Crisis Communication

A Content Analysis of Vale S.A's Post-crisis Communication after Two Mining Disasters

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Abstract

The purpose of this paper is to conduct an exploratory study of crisis response strategies employed by the Brazilian mining company Vale S.A. to communicate on two mining disasters. Accordingly, I explore whether Coombs' (2007) suggestions on the usage of crisis response strategies inform practice. Although my intention is not to generalize across broad populations, I intend to inform practice via identifying "lessons" that may be relevant and useful to other practitioners dealing with crises.

This research employs secondary data sources in the form of company responses retrieved from the 'Business and Human Rights Resource Centre' (BHRRC) and sustainability reports retrieved from the GRI database in June 2019. This research argues for an abductive approach to theory development, which allowed conducting latent coding in order to test part of SCCT prepositions, as well as the emergence of new strategies.

The analysis indicates that Coombs' (2007) recommended usage of crisis response strategies does not always inform practice. Firstly, this research contributes to the existing list of crisis response strategies by suggesting the incorporation of three new strategies and two sub-strategies that Vale consistently employs in its post-crisis communication: *Non-Repetition, Transparent Communication,* and *Crisis Support* (which includes the sub-strategies *Recovery* and *Immediate Support*). Secondly, this study identifies a predominant usage of accommodative strategies even for crises framed as accidents. Finally, this research suggests using the BHRRC to sound out the way stakeholders frame a crisis so crisis managers take better informed decisions to manage crisis communication.

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Introduction

A crisis is a sudden and unexpected event that threatens to disrupt an organization's operations and poses both a financial and a reputational threat (Coombs, 2007). Because a crisis gives people reasons to think badly about an organization, the field of crisis management is especially concerned with the impact that crises have on reputations. Managing organizational post-crisis communication can help to prevent the potential reputational damage of a crisis, or help repair an already damaged reputation (Coombs & Holladay, 2005).

Within the literature on crisis management, Situational Crisis Communication Theory (SCCT) developed. SCCT provides evidence-based crisis communication guidance for reputational repair. Specifically, SCCT suggests that crises can be clustered as accidents, preventable disasters, or disasters in which the organization is a victim too. Each crisis cluster generates different attributions of crisis responsibility and puts organizational reputation at risk.

For each cluster, SCCT suggests a set of guidelines for the usage of response strategies to protect an organization's reputation. The usage of these strategies is of particular interest to manage the pressure that external actors put in organizations to report on both positive and negative issues to incorporate transparency in sustainability disclosure. Particularly interesting for this research is SCCT's suggestion of using *Diminish* strategies for crises framed as accidents and *Rebuild* strategies for preventional crises and accidents coupled up with crisis history.

However, few studies have examined the practical usage of crisis response strategies and whether SCCT's suggestions are followed by crisis managers (e.g. Fussell Sisco, Collins, & Zoch, 2009; Richards, Wilson, Boyle, & Mower, 2017). In this research, I analyse two cases of dam collapses involving the Brazilian mining company Vale S.A (Vale).

This offers a very unique test case to analyse the practical usage of crisis response strategies and whether this evolves between crises. Particularly, I analyse Vale's communication regarding the Bento Rodrigues and the Brumadinho dam disasters by looking at the strategies employed by Vale in three GRI reports and two company responses to accusations of human rights violations.

I have selected these two case studies involving Vale because of the uniqueness of the occurrences. Two mining disasters from the same nature happened within the same region with only 3 years and 2 months difference. On November 5th, 2015, Samarco's Fundao tailings dam collapsed in the state of Minas Gerais, releasing 32.6 million m³ of tailings. The tragic disaster resulted in 19 deaths, several affected families, and significant impacts on the environment. Samarco Mineraçao S.A was equally owned by BHP Billiton and Vale S.A (Samarco, n.d). In Vale's sustainability report from 2015, Murilo Ferreira, CEO at the time, stated that "we will do whatever it takes to set the highest security parameters in the mining industry" (Vale, 2016, p. 11).

