterns observable in evolution trees (Allan, 2013)

Characteristic	Example evolution tree
<p>Low Bifurcation:</p> <p>Low numbers of bifurcations, shown by long straight branches, indicate areas of limited emergence. These areas are stable and independent from other risks. They possess few characteristics and can be more easily tracked.</p>	
<p>High Bifurcation:</p> <p>High numbers of bifurcations indicate areas of high complexity where risks are more likely to evolve from. This is shown by many branches on the evolutionary tree. Character patterns in these highly active regions can often be identified, creating a warning system.</p>	
<p>Lost and Gained Characteristics:</p> <p>Where Characteristics are lost and later regained indicates an interesting evolutionary path. This case may be because of a change in the environment and is worthy of further investigation.</p>	 <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-top: 10px;"> <p>Characteristics lost at this bifurcation point (lose shown by red numbers)</p> </div>

Model description

<p>Patterns:</p> <p>Pattern spotting between sets. As an example, pairs of common characteristics appearing in multiple locations can be used to identify potential locations for emerging risks. The emerging risks occur where one of the pair of characteristics exist. It is possible that these single characteristic locations may evolve into the common pair. Pair spotting (and other character pattern spotting) can be used to make predictions or scenarios about future risks.</p>	
<p>Key character Change:</p> <p>Key characters can indicate a change to the stability of the system and their presence can warn of sudden changes and further emerging risks.</p>	
<p>Sudden Character Emergence:</p> <p>The same character in multiple risk locations indicates something is changing fast. If character '14' was 'government', for example, why is it suddenly affecting so many risks and what will the consequences of this be?</p>	

5.2.2 – Alternative techniques

Two other techniques that can be considered to support the process of risk map integration are the Scenario Planning and Disaster Causation methodologies. While Scenario Planning is a structured process to build hypothetical scenarios, the Disaster Causation methods help to analyze past events in a structured manner.

Scenario planning

Miller (2003) defines scenario planning as “a process for structured thinking in which stories are created that bring together factual data and human insight to create scenario ‘plots’ exploring possible futures”. According to Rayner (2003) scenario planning is a tool that facilitates structured appraisal of possible future scenarios and their associated risks.

Miller analyzed the literature on scenario planning and identified eight steps within the process:

1. **Frame the issues.** Scenarios must have a clear purpose and focus. Thus, it is important to determine what a scenario planning process is intended to achieve: what are the issues to be explored, what should the time horizon be and what business areas should the focus be on.
2. **Identify participants and solicit input.** Assemble those individuals who can provide keen insights and fresh perspectives. This group of participants should include individuals within the organization who have roles directly connected issues being explored. In certain situations, input from external stakeholders can be helpful.
3. **Draw a picture of what is known.** Working from a figurative blank sheet, participants in the scenario planning process identify what they perceive to be the current trends and key elements that define the environment. Implicit understandings of relations among the various elements in the environment should be made as explicit as possible.
4. **Add uncertainties to the picture.** Building upon what is known, participants should identify uncertain environmental factors. Once managers identify uncertain contingencies, they should explore their significance and logical implications.
5. **Sketch out possible paths.** Given the trends and uncertainties identified, participants should strive to identify best case and worst case scenarios. Once consensus is reached, these extremes serve as bounds within which a variety of possible, but not necessarily plausible, future paths can be raised.

6. **Test for plausibility.** At this point, the multiple possible scenarios should be checked for internal consistency. The goal is to identify three or four scenarios that are the most relevant to formulating strategy.
7. **Anticipate interactive dynamics.** Using the selected scenarios, managers should anticipate the actions of the various actors in the scenarios. It is not enough for managers to determine how their own company will respond to the various scenarios. They must anticipate the responses of competitors and other stakeholders.
8. **Formulate strategies.** With clearly developed scenarios that span multiple future states of the world, managers can formulate strategic initiatives that exploit future opportunities and keep risk within an acceptable limit.

According to Fahey and Randall (1998) the scenario planning technique is commonly attributed to Herman Kahn during his tenure in the 1950s at RAND Corporation (a non-profit research and development organisation) for the US Government, and his formation of the Hudson Foundation in the 1960s. These techniques were also gaining credence in the corporate world and in the 1970s both Royal Dutch Shell and the Consulting Firm SRI International contributed to the creation of a more formalised approach to scenario planning (or thinking) that could be more readily linked with strategic planning.

Scenario planning can be a useful tool in exploring uncertainty and teasing out those difficult to-get-at risks. Building and analyzing scenarios can help the individuation of risks that can affect corporate reputation. It can be particularly helpful in considering the sets of circumstances that could spark a reputational crisis.

Disaster causation theories

Accident models provide a conceptualization of the characteristics of the accident, which typically show the relation between causes and effects. They explain why accidents occur and are used as techniques for i) risk assessment during system development and ii) post accident analysis to study the causes of the occurrence of an accident. One of the earliest accident causation models is the Domino theory proposed by Heinrich in the 40s which describes an accident as a chain of discrete events which occur in a particular temporal

order. This theory belongs to the class of sequential accident models or event-based accident models, which underlie most accident models such as Failure Modes and Effects Analysis (FMEA), Fault Tree Analysis (FTA), Event Tree Analysis, and Cause-Consequence Analysis (Leveson 1995). Sequential accident models explain accident causation as the result of a chain of discrete events that occur in a particular temporal order.

In the 80s, a new class of epidemiological accident models endeavoured to explain accident causation in complex systems. The accident is considered as the outcome of a combination of factors, some manifest and some latent, that happen to exist together in space and time. Reason's (1997) Swiss cheese model of defenses is a major contribution to this class of models, and has greatly influenced the understanding of accidents by highlighting the relationship between latent and immediate causes of accidents.

New accident models, based on systems theory and classified as systemic accident models, endeavour to describe the characteristic performance on the level of the system as a whole, rather than on the level of specific cause-effect "mechanisms" or even epidemiological factors (Hollnagel 2004). A major difference between systemic accident models and sequential/epidemiological accident models is that systemic accident models describe an accident process as a complex and interconnected network of events while the latter describes it as a simple cause-effect chain of events. Two notable systemic modelling approaches, Rasmussen's (1997) hierarchical socio-technical framework and Leveson's (2004) STAMP (Systems-Theoretic Accident Model and Processes) model, endeavour to model the dynamics of complex socio-technical systems.

These models can be applied to past reputational crises, perhaps focusing on the events that involved a specific industry or a specific company. This should allow to better understand the dynamics of such events and to identify what have been the latent causes. Ultimately such analysis should help detecting potentially underestimated risks.

5.3 - Mapping stakeholders and reputational cues

This second step of the framework aims at determining which are the main stakeholders and which are the reputational cues that could affect their decisions.

5.3.1 - Stakeholder analysis

The stakeholder analysis aims at evaluating and understanding stakeholders from the perspective of an organization and to determine their relevance to a project or policy (Brugha & Varvasovszky, 2000). The stakeholder analysis is the process of identifying the individuals or groups that are likely to affect or be affected by an organization or an action, and sorting them according to their impact on the organization/action and the impact the organization/action will have on them.

According to Preston (1990) stakeholders theories for managing an organization originated in the early 30s in the US, where General Electric identified four major interest groups it had to consider: customers, employees, the general public and shareholders. A stakeholder approach reflects the realization that the interests and influence of these individuals or groups, both within and outside the organization, need to be taken into consideration in strategic planning.

The stakeholder analysis is usually based on three steps:

1. Identifying: listing relevant groups, organizations, and people
2. Analyzing: understanding stakeholders' perspectives and interests
3. Mapping: visualizing relationships with objectives and other stakeholders

The first step in building any stakeholder analysis is to develop a list of the members of the stakeholders community. Various processes are suggested in the literature for building a stakeholders list but, generally, a multistep method is applied. This usually involves a series of interviews: the interviews include at first internal people and later other stakeholders. The potential list of stakeholders will always exceed the capability of the mapping tool to

sensibly display the results; the challenge is to focus on the ‘right stakeholders’ who are currently important.

The second step in the stakeholder analysis is to understand stakeholders’ attributes such as interest and power. Freeman (1984) suggests the following review questions to facilitate stakeholders mapping within an organization:

1. Who are our current and potential stakeholders?
2. What are their interests/rights?
3. How does each stakeholder affect us (challenges and opportunities)?
4. How do we affect each stakeholder?
5. What assumptions does our current strategy make about each important stakeholder?
6. What are the current ‘environmental variables’ that affect us and our stakeholders?
7. How do we measure each of these variables and their impact on us and our stakeholders?
8. How do we keep score with our stakeholders?

The third steps aims at representing and prioritizing the relationships between the organization and its stakeholders. A number of methods were suggested for stakeholders mapping, among which the simplest and best known are the following.

The method developed by Savage et al. (1991) offers a way to classify stakeholders according to potential for threat and potential for cooperation (fig. 18). The power of threat is determined by resource dependence, the stakeholder’s ability to form coalitions, and relevance of the threat to a particular issue. The potential to cooperate is partially determined by the stakeholder’s capacity to expand its interdependence with the organization: the greater the dependence, the greater the willingness to cooperate (Friedman & Miles, 2006).

Model description

		Potential for threat	
		High	Low
Potential for cooperation	High	Stakeholder type 4 Mixed blessing Strategy: collaborate	Stakeholder type 1 Supportive Strategy: involve
	Low	Stakeholder type 3 Non-supportive Strategy: defend	Stakeholder type 2 Marginal Strategy: monitor

Figure 18 – Savage’s model (1991)

Mitchell et al. (1997) proposed a classification of stakeholders based on their power to influence the firm, the legitimacy of each stakeholder’s relationship with the organization and the urgency of the stakeholder’s claim on the organization (fig. 19). The concepts of legitimacy, power, urgency and permutations of these attributes are used to create seven stakeholder categories and one non-stakeholder category. Power alone is insufficient for classifying a stakeholder as high priority. Legitimacy is required to provide authority. Urgency is necessary for execution, hence the stakeholder must be aware of its power and be willing to exercise it. They accept Suchman’s definition (1995) of legitimacy as ‘a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions’. Urgency is based on: i) time sensitivity, that is the degree to which managerial delay in attending to the claim or relationship is unacceptable to the stakeholder and ii) criticality, that is the importance of the claim or the relationship to the stakeholder.

