

Evaluating Corporate Online Reputation through Sentiment Analysis of News Articles: Threats, Maliciousness and Real Opinions

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Abstract: -This paper provides the academic, research, and business community with a concise but comprehensive overview of diverse, up-to-date, and valid research on the issue of effective online reputation management for organizations. To this end, reputation and its specificities are documented in the digital environment. Existing literature is analyzed and popular contemporary techniques used by organizations for optimal management of their online reputation are explored. Furthermore, a tool for measuring online reputation is developed, and the articles and news of 100 companies are analyzed. The main aim of this paper is to answer the question: “Can reputation be measured using similar tools that incorporate sentiment analysis algorithms?”. Finally, conclusions highlight the specifics of online reputation and provide recommendations to institutions and organizations.

Key-Words: Online reputation management, new media, social license, digital activism, algorithms, information overload, sentiment analysis, polarity, subjectivity, threats, malicious user.

1 Introduction

Organizations' reputation management is difficult to understand, because there are many different interpretations. As a result, there are still no widely agreed definitions, although it is an essential process. Besides, it has been shown that organizations with a strong reputation respond better - in financial terms – in case of economic downturns and do equally well in recruiting and retaining the most talented human resources. Moreover, most researchers conclude that reputation is an organization's most important intangible asset. Although it is not palpable, it can be measured and protected against threats and malicious users.

At the same time, technological advances have made it possible to use software tools to measure organizations' interaction with the public in real-time. In addition, it is evident that the reputation of organizations is not static but can change instantly and for a variety of reasons, especially in today's

digital age, where access to information is much easiest via than ever before. Furthermore, the proliferation of social networks and the attraction of billions of users in a short time make managing the online reputation of organizations a complex and challenging process. At the same time, we live in a world where academics, politicians, business leaders, and the mass media often refer to the fourth Industrial or Technological Revolution and its challenges, as humanity meets the future through Machine Learning, Artificial Intelligence, and Data Science.

2 Background & Prerequisites

2.1 Historical Background

Reputation has significantly affected individuals' identities from the beginning of human history. In antiquity, it was an almost tangible good and

included one's entire identity, namely the sense that individuals had of themselves and the picture that others formed of these persons (Freeman, n.d.). Besides, it is a common motif found in most works of ancient Greek literature, especially in the heroic epics, where heroes believed that they would win immortality through their posterity. Moreover, there are both mythological and historical reports that people of the time attributed divine properties to reputation, as it was recognized as the personified deity of the transmission of speech, traditions, and stories. *PHEME*, as she was addressed in antiquity, is also referred to as the youngest daughter of Heaven and Earth, and her main activity was announcing victories in sporting competitions (Hellenica world, n.d.).

2.1.1 Ostracism: an early reputation system?

Admittedly, in small-scale societies such as communities in antiquity, reputation significantly impacted one's life as it greatly influenced one's acceptance by one's fellow citizens (Reputation defender, 2017). In ancient Athens, this was expressed in the institution of ostracism, a political process implemented in the 5th century BC. After a popular vote, banished individuals considered too powerful or dangerous were from the city (World history, 2016). Although the orator Aeschines attempted to separate reputation from slander (Pyrisporos, 2014), it is nevertheless considered sure that there were cases in which individuals who had acquired a bad reputation were victims of ostracism without any formal and substantiated accusations against them (World history, 2016).

2.1.2 From tradition to the modern era

Since reputation has been of great concern to human societies, references to it exist in the earliest ancient Greek literary works. In particular, in Hesiod's (Hesiod, 2001) didactic epic *Work and Days*, which dates from the eighth century BC, the poet mentions: "And from the evil reputation of men beware. For ill-repute is ugly, and light that you can easily lift, but carry it heavily, and difficult to shake off". In addition, references to *PHEME* can be found in Homer, Pindar, and other poets who called it by various nicknames such as *pteroessa*, *polylalos*, and as she who brings information (Theoi, n.d.). Moreover, as informed through the traveler and geographer Pausanias, who lived in the 2nd century AD, in ancient Athens, there was an altar dedicated to *PHEME*, next to the altar of *Aidos* (shame) where

made offerings in her honor to appease her (Pausanias, *Description of Greece*, n.d.).

Reputation also concerned the Roman period society, since references exist in the Roman literature, particularly in the epic poem of Virgil the *Aeneid*, written at the end of the 1st century BC. *Fama* presented as a monster bird with many eyes, lips, tongues, and ears as wings. Although it moved on the ground, it had its head in the clouds, thus indicating that it was omnipresent. Furthermore, according to the Roman poet Ovid, she dwelt in a mountain palace of brass and resonated from above (Britannica, n.d.).

During the Medieval times, the issue of reputation took on tragic proportions as people no longer treated it as it had been during the Greco-Roman period. Unlike modern legal systems that do not accept rumors as evidence, the power of public opinion was taken into consideration in the Middle Ages. As a result, community opinion became part of legal systems in several regions of Europe (Fenster & Smail, 2003). Unfortunately, this resulted in thousands of citizens being prosecuted for the crime of witchcraft and murdered due to accusations fueled mainly by public rumors (Foster-Feigenbaum, 2018).

Another prime example of a dramatic illustration of the importance people attach to reputation (Solove, 2007) can be found in Shakespeare's play, *Othello*. Written around 1603, and in a passage, it stated (Litchapter, n.d.) in this regard; "a good reputation is the most valuable thing we have men and women. If you steal my money, you are just stealing junk. It is something, it is nothing: it is yours, it is mine, and it will belong to thousands more. But if you steal my reputation, you rob me of something that does not make you richer, but makes me much poorer," while at another point (Reputation xl, n.d.), Cassio whose reputation has been destroyed by evil laments, says, "Reputation, reputation, reputation! Oh, I have lost my reputation! I have lost the immortal part of myself and what remains is brutal."