Despite Vale's compromise with security, on January 25th, 2019, Vale's Dam I of Córrego do Feijao mine failed in the town of Brumadinho (state of Minas Gerais). The collapse release 11.7 million m³ meters of tailing, killing several employees and destroying the town of Brumadinho. In total, 270 lives were lost due to the rupture of Dam I (Vale, 2020, p. 9).

With this research, I hope to contribute to painting a greater picture of the practical usage of crisis response strategies in post-crisis communication when an organization sees itself involved in more than one crisis of the same nature. More concisely, this will be done by answering the following research questions:

RQ1: How did Vale employ crisis response strategies to communicate on the Bento Rodrigues and the Brumadinho dam disasters?

RQ2: What can we learn from Vale's usage of crisis response strategies in two mining crises?

To answer these questions, I employ content analysis to analyse Vale's choices to communicate on both disasters. Particularly, deductive coding is used to detect the presence of response strategies from SCCT. This is complemented with inductive coding, which allows for the detection of new response strategies. Finally, I discuss the findings in the light of existing research and critically reflect on the contribution of these to the existing literature.

Overview of the Dam Disasters

Bento Rodrigues Dam Disaster - November 5th, 2015

Founded in 1977, Samarco Mineraçao S.A is a Brazilian privately held mining company. Between 2000 and 2001, it turned into a joint venture between the Brazilian company Vale and the Anglo-Australian BHP Billiton when each of them acquired 50% of the company's stock. Samarco has been active in the Brazilian market for 42 years and has two operating units: Germano, in Mariana and Ouro Preto (State of Mina Gerais), and Ubu, in Anchieta (State of Espírito Santo) (Samarco, n.d.).

On November 5th, 2015, Samarco's Fundao tailing dam located in the Germano mine complex collapsed, destroying the villages of Bento Rodrigues and impacting other locations along the Doce River. The dam's failure released 32.6 million m³ of tailing which passed through the district of Bento Rodrigues and reached the rivers Gualaxo do Norte, Carmo, and Doce River. In total, 10,5 million m³ of tailing diluted along the Doce River, impacting around 680 km of water bodies in the river basin (Samarco, n.d.).

The disaster resulted in 19 deaths and hundreds of families were made homeless. In total, 39 municipalities were impacted in the state of Minas Gerais and Espírito Santo, resulting in families losing their homes, and flooded rural properties unable to produce. Moreover, the tailings plume affected the water supply in nine cities (Samarco, n.d.).

Vale's GRI report from 2015 mentions the word "accident" 36 times. 17 of these counts refer to the dam collapse. Furthermore, Samarco, Vale, and BHP Billiton requested an independent investigation of the dam failure by legal firm Cleary Gottlieb Steen & Hamilton LLP (Samarco, n.d.).

The investigation was undertaken by a panel of experts in geotechnical engineering and did not endeavour to assign fault or responsibility to any person or party or to evaluate whether or not the failure could have been foreseen or prevented. Instead, its objective was to determine the immediate cause of the Fundao tailings dam failure through a technical analysis (The Fundao Tailings Dam Investigation, n.d.).

Nevertheless, different stakeholders have argued against this and have framed the dam collapse as a human-error accident. A clear example of this is the decision of Brazilian authorities to arrest and charge the president of Samarco, five other executives, and a contractor with homicide for the mining disaster. The Police of Minas Gerais State presented an official report which concluded that the dam burst was caused by excess water in the dam, lack of proper monitoring, faulty equipment, and failure in the drainage system (Gallas, D., 2016).

Moreover, on May 24th, 2016, the social justice organization Coopération Internationale pour le Développement et la Solidarité (CIDSE) questioned Vale's commitment to building prosperity both for people and the environment, as Vale's webpage states. CIDSE published an article on its webpage explaining how different shareholders and stakeholders had participated in Vale's Annual General Meeting in Rio de Janeiro and the different allegations and accusations made.