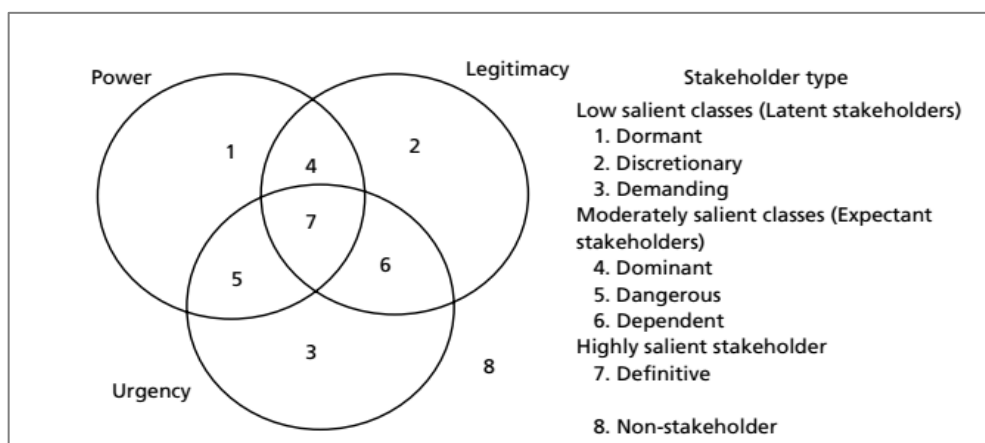


Figure 19 – Mitchell’s model (1997)

Model description

Figure 19 shows how a mixture of attributes can create different types of stakeholders with different expected behavioral patterns with respect to the firm.

Power versus interest grids are described in detail by Eden & Ackermann (1998; see Figure 20). These grids array stakeholders on a two-by-two matrix where the dimensions are the stakeholder's interest in the organization or issue at hand and the stakeholder's power to affect the organization's or issue's future. Four categories of stakeholders result: i) players who have both an interest and significant power, ii) subjects who have an interest but little power, iii) context setters who have power but little direct interest and iv) the crowd which consists of stakeholders with little interest or power (Bryson, 2003).

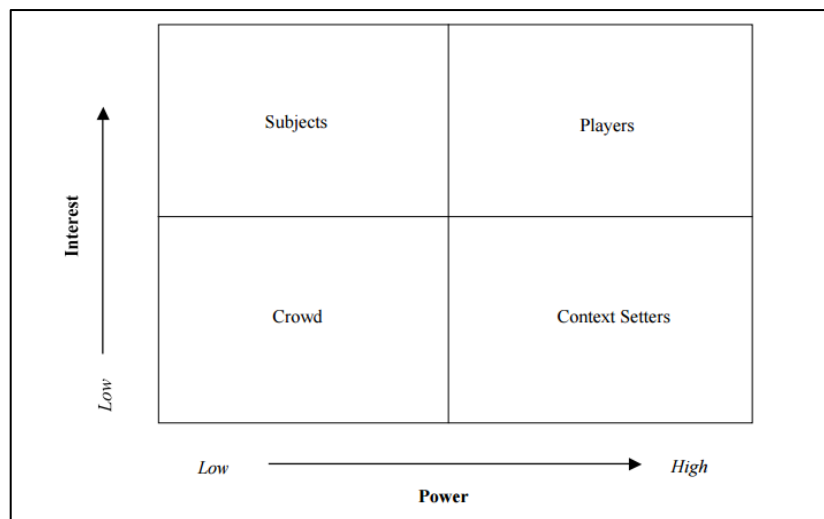


Figure 20 – Power vs interest grid (Bryson, 2003)

Stakeholder-issue interrelationship diagrams help show which stakeholders have an interest in different issues, and how the stakeholders might be related to other stakeholders through their relationships with the issues (Bryson, 2003). The resulting diagrams (see Figure 21) help provide some important structuring to the problem area, in which a number of actual or potential areas for cooperation – or conflict – among stakeholder interests may become apparent.

Model description

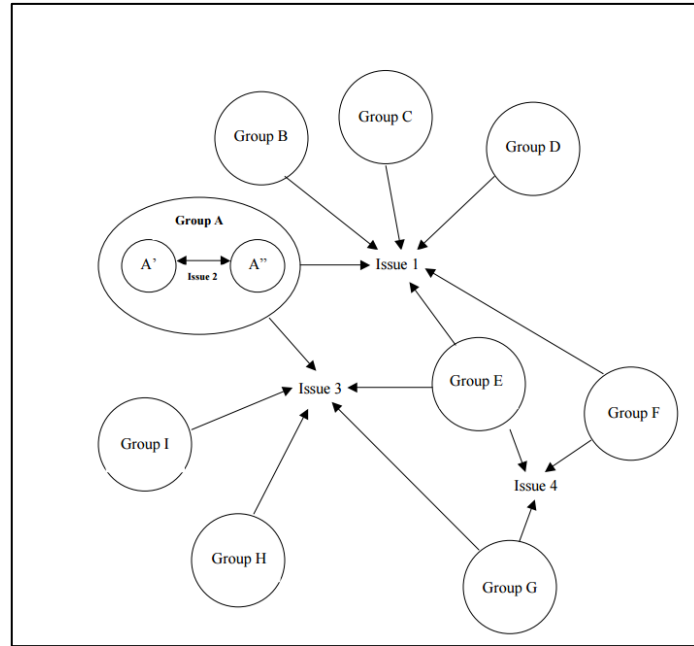


Figure 21 – Stakeholder-issue relationships (Bryson, 2003)

Other more complex methods for stakeholder analysis were proposed but they seem to fit better in project or policy proposal evaluation.

5.3.2 - Cues identification

Cues are defined in this model as the direct effects generated by the occurrence of the risks. They represent the signals that ultimately influence the stakeholders' decisions.

Such effects are definitely industry specific and should be identified with the support of industry experts. To support this process two sources of information are suggested. On the one hand the outputs of the stakeholders' analysis should provide insights over what are the key stakeholders' interests and what are their drivers. On the other hand an historical analysis of past risk events within the industry should offer an image of which are the direct effects of risks' occurrence.

Table 11 provides an example of what a list of reputational cues could look like. Clearly, the list will be different for each sector and for each company.

Model description

Table 11 – Cues examples

Category	Sub category	Cue
Economic impact	Sanctions	Major sanction (€)
		Average sanction (€)
		Minor sanction (€)
	Direct economic loss/ repair costs	Major loss (€)
		Average loss (€)
		Minor loss (€)
Regulatory consequences	Regulatory consequences	Prosecution
		Sentence
		Product recall
Company's reaction	Voluntary product recall	Voluntary product recall
	Earnings restatement	Earnings restatement
	Resignations	Top management resignation
		CEO resignation
	Public statements	Public apology
		Denial of responsibility
Negative news media coverage	Product/Service	Negative depiction of product/service quality
		Negative depiction of product/service safety
		Negative depiction of customers care
	Governance	Negative depiction of the company's transparency in it's practices
		Negative depiction of the company's ethical behavior

Model description

	Citizenship	Negative depiction of the company's environmental policies
Other signals	Rating agencies	Rating downgrade
	Previous events	Recent similar events by the same organization
		Recent similar events by the other organizations

5.4 - Understanding stakeholders' reactions

This step of the model has the objective of assessing the how the stakeholders would react to different combinations of cues.

Young (2010) suggests the use of the policy-capturing methodology in order to gain insight into the stakeholders' reaction to reputational risk.

Policy-capturing methods (or conjoint analysis methods as they are called by marketing researchers) are a specific kind of Experimental Vignette Methodology study. EVM studies generally consist of presenting participants with carefully constructed and realistic scenarios to assess dependent variables including intentions, attitudes, and behaviors (Aguinis & Bradley, 2014).

In particular policy capturing uses statistical methods to quantitatively describe relations between a person's judgment and the information used to make that judgment (Cooksey, 1996). Participants are asked to make decisions in response to a series of decision or problem solving scenarios presented by the researcher. The decision outcomes are then regressed against the values of one or more cues embedded in the scenarios. The resulting regression weights are then used to represent the respondents' judgment policies.

Policy-capturing evolved from Egon Brunswik's probabilistic "lens" model, where respondents use proximal cues from the environment and interpret them to develop judgements about physical or social reality (Cooksey, 1996).

Some of the most important aspects in designing the research are the representativeness, that is the selection of important elements of real-life judgment situations, and the design of

appropriate scenarios. The experimental design is another key point: it is important to involve a proper sample of respondents, a right number of cue variables and a sufficient number of scenarios that respondents will be asked to consider.

The independent variables in a policy-capturing analysis may be categorical or numeric. There are a number of multiple regression techniques (e.g., OLS, generalized least squares [GLS], logistic regression) that might be used in policy-capturing research, and it is important to choose the one that is appropriate for the specific study.

Before designing the research it is necessary to understand which are the decisions that will be investigated. According to Dowling (2006) among the determinants of the company's value (in a dcf framework) mostly affected by the reputation are: the cash in (sales) and the weighted average cost of capital. These effects can be investigated by surveying customers, clients, investors and banks. As far as the investors are concerned if the company is listed equity analysts that cover the company should be able to provide a comprehensive outlook of what the investors' reactions could be.

In specific circumstances other minor effects can be embedded in the model such as increased costs stemming from the reactions of suppliers and employees.

5.5 - Analyzing the generation of cues and drawing the conclusions

This step final step of the process analyzes what signals and with what probability are generated by each specific risk upon its manifestation and successively feeds these probabilities into a Monte Carlo simulation. The output of this simulation is the probabilistic distribution of losses stemming from the reputation-damaging event. This step of the process has to be repeated individually for each risk under examination.

In order to analyze the generation of cues there is the need for a systematic historical analysis. The process simply takes into consideration past manifestation of the same risk either within the company or within the industry. For each risk event an analysis of which cues (of the ones listed in step 2) have actually been generated. After a sufficient number of risk events has been analyzed, the probability that a specific risk will generate a specific cue can be computed (table 10).

Model description

Table 12 – Example of cue probability analysis

Category	Sub category	Cue	Probability
Economical impact	Sanctions	Major sanction (> xx € mil)	12%
		Average sanction (...)	25%
		Minor sanction (< xx € mil)	43%
	Direct economic loss/ repair costs	Major loss (> xx € mil)	5%
		Average loss (xx - xx € mil)	2%
		Minor loss (< xx - xx € mil)	10%
Regulatory consequences		Prosecution	0%
		Sentence	0%
		Product recall	2%

Finally the whole framework described in the previous paragraphs is built into a Montecarlo simulation that ultimately allows the calculation of the reputational VaR (see appendix 1) for each specific risk.

For each specific risk r_i the inputs to the model are:

- a_i = the frequency of the original risk
- $p_{i,j}$ = the probabilities of generation of each cue

The measure of frequency should be already available to the risk managers or can otherwise be assessed with an historical analysis. The frequency can reasonably be modelled as a Poisson distribution. Rachev and Fabozzi (2007) specifically consider the Poisson distribution as the best solution for modelling operational risk frequency.

$$a_i(n_i, \lambda_i) = P(x_i = n) = \frac{e^{-\lambda} \lambda^n}{n!} \quad n_i = 1, 2, ..$$

Where λ_i is the average number of events that take place within the time horizon and x_i is the number of events which probability is being estimated.