From the end of the 20th century an increasing interest in reputation can also be found in academic literature. This interest stems mainly from the noticeable absence of research on the intentions of organizations to adopt reputation management as a critical direction of their culture and philosophy. From 1997 to the present, the journal *Corporate Reputation Review* has published empirical and conceptual research on reputation management while allowing academics and practitioners to exchange knowledge about the field (Hutton et al., 2001).

Finally, it is worth mentioning that it has been studied by various disciplines in recent decades as a multifaceted social phenomenon, since it is considered a fundamental force in social life. Multiple studies show that reputation and its management are not a unidimensional situation concerned with some aspects of human activity in modern life. On the contrary, it has been of concern to societies in most traditional cultures over time and in various ways. After all, it documented (Conte & Paolucci, 2002) that people, regardless of their cultural background, are driven by an innate motivation to gain reputation in public life, often sacrificing material possessions to achieve their goal.

2.2 Definition of Reputation

Many scholars report that debate in the literature about the definition of reputation has led to conceptual confusion. Their position is supported by the fact that many different disciplines, such as those in sociobiology, evolutionary game theory, economics, political science, computer science, and communication technology, are interested in reputation but present different views. As a result, there is a lack of agreement on the terms and axioms that describe it (Barnett et al., 2006). Fombrun (Fombrun, 2012) adds that there is ongoing uncertainty about the definition and identifies the problem in the overlaps between concepts such as reputation, identity, and image, considering this the most significant barrier to establishing a standard definition.

The Oxford Dictionary (**Oxford learners dictionaries, n.d.**) defines reputation as: “*an opinion people have about how someone or something is, based on what has happened in the past.*” Similarly, the Cambridge dictionary (**Cambridge, n.d.**) defines reputation as “*the opinion people generally have of someone or something, or how much respect or admiration someone or something receives, based on past behavior or character.*”

2.2.1 Conceptual approach

Reputation represents the opinion of others about an individual, a company, or an organization. Therefore, it can be seen as a social construct, shaped significantly by people's evaluations and judgments (Meier & Portmann, 2013). In other words, although opinion is an important parameter influencing reputation, its main characteristic, which is subjectivity, makes it fragile and volatile since personal feelings, preferences, and interests often determine people's opinions.

The subsequent finding has to do with memory. In the preface to Halbwachs' book *The Collective Memory* (Halbwachs, 2013), it is stated that for the human brain, things seem simple because as a mechanism, memory chooses to remember and decides to forget, as individuals often do not wish to keep their entire past. However, the opposite is true in the online world, as everything is in constant remembrance and recalled at any time. Moreover, as in the case of opinion, memory, too, is subject to subjectivity. As Halbwachs aptly puts it, “*How many times does one not express, with absolute personal conviction, reflections drawn from a newspaper, a book, or a discussion? They correspond so closely to how we see things that we would be surprised to discover that their author is someone other than ourselves.*”

2.3 Characteristics of Reputation

Waller and Younger (Waller & Younger, 2017) observe reputation characteristics and conclude that has two distinct dimensions: competence and character. Furthermore, each has different dynamics regarding how easy they are to lose and how long it takes to recover them. The authors support this position by stating that reputation concerning competence is highly stable. Therefore, it takes more time to be lost, while reputation concerning character is much more volatile, and accordingly, the time to be negatively affected is much shorter.

3 Managing Organizations' Reputation

In the introduction to *The Information Society Series* volume, Masum, Tovey, and Zhang (Masum et al., 2011) place the issue of effective reputation management in a broader context. They stress that it has significant implications for many of the day-to-day activities of the stakeholders, namely organizations, companies, customers, and employees. For example, they argue that judging which products are worth buying in the marketplace is an act that both ensures value for money and provides sellers with an incentive to improve. Likewise, the difference between the worst and best treatment can be between life and death in medicine. In politics, too, reputation accompanies actions or omissions of those in power, determining the shape of our democracies and leaders' credibility. Newmark (Newmark, 2011) makes an equally exciting and bold point, predicting that soon power and influence will have mainly shifted to those with

the best networks of reputation and trust and away from people with money and nominal power.

In terms of managing the reputation of organizations, Larkin (Larkin, 2003) points out that effective management depends on successful relationships both within and outside organizations. These relationships are based on mutual trust, loyalty, and loyalty, and then gain goodwill, thereby helping organizations in difficult times to protect their valuable asset, reputation. Furthermore, she argues that an organization's positive reputation gives it a competitive advantage over other organizations. It enables to recruit and retain the best employees, attracts new customer-partners more efficiently while providing the organization with a remarkable level of protection, and reduces adverse effects in a crisis. In the same vein, Fombrun (Fombrun, 1996) argues that a strong reputation confers significant advantages and privileges to organizations. Nevertheless, at the same time, it creates significant responsibilities and obligations for managers since they are required to manage the critical and strategic capital of reputation in an increasingly competitive and challenging environment.

3.1 Social License

A strong reputation gives organizations competitive advantage and facilitates their stakeholders' acceptance of their decisions, products, and policies. An interesting version of this statement is that a strong reputation enhances their social footprint, and they receive a kind of social license. Simply put, they enjoy a broad and lasting social acceptance that increases both material and social gains. Moreover, it equips organizations with the necessary tools to cope in times of crisis. However, it is an arduous process that requires delicate manipulation and appropriate skills to acquire and then maintain (Sociallicence, n.d.).