During the meeting, critical shareholders and stakeholders pointed out the contradictions between the company's discourse on social and environmental responsibility and the occurrence of serious environmental damages and human rights violations. Furthermore, questioning of bad practices was intended to expose the negative consequences of Vale's violations and the impact in the corporate image, and, by extension, the impact for its shareholders (CIDSE, 2016).

One of the points raised was Vale's licensing process for three more dams in Minas Gerais while the report on the tailings dam breach in Mariana was not yet published. Another point concerned Vale's declaration that the disaster had no impact on the financial flow of the company, while simultaneously stating that Vale was assisting Samarco in the repairs (CIDSE, 2016).

Other points regarding salaries and investment policies or concerns regarding a hydroelectric Dam in Belo Monte were also raised. On June 29th, 2016, Vale responded to CIDSE's article. The response was published on the Business and Human Rights Resource Center (BHRRC) and will be analysed in the findings section.

Brumadinho Dam Disaster - January 25th, 2019

Founded in 1942 as the Brazilian stated-owned Companhia Vale do Rio Doce, Vale became a private multinational corporation belonging to the mining industry which currently ranks among the largest miners in the world. In addition to mining, Vale works with logistics, energy, and steel making (Vale, n.d.).

On January 25th, 2019, Dam I of Córrego do Feijao mine failed in the town of Brumadinho (state of Minas Gerais). When the mine collapsed, most of the 11.7 million cubic meters of tailing spread over approximately 295 hectares. The area of reach included the operational and administrative areas of the mine, where Vale's employees and those from third-party suppliers worked. The collapse released mine waste and iron ore, killing several employees and destroying the town of Brumadinho. In total, 270 lives were lost due to the rupture of Dam I (Vale, 2020, p. 9).

In addition to the negative impact on people's lives, the incident also caused environmental damage. The torrent of tailing arrived at the Ferro-Carvao Stream and the Paraopeba River, which increased turbidity and the concentration of metals in the first kilometres of the river (Vale, 2019, p. 11).

In the same vein as Samarco, Vale commissioned an investigation to a panel of experts in geotechnical engineering regarding the second failure. The report presented the results of the assessment of the technical causes of the failure of the Dam I. Once more, the panel did not assess matters relating to potential corporate or personal responsibility for the failure.

The fact that the experts' report only investigated the technical causes of the accident may imply that the organization tries to present itself as acting without negligence and that something else had triggered the disaster. Yet, this decision was perceived by stakeholders as a way to cover up the potential negligent attitude of the organization. For instance, the non-governmental organization Conectas argued that the company should be excluded from the UN Global Compact and argues that Vale acted with negligence.

According to Conectas, in absence of access to information about the exact cause of the accident, negligence may be inferred when, as here, the type of accident that occurred

would not normally happen without negligence, the defendant had exclusive control over the instrumentalities that led to the accident, and the accident caused demonstrable harm (Conectas, 2019).

Furthermore, on March 23rd, 2019, Vale received the invitation to respond to the online publication "Brumadinho dam: NGOs urge companies and investors to use leverage and require Vale to remedy the situation". Two letters were signed by 86 NGOs. One was directed to companies linked to the activities of Vale, and the other one was directed to companies linked to Vale's supply chain. Both letters are published at the International Federation for Human Rights' webpage.

Both letters, of identical content, raised concerns about the impacts and human right violations related to the Brumadinho dam disaster. The letters also addressed the case of the rupture of Bento Rodrigues' Dam. The letters make an urgent call upon companies which are directly or indirectly linked to Vale's activities to demand Vale to: redress the victims of both dam ruptures; to adopt measures to contain the damage, to formulate guarantees of non-repetition; and to adopt urgent and concrete measures to verify the status of all dams belonging to Vale (BHRRC, 2019).

Finally, the letters suggest that in the absence of a satisfactory response from Vale, companies should exercise their leverage, which may include suspending their business relationship until necessary measures are adopted (BHRRC, 2019). On April 8th, 2019, Vale responded to the online publication. In the response, there were references to both dam accidents. The response is available on the BHRRC.