The probabilities of generation of each cue by each risk $p_{i,j}$ have been estimated in the first part of the process described in this paragraphs. At this point each cue $c_{i,j}$ can be modeled

Model description

as a Bernoulli variable which probability is the combination of the probabilities of materialization of the risk and of generation of the cues:

$$c_{i,j} = B[1, p_{i,j}] \quad j = 1, 2, \dots, m \quad n = 1, 2, \dots$$

assuming therefore the value 1 with a probability $[p_{i,j}]$ and 0 with a probability $[1 - p_{i,j}]$.

The reaction of each stakeholder to each risk $R_{i,k}$ is a function of the cues $c_{i,j}$ determined by each risk. This function has been estimated through the regression in third step of the process.

$$R_{i,k} = f(c_{i,1}, c_{i,2}, \dots, c_{i,m}) \quad k = 1, 2, \dots, s$$

The overall impact I_i (loss of value) is a function of all the stakeholders' reactions and can be computed by building a DCF valuation in each scenario and comparing the result with a base case valuation of the company.

$$I_i = n_i \cdot g(R_{i,1}, R_{i,2}, \dots, R_{i,s})$$

All these relationships are built into a Monte Carlo simulation where the inputs are the number of events n_i and the manifestation of cues $c_{i,j}$, modelled as previously described, and the output is the loss of value I_i . One important aspect to consider at this point is whether the cues are correlated (and that is frequently the case). If the cues are not independent the correlation has to be embedded in the sampling process.

The final result of the Monte Carlo simulation is the probabilistic distribution of the reputational losses. In order to compute the reputational VaR_α it is sufficient to consider the $(1-\alpha)$ percentile of such distribution).

5.6 - Limitations to the model

This model presents two major limitations: the first risks one is that it does not take directly into consideration the effect of the media; the second is that as any model that relies on surveys is exposed to major biases and simulation.

5.6.1 – Media effects

Media coverage constitutes a key factor for reputational risk. According to Fombrun and van Riel (2004) reputation develops through the information stakeholders receive about the organization. Most of the information stakeholders, and in particular consumers, collect about organizations is derived from the news media. Extensive media coverage of an event can contribute to heightened perception of risk and amplified impacts (Bums et al., 1990). That is why media coverage is an important feature of reputation management (Carroll & McCombs, 2003; Carroll, 2004).

Communication involves the way (words, phrases, images, etc) that information is presented in a message (Coombs, 2007). The way a message is framed shapes how people define problems, causes of problems, attributions of responsibility and solutions to problems (Cooper, 2002). Frames stress certain facts or values making them salient when individuals make decisions (Joslyn, 2003). Kasperson et al. (1988) identified mass media as one of various “amplifications stations” that receive, interpret and pass on risk signals, transforming the original risk signal. The notion that media frames the way people think about certain issues and influences the public’s attitudes about said issues is referred to as the “agenda-setting” effect (Carroll & McCombs, 2003).

New media based on the Internet seems to be playing an increasingly essential role in information (Peng et al., 2014). Compared with the traditional media, new media has several advantages including rapid dissemination, a relatively free flow of information, online interaction and no limits on time or location. Studies have reported and confirmed that social media, such as review sites, individual weblogs, Facebook accounts and twitter messages, significantly influence consumer decisions (Kaplan & Haenlein, 2010; Kozinets et al., 2010).

Model description

However not all the information that are disseminated by the media are received in the same way, influencing awareness and behavior. Communication researchers have long been interested in what audiences learn from the media (Jensen, 2011). Kjaer and Morsing (2010) in a study on the relationship between media coverage and firm reputation in Denmark, found a statistically significant ($p < 0.001$) positive correlation (Spearman's rho 0.79) between the amount of media coverage and the respondents' awareness of that firm.

Media coverage is particularly important when considering consumers. While the other key stakeholders (e.g. investors, employees, suppliers) are likely to be almost perfectly informed on events that involve the company consumers are only partially aware of such events.

Since the model presented considered the influence that “reputational signals” have on stakeholders it should be of crucial importance to understand with likelihood which stakeholders and especially consumers are aware of such signals.

The awareness probability could be linked to the average level media coverage for a specific kind of event and constitute a filter, perhaps only for consumers (fig. 22).

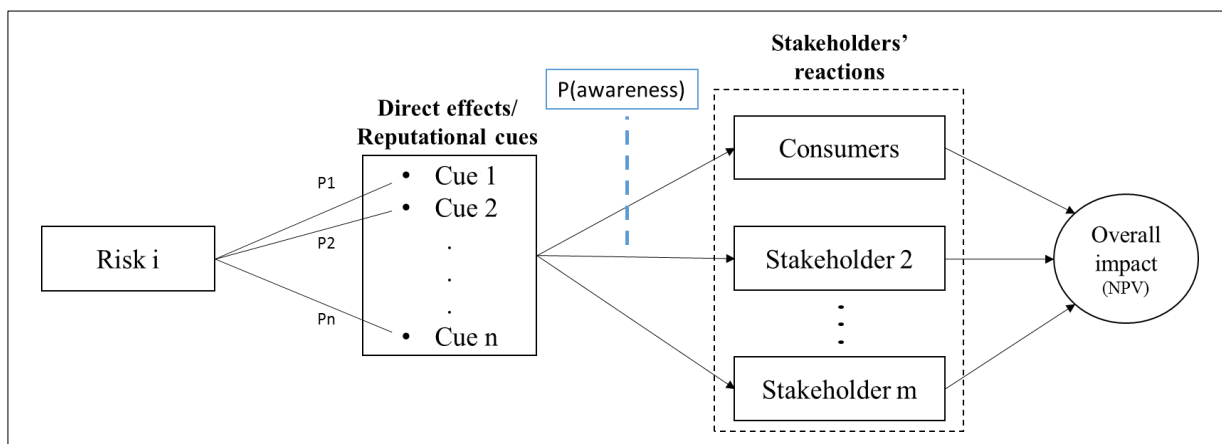


Fig. 22 – Media as filter

In order to embed this aspect in the framework an extensive research was conducted on the techniques of media analysis.

Media analysis can be conducted through both quantitative and qualitative methods. Quantitative content analysis collects data about media content such as topics or issues, volume of mentions, ‘messages’ determined by key words, circulation of the media (audience reach) and frequency (Macnamara, 2011). Qualitative content analysis examines

the relationship between the text and its likely audience meaning and tries to determine the likely meaning of texts to audiences. Qualitative content analysis can be incorporated within or conducted simultaneously with quantitative content analysis. For instance, positive and negative words and phrases can be analyzed to identify the tone of text.

Ultimately the effects of media on information acquisition are contingent on a variety of factors and conditions such as country, issue, individual attitudes and values. It was then concluded that it was a too difficult task to estimate the probability that a certain information offered by the media is acquired by the consumers.

Another option which was considered but ultimately not embedded either was to directly assess the level of awareness of risk events of the stakeholders directly within the surveys.

This clearly represents an area of potential improvement for the framework.

5.6.2 - Judgement analysis biases

The method presented relies on the stakeholders' opinions expressed in surveys rather than on historical data. This exposes the source data to errors determined by biases of the respondents. The decisions declared in the surveys may not represent accurately the real response that can be observed in historical data. According to Young (2010), "a survey-based technique captures what people say they do, as compared to observing what they actually do".

6. Case study

This chapter illustrates a simplified application of the model presented in the previous chapter. As described in chapter 5 the model is comprised of four steps:

1. Risk map integration
2. Mapping stakeholders and reputational cues
3. Understanding stakeholders' reactions
4. Analyzing the generation of cues and drawing the conclusions

While an exemplification a potential outputs of step two is be provided, the ultimate focus of the chapter are the most technical aspects of the framework, mainly contained in steps one, three and four.

The case will generally focus on the food&beverage sector. While the first step of the framework can be generalized for the whole sector the following steps have to be applied to a specific company and to a specific risk. Therefore, the chapter is divided in two parts.

In the first part a phylogenetic analysis will be used to understand which are the “key risk areas” for reputational risk in the food industry. The second part will consider an hypothetical diary company. First, an example of what the outputs of steps two and three could look like will be presented. Secondly, a simulation of step four will be conducted to assess the reputational impact of the food contamination risk (more specifically of the bacterial contamination risk).

6.1 - Risk integration with phylogenetic analysis

For this first step of the framework a phylogenetic analysis model is implemented. As it was mentioned in the previous chapter the objective of this analysis is to gain a better understanding of which among the risk categories are more likely to generate reputational risk.

The next paragraph will present the most operative aspects of the implementation. First the data collection process is presented, next the general methodology is described and finally the results of the analysis are displayed and commented.

6.1.2 - Data collection

The objective of this data collection was to identify a sample of major reputation-damaging events involving food&beverage companies in the last 15 years. Since there are no extensive public databases on this kind of events, the data collection was conducted through internet research with the support of the Lexis-Nexis academic database. The research was carried both by using general keywords and by directly searching for the world's largest food&beverage companies and assessing if they were involved in major reputation damaging events. The search resulted in a sample of 62 reputation-damaging events (tab. 13) that took place in the last 15 years.

Table 13 – Reputation damaging events sample

Year	Company	Year	Company
2013	ABP Foodgroup	2009	Land O'Lakes
2013	Barilla	2008	Maple Leaf Foods
2010	Binbo Bakeries	2007	Mars Inc
2013	Birds Eye	2009	Mars Inc
2008	Bright dairy	2013	Mc Donalds
2011	Brown-Forman	2014	Mc Donalds
2009	Campbell soup	2008	Mengniu
2003	Cargill	2010	Mondelēz International
2005	Cargill	2010	Mondelēz International
2007	Cargill	2011	Mondelēz International
2011	Cargill	2007	Nestlé

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2007	Chiquita	2008	Nestlé
2000	Coca cola co	2013	Nestlè
2003	Coca cola co	2003	Parmalat
2013	Comigel	2009	Peanut corp
2002	ConAgra	2010	Perdue Farms
2003	ConAgra	2010	Perdue Farms
2009	ConAgra	2002	Pilgrim's Pride
2010	Constellation	2004	Pilgrim's Pride
2011	Danone	2004	Pilgrim's Pride
2012	Danone	2013	Rich's
2005	Dole	2008	Sanlu
2007	Dole	2005	Smithfield Foods
2013	Findus	2010	Smithfield Foods
2013	Foster Farms	2013	Spanghero
2008	Heniz	2013	Sysco
2009	JBS USA	2013	The Hershey Company
2011	Jensen Farms	2011	The Hershey Company
2010	Kellog's	2003	Tyson Foods
2014	KFC	2008	Unilever
2013	Kraft foods	2011	Unilever [lipton]

6.1.3 - Methodology

The reputational events were analyzed and mapped against a list of risk characteristics. This list of characteristics was obtained by analyzing the risk registers of some companies within the food industry that were available online. A company that was to implement this model could consider the classification of risks of its own risk register.

The characteristics were initially 54 and were narrowed down to the characteristics actually observed throughout the previously mentioned sample of events. The remaining characteristics employed in the analysis are 30 (tab. 13).