Social license is based on stakeholders' beliefs, perceptions, and opinions. Therefore, once the community grants it, it is intangible, dynamic, vulnerable, and temporary since, people's beliefs, views, and perceptions are subject to constant change. Furthermore, Gunningham, Kagan, and Thornton (Gunningham et al., 2004) rightly point out that social license is not based on compliance to legal requirements. However, breaching these requirements can jeopardize it, as it depends on the degree of acceptance of an organization and its activities by local communities, the wider society, and different communities of individuals. Effortlessly, therefore, it can conclude that social license and reputation management are inextricably

linked concepts and should co-exist in any strategy design on the part of organizations. For example, Schwab (Schwab, 2020) predict that organizations will be required to cultivate a positive climate in their relationships with stakeholders, including the community, as this will be key to enhancing their reputation. In addition, he argues that they will increasingly be required to take steps to demonstrate good behavior and ethics, as the price of not doing so will be very high.

3.2 Online Reputation Management

A milestone in human history is the creation of the digital environment, where space (digital world) and time (no time limit) have expanded. This fact has created new challenges, such as reputation management and protection, as filtering is required on anything that can be transmitted and accessed. From antiquity where societies were significantly smaller, to the modern era where interactions among people are significantly larger (Tennie et al., 2010), reputation continues to be an important building block of human societies. In fact, it is an essential part of an individual's identity (Ryan, 2019) albeit with different characteristics compared to the physical world.

Moreover, it is often argued that the online environment has largely democratized the processes followed by an organization when it is called upon to manage comments, opinions, and especially negative reviews and news. Nevertheless, significant challenges arise from this process since organizations' reactions to criticisms occur in public and real-time, putting even more pressure on more effective online reputation management.

3.3 Definition of Online Reputation

The term online reputation defines the reputation of a company, organization, person, or product based on activity exclusively in the digital environment such as the Internet, the digital platforms, and the social networks (Atinternet, n.d.) and depends on both the behavior and subjective opinions of commentators, customers, executives, employees and others (Webopedia, 2020). Simply put, online reputation is based on the results and perceptions that arise when people search for the name of an organization, product, or individual online. Searches can include many sources, such as social media, news articles, advertising campaigns, weblog posts, and even customer complaint sites. Therefore, the term is almost inextricably linked to the Internet and online activity for the modern man.

Farmer (Farmer, 2011) claims that although online reputation has roots in social systems before the

Internet, we cannot emulate real-world reputation management techniques. As human societies evolve technologically, people begin to interact more and more with strangers to them, thus creating complex problems of trust and evaluation (Farmer & Glass, 2010). On the other hand, some scholars (Dutot & Castellano, 2015) counter that the essential difference between online and traditional reputation lies in the use of technology since, as a concept, reputation encompasses both online and offline aspects with mutual influence.

3.4 Peculiarities of Online Reputation

The rapid spread of the Internet has digitized the word of mouth process that occurred in traditional societies. With the progress of technology, the spread of any information is accompanied by speed and massiveness, thus calculating its impact is a complicated process (Stenger, 2014). We should not forget that search engines, such as Google, allow the most popular results to appear at the top, making the algorithms regulators of reputation in modern and digital terms (Gandini, 2016). The basic idea of PageRank is to estimate the reputation of a webpage using both quantitative and qualitative characteristics of other web pages to which it is linked (Firstmonday, 2004). Furthermore, research shows that about 80% of people first turn to the Internet when looking for information, and more than 50% use search engines (TripAdvisor, n.d.). Millions of consumers freely share their subjective opinions about products and services, making reputation management critical (Goldman, 2011). Therefore, when we talk about online reputation, we refer to the reviews and comments of individuals about businesses, organizations, and individuals mainly made on social media (Dolle, 2014).

Finally, everything is in constant *mnemosyne* in the online space. Information can be shared instantly and spread quickly through social media, while at the same time, the online space is available in a spatio-temporal continuum. In a sense, we live in a brand new world where information and the stories it makes up are expanding everywhere. At the same time, they do not have a life cycle but last forever. The result is that negative stories have a global reach and reappear at critical moments, thus creating the right conditions for them to evolve into risks to the reputation of any organization. It is clear that significant challenges arise, which need to be taken seriously. For example, Christakis and Fowler (Christakis & Fowler, 2010) argue that social networks are not easily manipulated because they cannot be easily understood. However, other researchers point out that the architecture of the

Internet and Social Media is structured in a way that there is a risk that they may evolve into fields of manipulation and these, in turn, lead to a society of control rather than a free society (Ramoné, 2017).

3.4.1 *Newmedia*

With the proliferation of the Internet, a new digital media ecosystem has emerged as the media and news environment has undergone significant changes (Fenton, 2009). Therefore, it is easy to see that technological changes in the digital age have created different communication channels, thus enabling stakeholders to better interact with organizations (Meier & Portmann, 2013). Furthermore, there are differences in the degree of influence organizations now have over communication channels compared to the pre-digital era (Foster, 2016). Several researchers have categorized Media as they are reflected in the modern era based on their specific characteristics, which are as follows (Hoffmann & Weithaler, 2015):

- **Owned Media / Paid Media:** communication channels that an organization owns. For example, the official website of the organization, online stores, blogs, press releases, and mobile apps. This category also includes the paid advertising campaigns of the organization to other media such as television, radio, and newspapers.
- **Shared Media:** communication channels that the organization can indirectly influence. Such channels are, for example, Facebook, Instagram, and Twitter, which allow direct connection with the audience.
- **Earned Media:** public conversation in specialized blogs or user forums, in which the organization has limited ability to influence the content of the discussions.

Finally, as Gleick (Gleick, 2011) aptly observes, in addition to advantages, significant difficulties arise when new technologies alter the existing landscape. He argues that confusion prevails during this process, as new communication channels redirect the flow of information, with the consequence that the balance between creators and consumers is upset, roles are reversed and thus create the right conditions for the development of reputational risks for organizations.

3.5 Online Reputation Risks

Reputation risk is any action, event, or circumstance that could negatively affect an organization's

reputation (Rayner, 2004). It is well known that Social Media expands and amplifies the dynamics of reputational risks for organizations since opinions are expressed on it that are often far from what the organizations themselves believe they stand for. Indeed, quite often, it is observed that these opinions are based on information that is mainly unverified, regardless of whether it is true or false (Aula, 2010). Heil (Heil, 2018) argues that changes in the digital environment, such as the development of new media and communication channels, expose organizations to increased reputational risks and adds that negative online reputation puts their intangible value at risk, so it is, as he says, "*the risk of all risks.*" Also, as Stenger (Stenger, 2014), aptly observes the issue of reputation is linked to a growing concern about the use and impact of online comments and reviews on the World Wide Web as there is a tendency for people to be more receptive to opinions and comments coming from internet users participating in virtual communities rather than from their physical circle of contacts.

3.6 Digital Activism

The above user behavior and the fact that anyone can with a blog post or social media post a comment or news item in the internet space can easily trigger a massive community reaction. This phenomenon is called digital activism or cyberactivism (Britannica, n.d.), and uses the Internet and digital media as primary platforms for mass mobilization (Fuentes, n.d.), thus posing a significant risk to the reputation of organizations.

3.7 Online Reputation Monitoring

The above challenges lead many researchers and practitioners to study and propose ways to control online reputation. One of the most common mistakes identified is the mistaken belief that organizations can control their reputation by relying solely on their identity, values, and mission (Carvalho, 2005). However, such a belief is entirely wrong since organizations do not exercise control over people's perceptions (Burson Marsteller, 2011). This fact often leads to a failure to understand what people think and expect from them and often results in the phenomenon of non-acceptance by the public of the position or message that an organization wishes to communicate (Pownall, 2015). As Aula and Heinonen (Aula & Heinonen, 2016) aptly point out, reputation management should not be about control. It is too naïve for organizations to believe that they can strictly control media content and the people who produce it. Instead, reputation

management should be primarily about expertise and secondarily about influence and control.

3.7.1 Proactive Strategy

In Forbes (Forbes, 2021), online reputation management is not fundamentally a defensive process. In practice, there are two main ways to manage it. The proactive one involves actions taken to prevent something from happening that negatively affects an organization's reputation. The reactive one involves actions taken after a negative situation. Therefore, online reputation management is not only about situations where a defense policy is necessary for an incident, but it is necessary to proactively maintain it at a high level through regular interactions on social media platforms.

4 Online Reputation Management Techniques

According to Eccles, Newquist, and Schatz (HBR, 2007), a fundamental premise for effective reputation management is the assumption that reputation is primarily a matter of perception. Once this view is accepted, they then suggest the implementation of five steps which are: a) assessing an organization's reputation among stakeholders, b) assessing the true nature of the organization, c) closing the gaps between reputation and reality, d) monitoring changing beliefs and expectations, and e) placing a senior executive under the CEO in charge. It should also be noted that although in general the principles of effective reputation management are stable, since as we have shown in the historical review, there is a norm of behavior in the human species from ancient times to the present day, nevertheless the environment in which we work and the tools we use have changed and continue to change regularly and rapidly.

Thus, although each situation is unique and has its particularities, any strategy should be based on some critical pillars for online reputation management. Therefore, to be considered adequate, the organization should: a) participate and monitor social networks closely, b) analyze how visible information affects its reputation, c) respond as quickly as possible by participating in conversations, and d) minimize negative voices (Vartiak, 2015). Besides, one of the most important goals for any organization should be to eliminate any risk of a negative reputation in the online environment. Towards this end, several experts suggest various techniques for online reputation management. One of them, Ranjit Nair (Adgully, 2019), summarizes in seven rules everything an

organization should do to succeed in the process of online reputation management: a) creating appropriate social media accounts, b) linking the accounts with appropriate social media monitoring tools, c) creating early warning systems using keywords, d) sentiment analysis, e) engagement and resolution, f) responsiveness and g) identifying communication - conversation topics.

4.1 Creating a Digital Community

A crucial technique for reputation management is creating a community and connecting the organization emotionally with it so that users feel part of its history and culture. This community can exist in the physical or online world, but the design and proper implementation of the engagement elements are vital to encourage people to interact with the organization. In addition, the organization should present the same message to stakeholders and convey consistency, credibility, and ethics by combining its vision, mission, and values (Meier & Portmann, 2015). Therefore, having a solid user community can act as a shield in times of crisis in a dual way. On the one hand, should a problem arise, there will be the benefit of the doubt (Gunningham et al., 2004), while on the other hand, knowledge of the community's opinion of an organization acts as an early warning system for issues that may develop into a crisis if left unattended. However, as in other cases, some constraints apply, such as that of continuous supervision of the digital community, to minimize the risk of misinformed, biased, and malicious individuals infiltrating and producing harmful content that will undermine the value and trust of other members (Bertino & Foster, 2015).

5 Measuring Online Reputation

The academic community's growing interest in reputation and its management could not fail to include the crucial stage of measuring it. Unfortunately, the impression one gets from reading the section on the definition of reputation and the confusion among experts, as there is no common ground, is also picked up in the discussion on the means and accuracy of measuring it (Money & Hillenbrand, 2006). Some researchers adopt positions that link reputation to human behaviors, such as social expectations and the concept of trust (Oncioiu et al, 2020), while Fombrun (Fombrun, 2009) has invented the so-called Reputation Quotient Project (RQP) that takes into account six factors to calculate reputation which are: a) an organization's emotional appeal, b) products and services, c) vision and leadership, d) workplace

environment, e) social and environmental responsibility and f) financial performance. Also, *Fortune* magazine, for nearly four decades, has conducted an annual reputation ranking survey entitled Top 100 Most Admired Companies based on the sum of eight sub-indicators which are: a) financial performance, b) quality of products and services, c) quality of management, d) innovation, e) value as a long-term investment, f) ability to attract, develop and retain talented people, g) responsibility to the community and the environment, and h) prudent use of an organization's assets (Carvalho, 2005).