Table 13 – Risk characteristics

Characteristic	Code	Characteristic	Code
Operational risk issue	1	Labor issue	16
Industrial investment issue	2	Underpaid labor	17
Sourcing issue	3	Unsafe working condition	18
Product safety and quality issue	4	Racial discrimination	19
Unhealthy product ingredients	5	Child labor	20
Unsafe production policies	6	Governance and integrity issue	21
Undeclared ingredients	7	Ethical issue	22
Inadequate raw materials	8	Animal cruelty	23
Contamination of the product	9	Unethical marketing practices	24
Foreign objects in the product	10	Homophobia	25
Bacterial contamination of the product	11	Internal fraud/illegal acts	26
Chemical contamination of the product	12	Compliance with laws	27
Environmental issues	13	Bribery	28
Production causing deforestation	14	License infringement	29
Production causing pollution	15	Tax evasion	30

The data collected was transformed into matrix format with the reputation-damaging events as rows and the characteristics as columns. A ‘1’ represented the presence of a characteristic and a space or ‘0’ represents a lack of that characteristic (fig. 23).

Case study

Events	Operational risk	Operations / Industrial Investments	Sourcing	Product Safety & Quality	Unhealthy ingredients	Unsafe policies	Undisclosed ingredients	Raw materials quality
ABP Foodgroup (2013)	1	0	0	1	0	0	1	0
Spanghero (2013)	1	0	0	1	0	0	1	0
Comigel (2013)	1	0	0	1	0	0	1	0
Findus (2013)	1	0	1	1	0	0	1	0
Nestlé (2013)	1	0	1	1	0	0	1	0
Birds Eye (2013)	1	0	1	1	0	0	1	0
Sanlu (2008)	1	0	0	1	0	0	1	0
Mengniu (2008)	1	0	0	1	0	0	1	0
Bright dairy (2008)	1	0	0	1	0	0	1	0
Mc Donalds (2013)								
[employment practices]	1	0	0	0	0	0	0	0
Mc Donalds (2014)	1	0	0	1	0	0	0	1
KFC (2014)	1	0	0	1	0	0	0	1
ConAgra (2002)	1	0	0	1	0	0	0	0
Jensen Farms (2011)	1	0	0	1	0	0	0	0
Nestlé (2007)	1	1	0	0	0	0	0	0
Nestlé (2008)	0	0	0	0	0	0	0	0
Tyson Foods (2003)	1	0	0	0	0	0	0	0
JBS USA (2009)	1	0	0	1	0	0	0	0
Coca cola co (2003)	1	0	0	0	0	0	0	0
Coca cola co (2000)	1	0	0	0	0	0	0	0
Kraft foods (2013)	1	0	0	1	0	0	1	0
Parmalat (2003)	0	0	0	0	0	0	0	0

Figure 23 – Extract from the data matrix

These binary data were then analyzed using two softwares for phylogenetic analysis: PHYLIP and Mesquite. While the first one was employed for the actual analysis of the data the second served as an instrument both to input the data and to represent the output tree. A more detailed explanation of the procedure can be found in appendix 2.

6.1.4 - Results

Figure 24 shows the phylogenetic tree resulting from the analysis. Each branch in the Cladogram below ends in a specific event. Each branching point is defined by a split in the characteristics. The length of the branch represents the number of characteristics that “evolved” to define that branch, with more characteristics leading the longer branches.

These diagrams are very useful in helping to visually identify patterns of interest. The first thing that is noticeable in this cladogram is the division into three major clades or groups:

- Operational risks (A)
- Governance and integrity risks (B)
- Compliance risks (C)

Case study

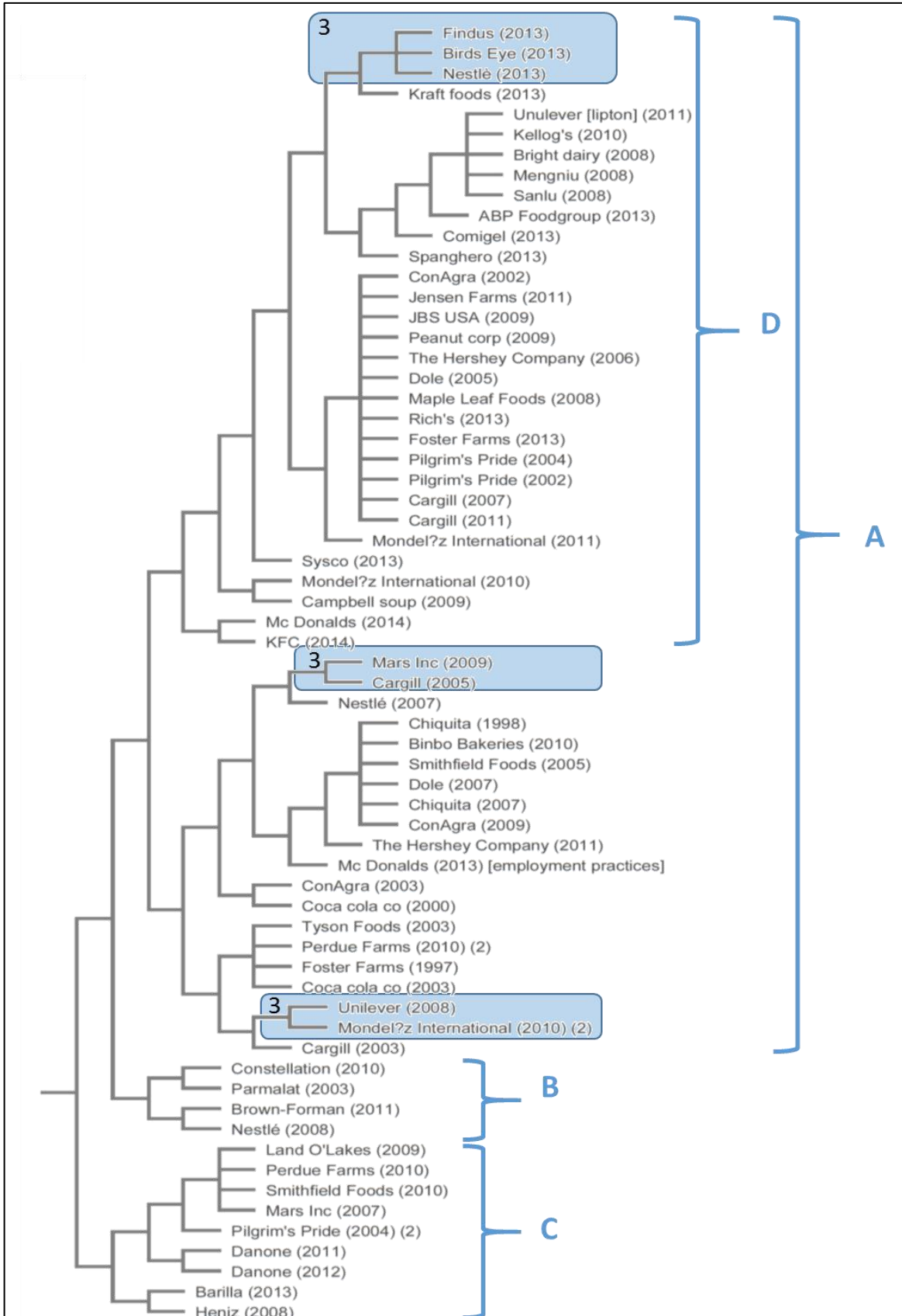


Figure 24 – Output tree

These can be considered the fundamental categories risks that can generate a reputational impact (at least as far as the food industry is concerned). We can then analyze which event types are more evolved than others by analyzing the branch length.

The bottom highlighted groups (B and C), the governance and compliance clades, shows very little evolutionary process. These events can be considered to be relatively stable and unchanging in nature.

In contrast to these events, the operational risks clade (A) shows significant evolution through a large number of bifurcations in characteristics. These can be considered to be highly evolved risk events. These types of risks should be studied in detail, as they are likely to give us greater insight into the types of events that are more likely to be subject to evolutionary forces in the future. While other studies are needed it is presumable that this prevalence of reputational risk is common to numerous sectors.

It is then interesting to observe that within the operational risk clade the largest “sub-clade” is represented by the food-safety risks. The food safety risk clade presents itself a large number of bifurcations meaning in order to identify potential reputational risks this is probably the area that should be more thoroughly investigated. This aspect is certainly peculiar to the food industry.

Finally, another interesting insight that can be drawn from the observation of the results involves the companies’ supplying process. As it can be seen the characteristic 3 (“sourcing issues”) is present in various branches in different clades. This means that it can be associated with different kind of risks. The implication for companies is that the reputational risk identification process should take in deep consideration the activities of the suppliers and how such activities could represent a threat to the organization’s reputation.

6.2 – Specific risk analysis

As highlighted by the phylogenetic analysis the food safety risk is definitely one of the risks that are most likely to generate a reputational damage to companies in the food industry.

This paragraph presents the process of assessment of the reputational VaR of the bacterial contamination risk for a dairy company. First the base case scenario for the hypothetical company will be presented and the specific risk will be described. Then the hypothetical outputs of steps two and three of the framework will be displayed. Finally step four of the framework will be implemented with the use of actual empirical data on real cases of bacterial contamination in the dairy sector.

6.2.1 - Problem setting

This section will present both the base case economics of the hypothetical dairy company and a synthetic description of the risk that will be analyzed in the case study.

Base case DCF

The case will consider a hypothetical Italian dairy company. Out of simplicity, we will suppose it produces only one product, which is milk. The company's forecasted results are shown in table 14. Table 15 instead shows the free cash flows' calculations:

Table 14 – Forecasted results

EUR M	2014A	2015E	2016E	2017E	2018E	2019E
Sales	95,7	100,0	104,5	109,2	114,1	119,3
Ebitda	6,6	7,0	7,9	8,8	9,5	9,9
Ebitda margin (%)	6,9	7	7,6	8,1	8,3	8,3
D&A	4,4	4,4	4,3	4,1	4,5	4,4
Ebit	2,5	2,6	3,3	4	3,8	4,0
Taxes	1,0	1,0	1,3	1,6	1,5	1,6
Net income	1,5	1,6	2,0	2,4	2,3	2,4

Table 15 – Cash flow calculation

EUR M	2015	2016	2017	2018	2019
EBIT	2.6	3.3	4.0	3.8	4.0
Taxes	1.0	1.3	1.6	1.5	1.6
NOPAT	1.6	2.0	2.4	2.3	2.4
Delta WC	0.0	0.0	0.0	0.0	0.0
Capex	2.7	2.7	2.7	2.7	2.7
D&A	4.4	4.3	4.1	4.5	4.4
Net cash flow	3.3	3.6	3.8	4.1	4.0

The base case DCF is computed under the following assumptions:

- The company is financed exclusively with equity
- The cost of capital is 7%
- The terminal growth is 2%

The resulting enterprise value, which in this case is the same as the equity value, amounts to 57.3 €M.