Things are somewhat different in measuring online reputation, as advances in technology have demonstrated several different software tools that an organization can use to monitor its digital presence and any comments or reviews that people share on the Web. These applications greatly assist organizations in managing their online reputation. However, their results have not yet resolved the issue's complexity and have failed to portray organizations' accurate picture accurately. Indicatively, some of these tools can be mentioned at this point: a) Google Alerts, b) Talkwalker, c) Yext, d) Oktopost, e) Hootsuite, f) LocalClarity, g) ReviewTrackers, h) Radarr, i) Social Mention and j) Yotpo.

The literature analysis so far reveals that measuring reputation is a multifactorial problem that requires complex and sophisticated approaches. Of particular importance is observing how it changes so that an organization can understand whether its decisions or actions are working or having the results it is looking forward to (Boxuk, n.d.). For this reason, more and more organizations are attempting to take advantage of the latest technological advances in data analytics and explore fields such as those of artificial intelligence and machine learning to improve the outcomes of their expectations and actions. One of the essential advantages of these techniques is the compression of information. It is a common belief that due to the vast amount of data now transmitted on the Internet, the human brain cannot process and utilize it (Souma et al., 2019).

5.1 Information Overload

It is worth dwelling on this weakness of the human brain because avoiding this situation is one of the objectives of tools such as the one presented below and because it leads to one of the most critical problems of the information society, which is information overload. Indeed, it obliges organizations unknowingly to bear a high cost and, at the same time, the risk of having their reputation

affected, as their managers are unable to manage the abundance and volume of information successfully. The adverse effects of this phenomenon include: a) waste of productive time, b) distraction and diversion from the primary task, and c) significant delay in decision-making in all respects (HBR, 2009). In addition to the difficulties that arise and jeopardize the economic well-being of organizations, the phenomenon of information overload can cause severe problems of stress, confusion, and uncertainty in human resources. Many studies in psychology have concluded that the human brain has a minimal capacity to store current information (Timesofindia, 2021).

5.2 The Role of Algorithms

Harari (Harari, 2017) aptly articulates that the traditional knowledge pyramid has been overturned, and now people cannot convert data into information and information into knowledge. This situation leads to an inability to manage massive data streams, with the consequences mentioned earlier. Therefore, processing data has necessarily been entrusted to computer algorithms, whose capacity far exceeds the human brain's. However, for the algorithms to work correctly, the essential requirement is that there must be a free flow of information. It is obvious and needs no further analysis that all actors should protect the right to receive, create and disseminate information. Moreover should be free from any control (Chomsky, 2015), as also defined by Article 19 of the UN Universal Declaration of Human Rights (United Nations, (n.d.))

5.3 Sentiment Analysis

As Balahur and Steinberger (Balahur & Steinberger, 2009) state, the development of technology and increased access to information has enhanced interaction and communication between individuals. As a result, the role of emotion has become critical. This fact means in practice that access to information is essentially access to an emotional response to it, as people react both to events and to their attitudes towards events.

According to the Oxford Dictionary (Lexico, n.d.), sentiment analysis is "*the process of computationally identifying and categorizing the views expressed in a piece of text, particularly to determine whether the author's attitude towards a particular topic, product or something else is positive, negative or neutral.*" In other words, sentiment analysis, or opinion mining, analyzes people's opinions, evaluations, attitudes, and feelings (Hirst, 2012).

5.3.1 Polarity and Subjectivity

Essentially, the essential function of sentiment analysis is to process a body of text to understand the opinion expressed through it. Specifically, the quantification of this sentiment with a positive or negative value is called polarity. The overall sentiment is labeled as positive, neutral, or negative depending on the sign of the score it receives. On the other hand, subjectivity quantifies the opinion in the processed text corpus and is labeled by a range of values ranging from intensely subjective to strongly objective (Towardsdatascience, 2020).

5.4 Sentiment Analysis in News Articles

In academia and business, most of the work and research on sentiment analysis and opinion mining is done on user comments from social media such as Twitter, YouTube, and Reddit. However, as mentioned in this study, user comments are subject to subjectivity, as their biased opinions are expressed. On the contrary, the situation seems to be different in articles and news, as several Media outlets wish to give an impression of objectivity to the way they perceive, capture, and disseminate news to the community. That is why many journalists avoid expressing their opinion when presenting a news story, making sure that the vocabulary of their texts includes as few words related to opinion and emotion as possible (Balahur et al., 2010).

Moreover, sentiment analysis in user comments from social media platforms sometimes highlights an organization as disreputable (Fastcompany, 2021). However, that fact is not reflected in the physical world, as vital indicators such as sales of services and products are not affected. This situation poses significant limitations in terms of the ability to identify and accurately measure the online reputation of organizations, primarily when the data is derived solely from user comments on social networks.

Therefore, we will turn to an organization's news to measure its online reputation in this research. Thus, we will bypass the limitations of social media, polls, and other traditional opinion analysis methods and focus on news rather than individual perceptions. After all, it is understandable that in today's expansive media landscape, it is imperative to monitor news articles, as the right or wrong message can significantly impact the reputation of organizations, either positively or negatively. It is also apparent that quick knowledge of a negative story circulating in the media about an organization provides an opportunity for immediate reaction and ensures that the public knows its position on the

incident. It also provides valuable time to plan a response strategy (Ghidotti, n.d.). Equally critical for an organization is the knowledge of a positive news story that is made public, as it is a way of evaluating its actions and performance. Moreover, as reputation will be calculated based on news published on the World Wide Web, we will integrate subjectivity analysis as a critical stage of the whole process. The novelty in the above theory lies in the fact that organizations will be allowed to know simultaneously with emotion and subjectivity or objectivity that an article contains.

Summarizing and formulating in simple terms the above hypothesis, we can argue that the polarity and subjectivity of news articles can be identified, calculated, and classified automatically. Depending on their positivity or negativity, the organizations can be equipped with solid knowledge and interpretation of their digital presence. That will help them manage their online reputation in the best possible way since they will base their decisions, among other things, on the judgments of newsgroups. After all, as Christian & Griffiths (Christian & Griffiths, 2017) rightly point out, the outcomes of any story ultimately make it into the News and influence, if not make the world we live in. Furthermore, suppose the results of sentiment analysis of articles are cross-checked with the results of traditional opinion analysis techniques. In that case, they will provide an even clearer picture of how organizations should act in the digital environment because of its peculiarities.

To verify or not the working hypothesis we make, we will use the data from all included organizations from the list of Axios Harris Poll 100. Subsequently, perform sentiment analysis with the Sentiment Viewer App on the News and articles surrounding these organizations from 01/01/2021 to 21/04/2021. Finally, after generating a ranking list based on the sentiment analysis methodology using the algorithm, we will contrast the results of the two methods. The goals are: a) to determine whether it is possible to measure and calculate online reputation using sentiment analysis algorithms and b) whether any significant discrepancies will obtain are due to the specificities considered in the literature review concerning the online reputation management of organizations.

5.4.1 The Axios Harris Poll 100 Survey

The Axios Harris Poll 100 survey (Theharrispoll, 2021) calculated company reputation rankings using online interviews with a nationally representative sample of US adults. Respondents were asked to answer which two, in their opinion, organizations

have the best reputation and which two stand out for having the worst reputation. The second group of respondents then rated the 100 most prominent organizations on three dimensions of reputation; trust, character, and record of accomplishment. The final phase of the survey was conducted from April 8, 2021, to April 21, 2021, and 42935 respondents participated.

5.4.2 Sentiment Viewer App

The Sentiment Viewer App has been developed in Python and can be accessed at <https://sentimentviewer.com/>. It was developed using the Django web framework (Django project, n.d.). It uses the TextBlob library, which processes textual data by providing a simple API that delves into typical natural language processing tasks. Sentiment analysis (Textblob, n.d.) is used, specifically polarity and subjectivity of a sentence. In particular, the polarity ranges between [-1, 1], where -1 is a negative emotion, 1 is a positive emotion, and 0 is a neutral emotion. On the other hand, subjectivity quantifies personal opinion and factual information and ranges between [0, 1]. Therefore, the higher the value, the more the personal opinions and the less the information (Towards datascience, 2020). In addition, the API that returns News via the RapidAPI platform (Rapidapi, n.d.) is used for news retrieval. The performance of the news retrieval module is very high, since it can retrieve more than 10,000 news items per minute.

5.4.3 Results Table

Table 1 presents the sentiment analysis results obtained from articles and News of the 100 companies under examination. Most of these companies are well-known. The first column (from the left), contains the names of the companies with the best reputation in ascending order starting with number one (#1). The second column (SV) shows the ranking of the companies as derived by the proposed algorithm. The three next columns correspond to the positive, neutral, and negative news (%). Finally, the two last columns provide percentages of objective and subjective news.

* At position #96 is Sears Holdings Corporation. The following cells are empty because the algorithm did not return results for the defined period, as this company went bankrupt in 2018, and its assets were transferred (Investopedia, 2020).

Table 1: Ranking of 100 Companies

(Axios Harris Poll 100)	SV	Pos.	Neu.	Neg.	Obj.	Subj.
		%	%	%	%	%

#1 Patagonia	13	91.48	2.12	6.38	76.59	23.40
#2 Honda Motor Company	17	91.30	4.34	4.34	79.71	20.28
#3 Moderna	55	85.18	5.82	8.99	88.88	11.11
#4 Chick-fil-A	59	84.00	3.50	12.50	59.00	41.00
#5 SpaceX	31	88.67	4.13	7.13	82.57	17.42
#6 Chewy	71	82.30	9.46	8.23	79.83	20.16
#7 Pfizer	28	89.02	5.48	5.48	90.85	9.14
#8 Tesla Motors	48	86.43	3.93	9.62	82.05	17.94
#9 Costco	73	82.05	6.66	11.28	79.48	20.51
#10 Amazon.com	26	89.74	2.56	7.69	92.30	7.69
#11 REI	56	85.18	9.87	4.93	92.59	7.40
#12 USAA	81	78.94	2.63	18.42	85.52	14.47
#13 Wegmans	61	83.72	6.20	10.07	86.82	13.17
#14 Subaru	34	88.33	3.33	8.33	78.75	21.25
#15 Unilever	37	88.18	5.06	6.75	84.38	15.61
#16 Apple	4	94.15	3.78	2.06	72.50	27.49
#17 In-n-Out Burger	45	86.66	6.66	6.66	80	20
#18 Toyota Motor Corp.	44	86.71	3.90	9.37	81.25	18.75
#19 UPS	72	82.25	11.69	6.04	97.98	2.01
#20 PepsiCo	14	91.44	3.94	4.60	90.46	9.53
#21 IKEA	35	88.32	2.72	8.94	201	56
#22 Lowe's	40	87.23	2.12	10.63	76.59	23.40
#23 Publix Supermarkets	46	86.66	4.07	9.25	81.85	18.14
#24 CVS (CVS Health)	19	91.02	5.71	3.26	82.04	17.95
#25 3M Company	1	100	0	0	93.61	6.38
#26 HP, Inc.	41	87.04	2.59	10.36	66.32	33.67
#27 Berkshire Hathaway	18	91.30	2.17	6.52	84.78	15.21
#28 Hulu	8	92.90	2.58	4.51	67.09	32.90
#29 Nestle	10	92.10	3.80	4.09	81.28	18.71
#30 The Kroger Company	52	86.17	7.33	7.33	89.90	10.09
#31 Samsung	5	94.10	1.90	3.98	70.53	29.46
#32 Paypal	50	86.27	8.49	5.22	89.54	10.45
#33 FedEx Corporation	90	73.75	8.51	17.73	88.65	11.35
#34 Sony	6	93.53	2.04	4.42	73.12	26.87
#35 Procter & Gamble Co.	24	90.29	6.79	2.91	99.02	0.97
#36 Microsoft	38	87.85	6.42	5.71	75.71	24.28
#37 The Walt Disney Co.	63	83.46	12.59	3.93	98.03	1.96
#38 Netflix	11	92.08	2.08	5.83	66.66	33.33
#39 IBM	39	87.26	6.36	6.36	82.16	17.83
#40 General Electric	64	83.13	4.81	12.04	89.15	10.84
#41 Target	84	76.92	7.69	15.38	76.92	23.07
#42 Wayfair	16	91.34	4.81	4.15	68.85	31.14
#43 Citigroup	86	74.43	13.26	12.29	96.11	3.88
#44 American Express	76	81.15	13.04	5.79	98.55	1.44
#45 The Home Depot	43	86.84	7.89	5.26	92.10	7.89
#46 Walgreens	54	86.03	4.76	9.20	94.92	5.07
#47 Kaiser Permanente	7	93.45	1.86	4.67	89.71	10.28
#48 Best Buy	58	84.37	3.12	12.5	75.00	25.00
#49 Adidas	9	92.63	1.93	5.42	75.96	24.03
#50 Ford Motor Company	21	90.72	2.06	7.21	77.31	22.68
#51 Electronic Arts, Inc.	85	75.47	11.32	13.20	81.13	18.86
#52 State Farm Insurance	23	90.62	4.16	5.20	87.50	12.50
#53 Hobby Lobby	25	90.19	4.90	4.90	77.45	22.54
#54 JPMorgan Chase & Co.	97	47.81	27.37	24.81	96.35	3.64
#55 Kohl's	62	83.57	6.20	10.21	81.02	20.07
#56 T-Mobile	2	100	0	0	81.08	18.91
#57 Domino's Pizza	33	88.61	2.43	8.94	73.17	26.82
#58 The Coca-Cola Company	29	89.00	5.63	5.36	87.39	12.60
#59 Goya	49	86.36	2.72	10.90	87.27	12.72
#60 Google	20	90.80	4.02	5.17	79.88	20.11
#61 Verizon Communication	67	82.95	9.32	7.71	97.42	2.57
#62 Nike	68	82.79	8.06	9.13	84.40	15.34
#63 Nordstrom	22	90.64	3.54	5.80	58.38	41.61
#64 Macy's	42	86.95	2.60	10.43	71.30	28.69