The bacterial contamination risk

Worldwide, food safety is frequently at the center of media attention. Outbreaks of foodborne illnesses happen in developed as well as in emerging countries and affect entire food supply chains. Many smaller outbreaks go unnoticed. Bacteria are the leading cause of foodborne diseases and appear to be the causative agents of about half of the recorded outbreaks (CDC, 2014). Larger outbreaks trigger public attention, since they impact on public health and impose high costs on society. Media influence the perception of foodborne illnesses and can contribute to increased risk perception of consumers.

Among the food safety risks, the bacterial contamination risk is certainly one of the most interesting to study, especially in the dairy sector. Bacterial illnesses are frequently associated to the consumption of milk and dairy products. In particular one of the most dangerous bacteria in the dairy chain is represented by *Listeria monocytogenes*.

Human listeriosis is a relatively rare but serious zoonotic disease; it is considered an emerging disease as the number of cases in western countries are increasing (EFSA, 2014). Of all the zoonotic diseases under EU surveillance, listeriosis causes the most severe human

disease: in 2012 in EU, 91.6 % of the cases were hospitalized and the fatality rate was 17.8 %. The bacterium can be found in raw foods and in processed foods that are contaminated during and/or after processing. Good manufacturing practices, appropriate cleaning, sanitation and hygiene programs and effective temperature control throughout the food production, distribution and storage chain are required for prevention of contamination or inhibition of growth of *L. monocytogenes* (EFSA, 2013).

Other bacterial illnesses that can be occasionally linked to dairy products are salmonellosis and *E.coli* infections.

6.2.2 - Mapping stakeholders and cues

This step of the framework is obviously company specific. A possible list of the stakeholders of a dairy company could include:

- Customers
- Stockholders
- Employees
- Clients
- Product suppliers
- Service suppliers
- Banks
- Subsidiaries
- Regulatory agencies
- Public administration
- Competitors
- Workers' unions
- Mass media
- Local community
- Scientific community

This list was obtained by analyzing the stakeholders presented in the sustainability reports of some food companies. As it was presented in the previous chapter the stakeholders' analysis should be conducted through structured interviews and brainstorming groups.

Moreover the analysis should include the prioritization of the stakeholders and the assessment of their main interests. These in depth studies are not embedded in this hypothetical case study for obvious reasons.

The case developed in the following paragraphs will actually consider only two stakeholders: customers and investors. This is clearly a simplification of the model yet these two stakeholders are usually the most relevant when considering reputational risk. The aspects that will be examined are the customers' purchase probability and the investors' expected rate of return.

As far as the cues are concerned, the case will only consider the ones which have been found to be the most relevant with reference to the bacterial contamination risk (Table 16).

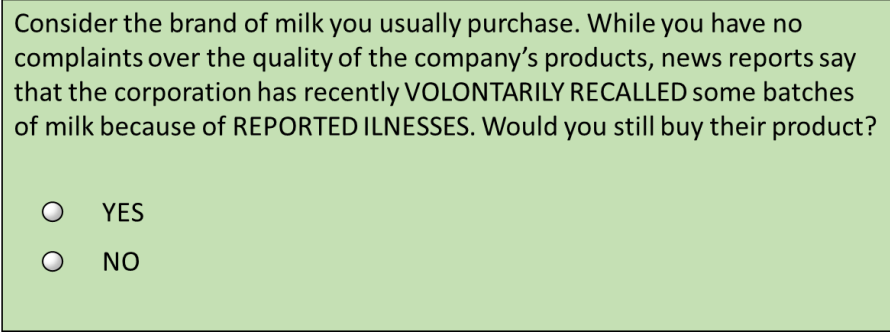
Table 16 – Cues considered

Cues
<ul style="list-style-type: none">• Reported illnesses• Reported deaths• Investigation• Lawsuit• Imposed product recall• Temporarily ceased production• Voluntary product recall• Media headlines• Multiple contamination events in short time

Once again the actual application of the model to a real life situation would require a more complex analysis and the identification of all the possible cues with reference to all the risks under examination, yet that is not the focus of this hypothetical case study.

6.2.3 - Understanding stakeholders' reactions

As presented in the previous chapter the analysis of the stakeholders' reactions has to be explored with the use of extensive surveys. Such surveys should investigate precise stakeholders' decisions in response to simulated scenarios (fig. 25). The scenarios have to be constructed by randomly combining the reputational cues in order to ultimately assess the effect of each cue. The number of scenarios created has to be sufficient for the subsequent regression to be statistically significant.

A green rectangular box containing a survey question and two radio button options. The text inside the box reads: "Consider the brand of milk you usually purchase. While you have no complaints over the quality of the company's products, news reports say that the corporation has recently VOLONTARILY RECALLED some batches of milk because of REPORTED ILNESSES. Would you still buy their product?" Below the text are two radio buttons, one labeled "YES" and one labeled "NO".

Consider the brand of milk you usually purchase. While you have no complaints over the quality of the company's products, news reports say that the corporation has recently VOLONTARILY RECALLED some batches of milk because of REPORTED ILNESSES. Would you still buy their product?

YES

NO

Figure 25 – Example of survey question

The respondents do not necessarily have to analyze all the scenarios created but can each be provided with a smaller subset of cases. Once all the answers have been collected, the average reaction for each scenario and for each stakeholder can be computed.

Finally in order to assess the effect of each cue a multiple regression models (one for each stakeholder) have to be implemented. The cues are modelled as dummy variables while the average reaction is the dependent variable.

In the case study, being an hypothetical case, reactions of customers and investors have been simulated. A sample of 100 scenarios was generated: each scenario consisted of a random combination of the previously described cues. The average response of customers and investors was simulated for each scenario. Subsequently two regression models were implemented to assess the deterministic relationships between cues and reactions (tab. 17).

Table 17 – Regression results

Cues	Customers’ reaction coefficients	<i>P-value</i>	Investors’ reactions coefficients	<i>P-value</i>
Reported illnesses	-0.23	0.000	0.0016	0.010
Reported deaths	-0.32	0.000	0.0045	0.000
Investigation	-0.09	0.000	0.0045	0.000
Lawsuit	-0.12	0.002	0.0053	0.000
Imposed product recall	-0.18	0.000	0.0045	0.000
Temporarily ceased production	-0.02	0.159	0.0098	0.000
Voluntary product recall	-0.02	0.098	0.0014	0.000
Media headlines	-0.12	0.000	0.0029	0.006
Multiple contamination events in short time	-0.09	0.000	0.0042	0.000

At this point it is important to check that the terms of the regression are statistically significant. As a matter of fact some cues could prove not to affect the reaction of specific stakeholders. In this case the customer reaction to the “temporarily ceased production” coefficient had a p-value of 0,16 and was therefore excluded with a 15% confidence level. The customers’ regression was therefore repeated without the “temporarily ceased production” variable (tab. 18).

Table 18 – Regression results with seven variables

Cues	Customers’ reaction coefficients	<i>P-Value</i>
Reported illnesses	-0.23316	0.000
Reported deaths	-0.3125	0.000
Investigation	-0.09518	0.000
Lawsuit	-0.11638	0.000
Imposed product recall	-0.18689	0.002
Temporarily ceased production	-	-
Voluntary product recall	-0.02454	0.000
Media headlines	-0.12269	0.000
Multiple contamination events in short time	-0.08842	0.000

6.2.4 - Analyzing the generation of cues and drawing the conclusions

This paragraph will present the final step of the framework. As it was presented in the previous chapter this final passage ultimately consists in a scenario analysis:

- Real cases of the event considered (bacterial contamination) are analyzed
- The historical probability of generation of each cue is assessed
- Scenarios are created as combinations of cues
- The probability of each scenario is computed according to the historical probabilities
- The consequences of each scenario are computed using the results of the judgement analysis (last passage)
- The overall distribution of the effects is assessed

The following paragraphs will first present the data collection process, next the detailed methodology employed will be described and finally the results will be considered.

6.2.4.1 - Data collection

The objective of this data collection was to identify a sample of events of bacterial contamination in the dairy industry. The choice has been to consider exclusively cases of recalled products since that is the only case in which there is certainly a reputational damage. The research mainly considered events found in the FDA's (Food and Drugs Administration) database of recalls and safety alerts. The EFSA (European Food Safety Authority) has an analogous database but does not publicly disclose the names of the companies and the brands involved in the events. The search resulted in a sample of 58 bacterial contamination events (tab. 19) that took place in the last 5 years.

Table 19 – Bacterial contamination events

Date	Brand	Company	Issue
01/23/2015	Queseria Bendita	Queseria Bendita LLC	Listeria monocytogenes
01/02/2015	Full Tilt Ice Cream	Full Tilt Ice Cream	Listeria monocytogenes
12/30/2014	Buff Ewe Blue, Buff Blue, Double Down Blue and	Bleating Heart Cheese (BHC)	Listeria monocytogenes

Case study

	more		
12/24/2014	Farm Country Cheese House	Farm Country Cheese House	Listeria monocytogenes
12/11/2014	Flat Creek Lodge	Flat Creek Farm & Dairy	Salmonella
11/21/2014	Flying Cow Creamery	Flying Cow Creamery	May not have been adequately pasteurized
11/04/2014	Lacteos Santa Martha	Oasis Brands, Inc.	Listeria monocytogenes
07/28/2014	Mt Sterling Coop Creamery	SW Wisc Dairy Goat Products Coop	Escherichia coli (STEC) O111:H8
06/11/2014	Smith's Farmstead, Mountain Gouda	Smith's Country Cheese	Listeria monocytogenes
05/17/2014	Knudsen, Breakstone's, Simply Kraft, and Daily Chef.	Kraft Foods Group	Potential for spoilage and/or food borne illness
03/26/2014	Oscars Smokehouse Inc.	Oscars Smokehouse Inc.	Listeria monocytogenes
03/01/2014	Mexicana, Amigo, Santa Rosa De Lima, and Anita	Roos Foods	Listeria monocytogenes
11/26/2013	Heavenly	Flat Creek Farm and Dairy	Salmonella enteritidis
09/05/2013	Chobani	Chobani, Inc.	Reports of bloated, swelled product
07/29/2013	Trois Comtois	Trois Comtois	Listeria monocytogenes
07/05/2013	Cave Brothers, Les Freres	Crave Brothers Farmstead Cheese Company	Listeria monocytogenes
06/03/2013	Finger Lakes	Finger Lakes Farmstead Cheese Company, LLC	Listeria monocytogenes
01/15/2013	Homestead Creamery	Homestead Creamery	Contaminated with Shiga-Toxin producing E.coli
11/05/2012	Kenny's Farmhouse Cheese	Kenny's Farmhouse Cheese	Listeria monocytogenes
09/26/2012	Marte, frescolina	Forever Cheese Inc.	Listeria monocytogenes
08/08/2012	Tomales Bay Foods, Shepherd's Way Farms, Tumalo Farms	Tomales Bay Foods, Inc.	Listeria monocytogenes

Case study

07/19/2012	Tita	Productos Tita Corp.	Improper pasteurization of their milk used to make the cheese.
07/03/2012	Andante Dairy	Andante Dairy	Insufficient Pasteurization
07/02/2012	Mexicali Cheese Corp.	Mexicali Cheese Corp.	Listeria monocytogenes
03/16/2012	El Ranchero Del Sur, Los Corrales	El Ranchero Del Sur, LLC.	Listeria monocytogenes
01/19/2012	Cedar Tree	Kradjian Imp Co	Listeria monocytogenes
01/03/2012	HEB, El Viajero, BMF	Alpine Slicing and Cheese Conversion	Listeria monocytogenes
01/03/2012	Nordic Creamery	Bekkum Family Farms LLC	Listeria monocytogenes
12/31/2011	Edelweiss Creamery	Alpine Slicing and Cheese Conversion	Listeria monocytogenes
12/29/2011	Fromagerie Marie KadÄ“	Cedar Market	Listeria monocytogenes
12/27/2011	Green Cedar Dairy	Green Cedar Dairy	Listeria monocytogenes
12/23/2011	Cedar	Kradjian Imp Co	Listeria monocytogenes
11/08/2011	Golden Glen Creamery	Golden Glen Creamery	Listeria monocytogenes
10/17/2011	Fair Oaks Royal Blue	Fair Oaks Dairy Products LLC	Listeria Monocytogenes
10/07/2011	KALONA SUPER NATURAL	Farmers All Natural Creamery	Residual Phosphatase
9/16/2011	Del Bueno Casero	Del Bueno	Listeria monocytogenes
08/11/2011	Miss Bonnie's	Miss Bonnie's Gourmet, LLC	Salmonella
06/15/2011	Queso Fresco	Quesos CentroAmericano Corp.	Staphylococcus Aureus
06/14/2011	Royal Blue Stilton , natzhert	Atalanta Corporation	Listeria monocytogenes
05/18/2011	Quenby Hall Blue Stilton	Schratter Foods, Incorporated	Listeria monocytogenes
01/10/2011	La Original	Surtex Foods	Contaminated with Listeria monocytogenes and Staphylococcus

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			aureus
12/17/2010	Sally jackson cheese	Sally Jackson Cheese	E. coli O157:H7
11/23/2010	Bravo Farms	Bravo Farms	E. coli O157:H7, Listeria monocytogenes
11/17/2010	Del Bueno	Del Bueno	Listeria monocytogenes
11/11/2010	Mauri	DPI Specialty Foods	E. coli O157:H7
10/06/2010	La Nuestra	Montalvan's Sales	Salmonella
08/30/2010	Morningland Dairy, Ozark Hills Farm	Morningland Dairy of the Ozarks, LLC	Listeria monocytogenes and Staphylococcus aureus
08/26/2010	Queseria Chipilo, Chipilo, Aztlan, more	Queseria Chipilo, Inc.	Listeria monocytogenes
08/06/2010	Queso Cotija	Mexicali Cheese Corp.	Staphylococcus aureus
07/01/2010	Queso El Azteca	Azteca Linda Corp.	Listeria monocytogenes
05/06/2010	Mt. Vikos	Mt. Vikos, Inc.	Listeria monocytogenes
04/06/2010	Del Bueno	Del Bueno	Listeria monocytogenes
03/12/2010	Spreadables	Emmi-Roth Kase USA	Salmonella
03/05/2010	Estrella Family Creamery	Estrella Family Creamery	Listeria monocytogenes
02/19/2010	Queseria Bendita	Queseria Bendita	Listeria monocytogenes
01/11/2010	Heluva Good	HP Hood	Listeria monocytogenes
01/10/2010	The Wisconsin Cheeseman	The Wisconsin Cheeseman	Listeria monocytogenes

6.2.4.2 - Methodology

The information collected was transformed into matrix format with the bacterial contamination events as rows and the cues as columns. A ‘1’ represented the presence of a characteristic and a space or ‘0’ represents a lack of that characteristic (fig. 26).

Date	Brand	Reported illness	Reported deaths	Investigation	Lawsuit	Forced product recall	Temporarily ceased production	Voluntary product recall	Media headlines
01/23/2015	<u>Queseria Bendita</u>	1	1	1	0	0	1	1	0
01/02/2015	<u>Full Tilt Ice Cream</u>	0	0	0	0	0	0	1	0
12/30/2014	<u>Buff Ewe Blue, Buff Blue, Double Down Blue and more</u>	0	0	0	0	0	0	1	0
12/24/2014	<u>Farm Country Cheese House</u>	0	0	0	0	1	1	0	0
12/11/2014	<u>Flat Creek Lodge</u>	0	0	0	0	1	0	0	0
11/21/2014	<u>Flying Cow Creamery</u>	0	0	0	0	0	0	1	0
11/04/2014	<u>Lacteos Santa Martha</u>	1	0	1	0	1	0	0	0
07/28/2014	<u>Mt Sterling Coop Creamery</u>	0	0	0	0	0	0	1	0
06/11/2014	<u>Smith's Farmstead, Mountain Gouda</u>	0	0	0	0	0	0	1	0
05/17/2014	<u>Knudsen, Breakstone's, Simply Kraft, and Daily Chef</u>	0	0	0	0	0	0	1	1
03/26/2014	<u>Oscars Smokehouse Inc.</u>	0	0	0	0	0	0	1	0
03/01/2014	<u>Mexicana, Amigo, Santa Rosa De Lima, and Anita</u>	1	1	1	1	1	1	0	1
11/26/2013	<u>Heavenly</u>	0	0	0	0	1	0	0	0
09/05/2013	<u>Chobani</u>	1	0	0	0	1	0	0	0

Figure 26 – Extract from the data matrix

The probability (frequency) of generation of each cue was computed as the number of events that generated the specific cue over the total number of events (tab. 20).

Table 20 – Cues frequency

Cue	Probability
Reported illnesses	23%
Reported deaths	9%
Investigation	37%
Lawsuit	4%
Forced product recall	60%
Temporarily ceased production	25%
Voluntary product recall	40%
Media headlines	7%

Next, before generating the scenarios, the correlation between the variables was controlled (tab. 21).

Table 21 – Correlation matrix between cues

	<i>Reported illnesses</i>	<i>Reported deaths</i>	<i>Investigation</i>	<i>Lawsuit</i>	<i>Forced product recall</i>	<i>Temporarily ceased production</i>	<i>Voluntary product recall</i>	<i>Media Headlines</i>
Reported illnesses	1.000							
Reported deaths	0.570	1.000						
Investigation	0.538	0.406	1.000					
Lawsuit	0.351	0.615	0.250	1.000				
Product recall	0.191	0.129	0.406	0.157	1.000			
Temporarily ceased production	0.273	0.399	0.494	0.334	0.220	1.000		
Voluntary product recall	-0.191	-0.129	-0.406	-0.157	-1.000	-0.220	1.000	
Media headlines	0.014	0.158	-0.067	0.321	-0.054	0.003	0.054	1.000

As it can be observed from table 21 the correlations between variables are consistently different from 0. For instance the correlation between the variable “Voluntary product recall” and the variable “Forced product recall” was “-1”. This implies that without indulging in formal testing the variables can reasonably be considered not independent. Assessing the joint distribution of multiple correlated variables (in this case a multivariate correlated Bernoulli distribution) represents a complex problem. This issue is likely to frequently arise using this framework.

For the scenario analysis therefore a specific excel tool was used (DiscoverSim). This excel extension allows to build simulations with correlated input variables: it employs the copula model (see appendix 3) to sample from correlated joint distributions.

Before running the simulation, another variable was added to the model: the number of contamination events. The number of events variable was modelled as a Poisson distribution with mean 0.1. Which, considering that the time horizon of the model is one year, means that the hypothetical company is subject to one contamination event on average every 10 years. As it was mentioned in the last chapter, the Poisson distribution is particularly suggested for modelling the frequency of operational risks.

6.2.4.3 - Results

Finally the simulation was run. The input variables were the eight cues and the number of events with specified probabilities and correlation. The output variable was the loss which was computed as the difference between the EV in each scenario and the EV in the base case. The simulation is based on 10000 iterations. The distribution of losses can be observed in figure 27.

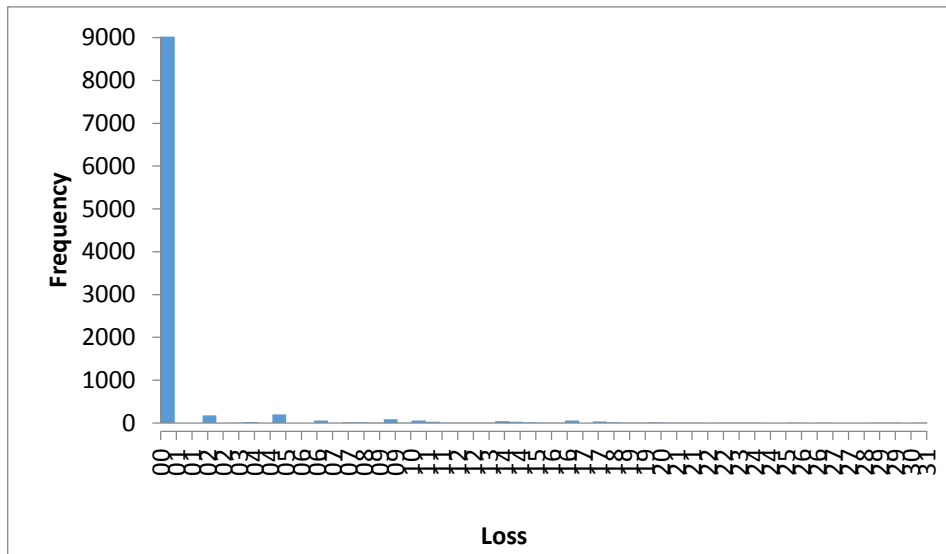


Figure 27 – Loss distribution (€M)

The resulting $VaR_{95\%}$ amounts to 6.4 €M. The distribution is obviously affected by the fact that in 90% of the scenarios there is no contamination. It is interesting to observe the distribution of losses in case of a contamination event Figure 28.

The resulting conditional $VaR_{95\%}$ amounts to 16.4 €M. As it can be observed, the distribution of losses is extremely irregular: that is due to the correlations between the input variables. Had the variables been considered independent the resulting distribution would have been the one represented in figure 29.