#65 Starbucks Corporation	51	86.27	7.84	5.88	84.31	15.68
#66 eBay	80	80.62	6.97	12.40	72.09	27.90
#67 Wendy's	87	74.24	6.81	18.93	62.87	37.12
#68 General Motors	65	83.11	3.89	12.98	84.41	15.58
#69 Royal Dutch Shell	98	44.66	12.00	43.33	89.33	10.66
#70 Yum! Brands	91	72.09	10.07	17.82	92.24	7.75
#71 Dollar General	66	83.03	4.24	12.72	88.78	11.21
#72 Johnson & Johnson	46	86.66	3.33	10.00	76.66	23.33
#73 McDonald's	93	69.48	2.34	28.16	63.84	35.68
#74 Dollar Tree	70	82.35	4.41	13.23	90.68	9.31
#75 Fiat Chrysler Auto.	96	66.66	11.11	22.22	94.44	5.55
#76 Chipotle	15	91.41	1.51	7.07	86.86	13.13
#77 Bank of America	89	73.76	13.27	12.96	92.90	7.09
#78 Reddit	36	88.28	5.70	6.00	80.78	19.21
#79 Robinhood	57	85.07	6.47	8.45	82.53	17.46
#80 ExxonMobil	82	77.58	5.17	17.24	77.58	22.41
#81 Delta Air Lines	92	71.11	16.29	12.59	86.66	13.33
#82 GameStop	69	82.58	3.95	13.45	89.18	10.81
#83 Walmart	79	80.79	6.15	13.04	80.07	19.92
#84 Burger King	94	69.02	3.53	27.43	74.33	25.66
#85 BP	78	81.11	8.88	10.00	90.00	10.00
#86 AT&T	3	100	0	0	62.96	37.03
#87 United Airlines	77	81.13	9.43	9.43	92.92	7.07
#88 Huawei Technologies	53	86.13	4.37	9.48	86.13	13.86
#89 JCB	12	91.54	0	8.45	84.50	15.49
#90 Uber	95	67.20	9.64	23.15	84.24	15.75
#91 My Pillow	83	77.27	9.09	13.63	84.09	15.90
#92 Comcast	30	88.95	6.74	4.29	80.98	19.01
#93 Twitter	88	74.07	6.48	19.44	85.18	14.81
#94 TikTok	27	89.41	3.52	7.05	77.64	22.35
#95 Wells Fargo & Company	75	81.77	9.89	8.33	100	0
#96 Sears Holdings Corporation	*	*	*	*	*	*
#97 Wish.com	99	35.00	12.00	53.00	91.00	9.00
#98 Facebook	60	83.80	6.23	9.96	89.09	10.90
#99 Fox Corporation	33	88.61	2.47	8.91	82.92	17.07
#100 The Trump Org.	74	81.85	6.76	11.38	92.88	7.11

6 Conclusions

From the literature analysis, it was easily understood that it is vital for organizations to continuously analyze their sense of publicity and the narrative that they communicate to their stakeholders to take timely actions to protect and promote their online reputation. In addition to this, it was understood that measuring online reputation requires a multidimensional analysis of information, given that it is a multifactorial issue with significant specificities.