Case study

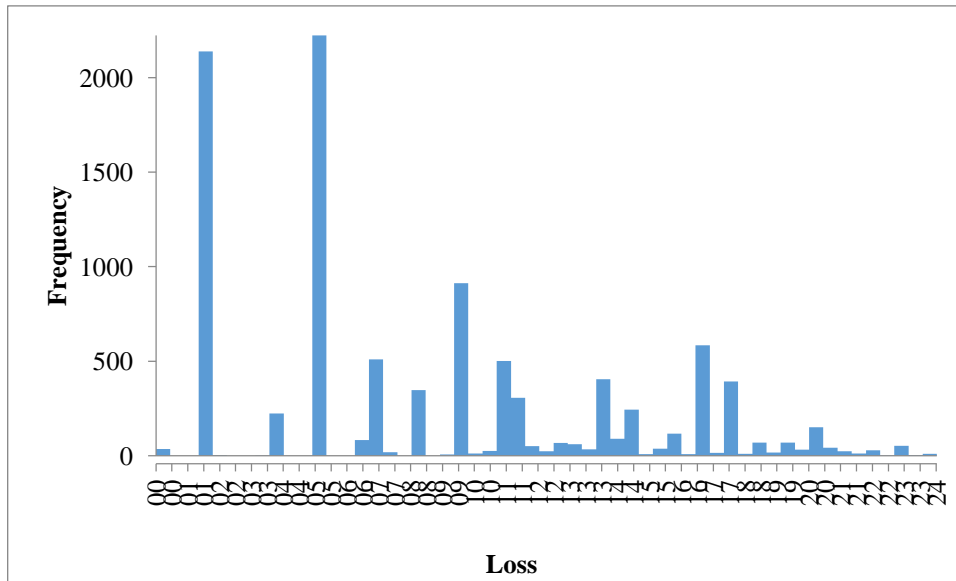


Figure 28 - Conditional loss distribution (€M)

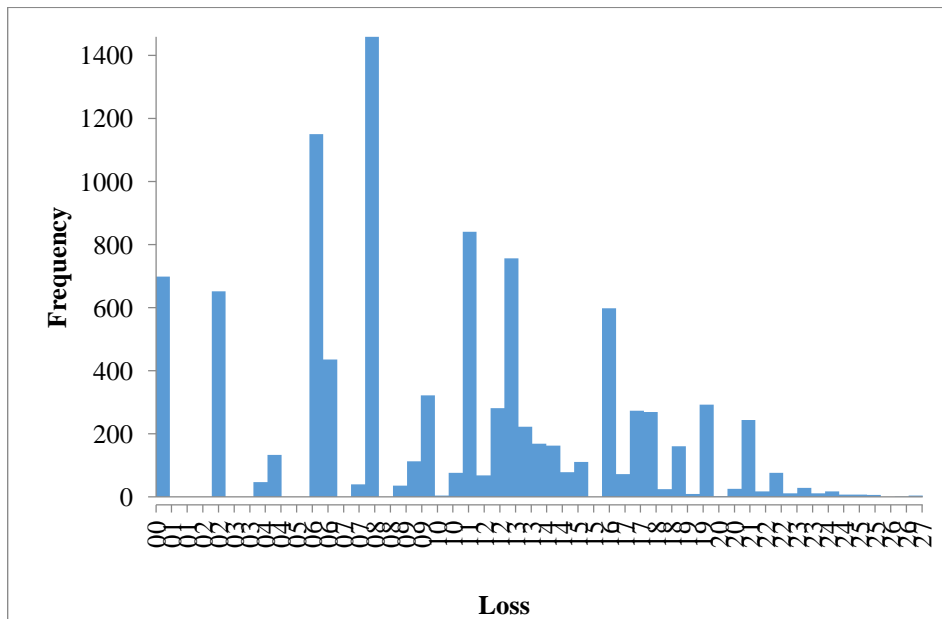


Figure 29 – Conditional loss distribution with independent variables (€M)

7. Conclusions

An increasing attention is growing for the concepts of reputation and reputational risk as a consequence of market globalization, increasing accessibility to information, rising regulatory pressure. In recent year several crisis characterized by a clear reputational dimension have severely damaged some well-known companies.

There is an urgent need among managers, practitioners and researchers for simple and reliable methodologies to assess reputation and reputational risk. But the still existing lack of a worldwide accepted definition of reputation does not facilitate the development of such methods.

Measuring reputation and reputational risk are widely acknowledged as very complex tasks, for which a number of qualitative and quantitative models have been proposed.

As far as reputation is concerned, qualitative methodologies assign a numeric score to the level of reputation of an organization, generally on the basis of surveys carried out among stakeholders, whereas quantitative methodologies are mostly based on the evaluation of the differences between a company's market value and its book value. Quantitative methods though are limited and rarely used.

Likewise qualitative and quantitative methodologies for the assessment of reputational risk have been proposed. The first ones, which are the only ones presently employed by risk managers, are simple and intuitive, but are biased and do not allow to compare the effects of reputational risk to the effects of other risks. The quantitative assessment on the other hand is a very complex process. A number of quantitative models attempt to estimate the reputational damage, mainly by observing the volatility of share prices of companies around reputation-damaging events. These models operate from an academic perspective and provide a rigorous demonstration of the existence of reputational risk with *ex-post* analyses. At the state of the art though they provide no useful tools to conduct an *ex-ante* valuation of the reputational risk to which a company is exposed.

The aim of the thesis was to develop an integrated methodology for the quantitative *ex-ante* assessment of reputational risk. The framework presented in the previous chapters represent an interesting step forward in the study of reputational risk. Its major innovation resides in the combination of scenario analysis and judgment analysis, which allow for a quantitative

Conclusions

ex-ante valuation of the risk. As it was shown, the model allows the estimation of the reputational losses distribution and consequently the calculation of the reputational VaR.

Moreover, the use of phylogenetic analysis in the process of identification of reputational risk represents a useful tool that can easily be employed by risk managers.

In this thesis the different steps of the methodology were applied in a simplified way to test its feasibility, focusing on identification and evaluation of reputational risks related to microbial contamination in the dairy sector. The framework has demonstrated to function properly and to produce sensible results. The test has not required excessively complex mathematical modelling, and is therefore of easy application for practitioners. One of its few drawbacks in the perspective of a practical use is a certain level of complexity originated by the multistep structure.

Both the model and its implementation have some limitations. Regarding the model itself, the main limitation is that its current framework does not consider directly embed the filtering effect of media coverage on the stakeholders' perceptions. This limitation can represent the starting point for further researches aimed at refining this model. In addition, further investigations and testing should be performed to study the validity of the model in different contexts.

The model implementation on the other hand was mainly limited by the lack of extensive public databases on events that can have reputational effects. As a consequence only a small number of events could be analyzed and data sets of different origin were used in different steps of the procedure.

Overall the model, even with its limitations, presents a practical approach that can be applied to real life cases. It seems likely that in the long term, once extensive databases on the matter have been built, the models based on the market values will be refined and will allow for more rigorous inferences over the ex-ante value of reputational risk. Still, at the state of art, the kind of approach presented in this thesis seems to be the best choice to quantitatively assess reputational risk.

8. Appendices

Appendix 1: The VaR and the reputational VaR

The Var (Value at Risk) is risk measure usually employed for financial risks: it expresses the maximum loss that can be expected with a defined confidence level (α) over a specified time horizon (t).

There are three main methodologies to calculate the Var: the Parametric methods, the historical simulation (non-parametric) and the Montecarlo simulation (semi-parametric) (Abad 2013).

Parametric method - Parametric approaches measure risk by fitting probability curves to the data and then inferring the VaR from the fitted curve. The most common method is the variance-covariance method which assumes that returns/losses are normally distributed. Once mean and variance of the returns over the time horizon t are estimated the VaR is calculated as the $(1-\alpha)$ percentile of a normal distribution with said mean and variance (fig. 30).

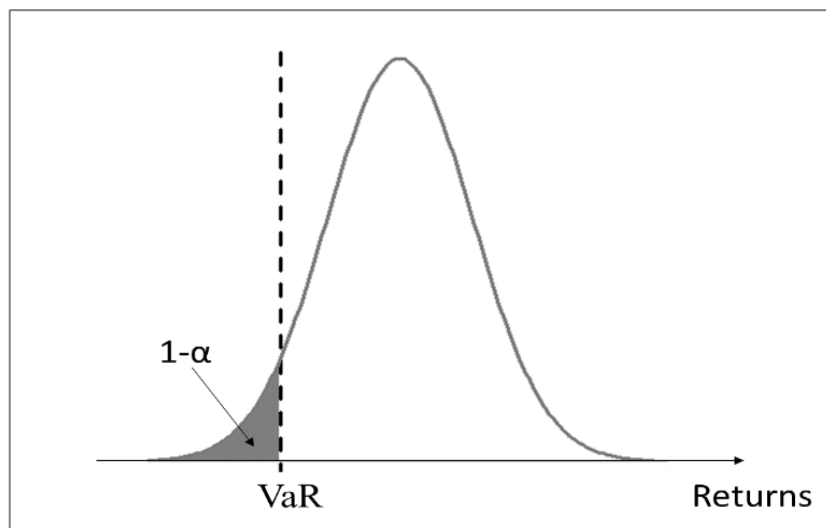


Figure 30 – Parametric VaR

Historical simulation - The historical simulation is the most widely implemented Non-parametric approach. This method uses the empirical distribution of financial returns as an approximation for $F(r)$, thus $VaR(\alpha)$ is the $(1-\alpha)$ percentile of empirical distribution.

Montecarlo simulation – The Montecarlo simulation involves developing a model for future losses/returns and running multiple hypothetical trials through the model. The VaR is then computed as the $(1-\alpha)$ percentile of the simulated distribution of outcomes (fig. 31).

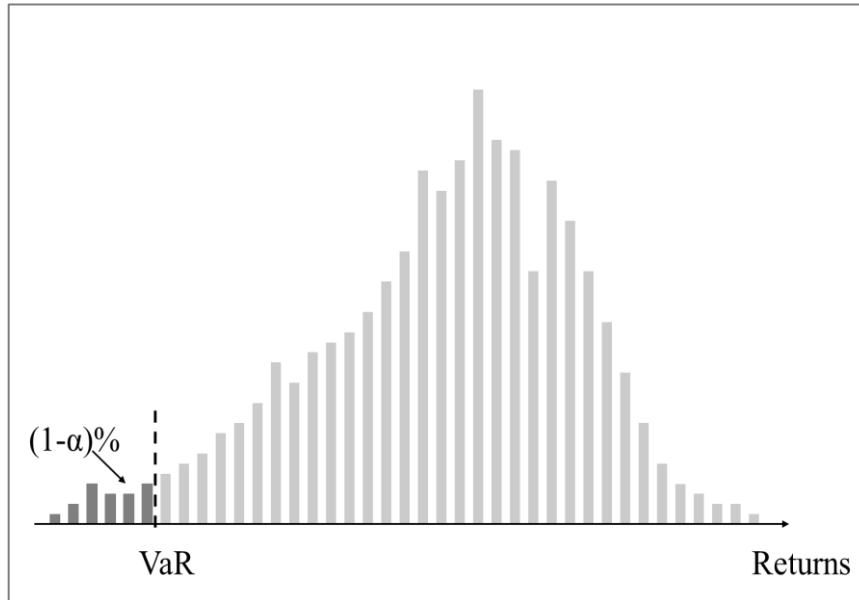


Figure 31 – Montecarlo VaR

The *reputational* VaR of a specific risk refers to the component of loss stemming exclusively from the reputational damage and is computed using the Montecarlo simulation methodology.