A simple examination of opinion or sentiment is insufficient for calculating reputation. Surveys in interviews, user comments, polls, or News are incomplete and should be extended to other data. Next, concerning reputation tools, such as the one used in this research, we believe they cannot accurately measure reputation because of the limitations discussed below. However, they can show trends, highlighting aspects that escape both human attention and traditional methods of opinion analysis, making the use of such tools a beneficial

process for organizations. Moreover, observing any changes can act as an early warning system for reputational risk to organizations. Finally, as we will see shortly, from a technical point of view, it was found that the algorithms are not always correct but make significant errors, both in the retrieval of data and in the process of its analysis.

6.1 Confusion of the Algorithm

The algorithm obtains noisy results that need further filtering, which breaks the chain of automation and makes it difficult to achieve the goal of avoiding information overload. Furthermore, it distorts the image of organizations on the Web, thus having a mainly negative impact on the online reputation. For example, when retrieving data from the Web for Johnson & Johnson, the API returned a plethora of news articles to the Prime Minister of Great Britain, Mr. Johnson. It took additional time and human intervention to clean the data, thus negating the advantage of dealing with information overload. Moreover, the algorithm returned false-negative results in the sentiment analysis procedure, while the news was positive. For example, the algorithm evaluated the news story "*Chick-fil-A manager helps ease gridlock at drive-thru COVID vax site*" as unfavorable, even though the content of the news story stated that the manager of a Chick-fil-A store in South Carolina was enlisted to help reduce traffic at a local COVID-19 vaccination site. Similarly, the news story titled "*Citigroup lets Texas staff shelter in its offices from the cold*" received a negative score from the algorithm, even though the article reported that Citigroup Inc. provided the facilities to its employees to protect them from the extreme weather in the area.

6.2 Emergency Incidents

A typical example of the peculiarities of managing the reputation of organizations on the Internet was highlighted by the analysis of the results of FedEx Corporation, which was ranked 33rd in the Axios Poll 100 list, while using the SV application it was ranked 90th, which shows a significant divergence between the two methods. The negative ranking received by the company is because for the examined period the algorithm returned several results about an armed attack at its facility in Indianapolis, Indiana, United States. The attack resulted in nine people losing their lives, including the perpetrator, a 19-year-old former employee who committed suicide. Therefore, crisis management is most often associated with sudden incidents. That situation causes intense pressure in a short period on the organizations involved and places them under an

immediate, rapidly evolving operational and communication challenge.

6.3 Poor Stakeholder Experience

Wish.com appears in the bottom positions in Axios Poll 100 and SV rankings. Looking back at the news collected for the period in question, the polarity in 53 of the total 100 news items has a negative sign. Most of the news stories were related to information about the company's share price falling, following multiple media reports of the company's delays in product deliveries and refunds. Therefore, organizations should pay special attention to prevent wrong actions such as poor customer experience and supply chain management crises, as they are proven to affect their reputation negatively. United Airlines is in the same situation, with negative news mainly concerned with complaints following bad passenger experiences recorded online.

6.4 Communication Channels

Different communication channels play an essential role in shaping and managing online reputation. For example, Samsung and Sony have ranked 31st and 34th in the Axios Poll 100 and 5th and 6th place respectively in the SV ranking. These two have been ranked in the top of the companies, having high rates of positive news, and therefore high online reputation, because the application returned results that were primarily related to product launches in *Owned Media/Paid Media* communication channels, which include the organization's official website, online stores, and the press releases. Likewise, State Farm Insurance and AT&T, in which several of the articles were mainly from their communication channels, provide a similar example. Indeed, it was noted that the content of their websites is astoundingly active, which has a positive effect on online reputation.

6.5 Stock Market Reputation

The application returns news articles related to stock market performance for many companies in the list. In *Homo Deus*, Harari (Harari, 2017) argues that "*the stock market is the fastest and most efficient data processing system created to date.*" When combined with the position of many researchers that reputation is linked to economic terms, this theory leads us to the conclusion that a stock market is a form of reputation, since when a company's stock rises, it positively affects the organization's reputation. Conversely, a fall in stock prices negatively affects reputation. Relevant examples in which the SV application has returned the vast majority of articles on the stock market performance

of companies are Royal Dutch Shell, Procter & Gamble Co., Wayfair, and Citigroup.

6.6 Digital Communities

Another key feature of online reputation management is the existence of digital communities, evidenced by the fact that the algorithm returned several results from digital discussion and problem-solving spaces. The existence of a digital community is an excellent technique for managing the online reputation of organizations as it allows them to interact with their audience and somehow control their online reputation. Typical examples of companies that have invested in the existence of digital communities and have successfully managed them, thereby maintaining their online reputation at a good level, are Microsoft, IBM, and HP.

6.7 Multiplicity and Diffusion of Online Reputation

In the results returned by the algorithm about the SpaceX company, there is an article entitled "SpaceX: more risks, better rockets?" that was fully reproduced in various websites, including phys.org, ctvnews.ca, and dailymail.co.uk. Therefore, it is easy to see that the organizations' reputation is also spread simultaneously through the dissemination of information, which should be precise and carefully worded.

6.8 Further Findings

The overall analysis of the results revealed three robust findings on the effective management of organizations' online reputation, which are: a) in order to manage and measure their online reputation effectively, they must first gain an in-depth understanding of how it is shaped in the digital environment, b) sentiment analysis is a technically demanding process, and although the research community has published several research papers, significant problems remain to be solved, as a complete understanding of natural language text is still beyond the capabilities of machines, and c) statistical analysis of relatively simple sentiment cues can provide a strong sense of how organizations' online reputation is affected, thus offering a significant advantage over competitors.

6.9 Future Directions

In the future, this research could be extended to examine why, in a theoretically unified digital world, different perceptions due to ethnographic reasons affect the online reputation of organizations. Specifically, the study could investigate why specific organizations thrive in some parts of the

world while failing to survive in others. Simply put, to examine at a local level the online reputation of organizations in terms of cultural, economic, educational and other factors of the citizens.

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