The model presented in the previous chapters employs a Montecarlo VaR. All the relationship analyzed are built into a Montecarlo simulation that ultimately allows the calculation of the reputational VaR for each specific risk.

Appendix 2: How to build a phylogenetic analysis of risks

As it was mentioned the two softwares that were employed in the analysis are PHYLIP and Mesquite. While PHYLIP is used for the actual phylogenetic analysis Mesquite is employed to enter the data and to represent the results.

The first step of the process is to transform the observation into a matrix where the rows are the events and the columns are the risk characteristics. In each cell ‘1’ represented the presence of a characteristic in the observation and a space or ‘0’ represents a lack of that characteristic in the observation (fig. 32).

Events	Operational risk	Operations / Industrial Investments	Sourcing	Product Safety & Quality	Unhealthy ingredients	Unsafe policies	Undisclosed ingredients	Raw materials quality
ABP Foodgroup (2013)	1	0	0	1	0	0	1	0
Spanghero (2013)	1	0	0	1	0	0	1	0
Comigel (2013)	1	0	0	1	0	0	1	0
Findus (2013)	1	0	1	1	0	0	1	0
Nestlé (2013)	1	0	1	1	0	0	1	0
Birds Eye (2013)	1	0	1	1	0	0	1	0
Sanlu (2008)	1	0	0	1	0	0	1	0
Mengniu (2008)	1	0	0	1	0	0	1	0
Bright dairy (2008)	1	0	0	1	0	0	1	0
Mc Donalds (2013)								
[employment practices]	1	0	0	0	0	0	0	0
Mc Donalds (2014)	1	0	0	1	0	0	0	1
KFC (2014)	1	0	0	1	0	0	0	1
ConAgra (2002)	1	0	0	1	0	0	0	0
Jensen Farms (2011)	1	0	0	1	0	0	0	0
Nestlé (2007)	1	1	0	0	0	0	0	0
Nestlé (2008)	0	0	0	0	0	0	0	0
Tyson Foods (2003)	1	0	0	0	0	0	0	0
JBS USA (2009)	1	0	0	1	0	0	0	0
Coca cola co (2003)	1	0	0	0	0	0	0	0
Coca cola co (2000)	1	0	0	0	0	0	0	0
Kraft foods (2013)	1	0	0	1	0	0	1	0
Parmalat (2003)	0	0	0	0	0	0	0	0

Figure 32 – Extract from data matrix

This matrix can either be created directly in Mesquite or can otherwise be created in Excel and later copied in a Mesquite file. In both cases to create a file in Mesquite select New from the File menu, select the number of taxa (events) and character (characteristics) and specify that the matrix will contain categorical data.

At this point the data can be exported to PHILYP. To export the data from Mesquite to PHYLIP choose Export from the File menu. Choose the PHYLIP (categorical data) option and accept the default values in the save window¹ (taxon names = 10 characters, end of line current system default).

PHYLIP is a simple program and always reads data from a file named “infile” that is located in the PHYLIP folder. Copy the file you exported from Mesquite to the PHYLIP folder named “exe”. If there is currently a file named “infile” then delete it. Rename your file as “infile” (remove the extension .phy).

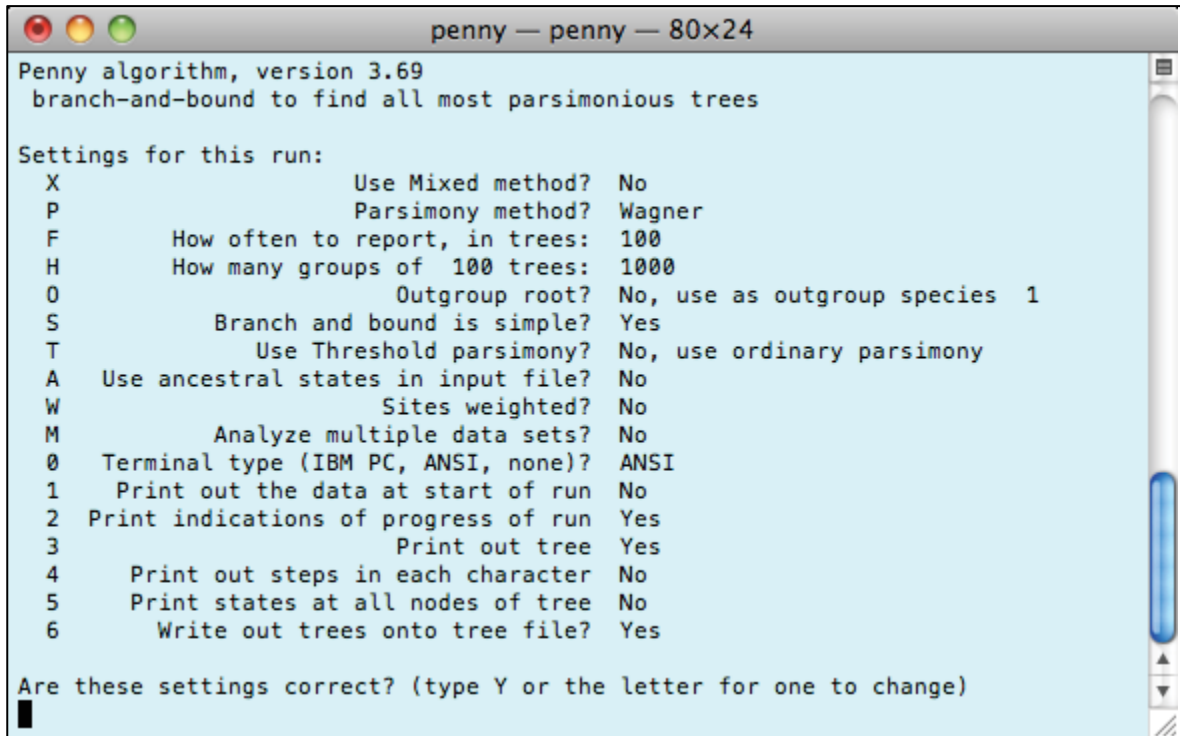


Figure 33 - The user interface of Penny in the PHYLIP package

The Penny module does a parsimony analysis (fig 33). Double click on the Penny icon to start the program. It should read your data file automatically if you have performed the above steps correctly. PHYLIP is a simple program and you change settings by typing the letter or number in the left column (you can use the defaults).

PHYLIP is a simple program and it sends its results to text files that are automatically saved in the exe folder. The main results are in a text file named “outfile” and the most parsimonious tree(s) is in the file named “outtree”. Both of these are text files and you can open them in Word or a text-editing program.

The “outfile” and “outtree” files will contain numerous equally parsimonious trees. Change the names of these two files to “infile” and “intree” (first delete the initial infile). Use the program Consense.exe (in the same folder) to produce one consensus tree from all the equally parsimonious trees. The outputs will be two new “outfile” and “outtree” files.

To plot the results in Mesquite copy the “outtree” file to another folder and rename it appropriately. Add the extension “.tre”. Using the Taxa&Tree menu, choose “Import file with trees” with the “Include contents” option. Select your file and open, choosing the “Phylip (trees)” option when prompted². You can view the tree by clicking on “View Trees” in the Imported tree pane at the left of the main window.

The tree can now be edited with the numerous editing functions of Mesquite. In order to assess what the character evolution has been go in the Tree Window and select Trace Character History from the Analysis menu. Select Stored characters and Parsimony Ancestral States.

Troubleshooting

- (1) Note that the names of taxa have to be maximum 10 characters long and contain no symbols. This would create issues later on. The correct names of the taxa can be reinserted once the tree has been constructed and represented.
- (2) Before opening the file in Mesquite it is important to remove the “carriage returns”. Open the file in the text editor, leave the first row empty, eliminate the carriage returns so that the tree is represented by a continuous string of text (it might still occupy more than one rows but there must not be carriage returns).

Appendix 3: The copula model

In probability theory and statistics, a copula is a multivariate probability distribution for which the marginal probability distribution of each variable is uniform. Copulas are functions that describe dependencies among variables, and provide a way to create distributions to model correlated multivariate data. Using a copula, a data analyst can construct a multivariate distribution by specifying marginal univariate distributions, and choosing a particular copula to provide a correlation structure between variables. Copulas are popular in high-dimensional statistical applications as they allow one to easily model and estimate the distribution of random vectors by estimating marginals and copulae separately. In risk/portfolio management, copulas are used to perform stress-tests and robustness checks.

The software employed uses specifically uses Gaussian copulas. The first step in the process is to construct a multivariate correlated normal distribution with a corresponding correlation matrix (fig. 34).

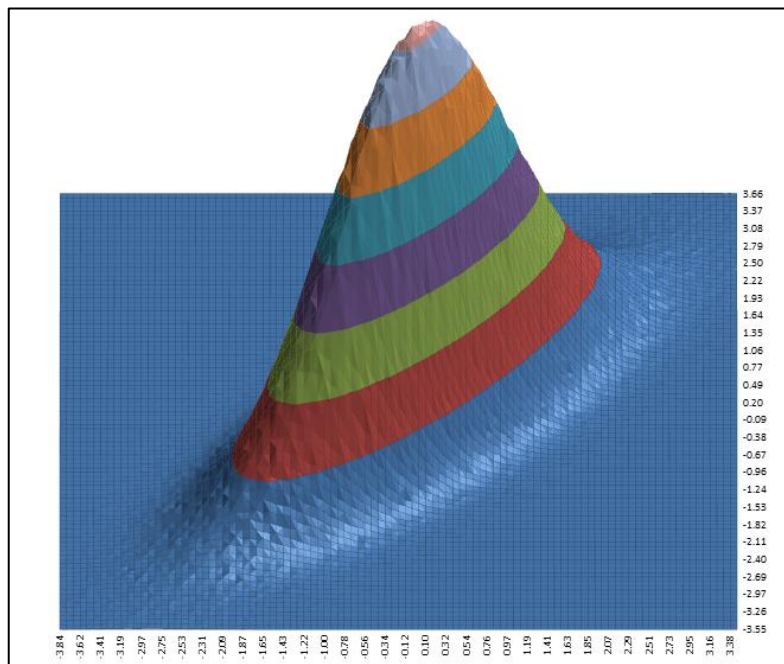


Figure 34 – Example of bivariate correlated normal distribution

Next multivariate samples are drawn from the normal distribution. Using the probability integral transformation, the copula is then generated simply by taking the CDF (Cumulated distribution finction) of each of the vectors of the multivariate draws, so that each is

uniformly distributed $U(0,1)$. Finally, applying the inverse CDF of any distribution (in our case the Bernoulli distribution) to a $U(0,1)$ random variable results in a random variate whose distribution is exactly the one selected, with the specified correlation structure. This

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