Theoretical Framework

In the current business world, there is an ongoing debate about whether the purpose of corporations should be to maximize the profit for its shareholders or to care about a wider public of actors like employees, suppliers, customers, or the environment. This dual thinking traces back to the Great Debate of 1932, in which Berde and Dodd took part and represented two opposing poles of what a corporation's purpose is (Stout, 2012).

Berde argued that all powers granted to a corporation or the management of a corporation are at all times exercisable only for the benefit of the shareholders.

Contrastingly, Dodd defended that the purpose of public corporations goes beyond benefit for shareholders. He saw a corporation as an economic institution which has a social service as well as a profit-making function (Stout, 2012).

Shareholder-primacy thinking ignores the diverse interests and values of shareholders and organizations, and reduces them to short-sighted, opportunistic, indifferent to external costs, and lacking in conscience (Stout, 2012). According to Thomsen, Pulsen, Borsting, and Kuhn (2018), short-termism reflects a market failure because organizations fail to internalize the future cost and benefits of their present decisions.

Current trends in the business environment have raised questions concerning the role of business in society (Fassin & Buelens, 2011), which has been translated into major demands for businesses to operate according to responsible codes and standards of conduct. This aligns with stakeholder theory, which states that value creation for a broad range of stakeholders is the primary interest of a firm, which goes beyond the interest of shareholders solely (Strand, Freeman & Hockerts, 2015).

Companies that aim for a socially responsible way of conducting business can introduce Corporate Social Responsibility (CSR) in its practices by considering aspects such as the values and principles of their business, human rights and workforce, their corporate governance, the relationship with its providers, the degree of transparency and accountability of the business, or the environmental impact of it (Correa, Flynn, & Amit, 2004).

Corporate Social Responsibility and its limits

The World Business Council for Sustainable Development (WBCSD) defines CSR as the continuous commitment by businesses to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large (WBCSD, n.d, as cited in Correa, et al., 2004). In a similar vein, Davis (1973) defines CSR as "the firm's considerations of, and response to, issues beyond the narrow economic, technical, and legal requirements of the firm" (p.312).

CSR motivates companies to recognize and manage their role in global problems such as

climate change or violations of human rights (Correa et al., 2004). In addition, creating CSR policies or engaging in CSR practices can constitute a source of benefits in terms of organizational reputation and corporate image, which in return reduce public opposition against an organization's operations (Correa et al., 2004).

According to existing literature, there are three main motives for pressuring firms to engage in CSR efforts: instrumental, relational, and moral (Aguilera, Rupp, Williams, & Ganapathi, 2007). Instrumental motives refer to self-interest driven motives such as avoiding bad publicity or penalties due to non-compliance with the law. This motive persuades the firm to engage in CSR efforts when those are compatible with profitability.

This approach to CSR aligns with a part of the literature which suggests that CSR can be interpreted as a solution to problems associated with social costs (e.g. Kotchen & Moon, 2011; Heal, 2005). Heal (2005) described CSR as a program of actions to reduce externalized costs or to avoid distributional conflicts. Similarly, van Marrewijk (2003) suggests that companies engage in CSR practices following financial, marketing, or public relations considerations or a long-term reputational strategy. Thus, a cost-benefit analysis may lead managers to invest in CSR activities (van Marrewijk, 2003).

Relational motives refer to a company's interest in seeking legitimacy from its stakeholders (Aguilera et al., 2007) to prevent negative perceptions and ensure organizational long-term survival (Meyer & Rowan, 1977, as cited in Aguilera et al, 2007). But relational motives may turn CSR practices into a strategy to offset corporate social irresponsibility (CSI), as Kotchen and Moon (2011) suggest.

The authors define CSI as a set of actions that increase externalized costs and /or promote distributional conflicts. Under this interpretation, CSI is a liability and CSR is an incentive for companies to act more socially responsible in order to counterbalance actions perceived as socially irresponsible by stakeholders (Kotchen & Moon, 2011).

This perception of CSR as an opportunistic tactic to win public acceptance and legitimacy has led to a perception of hypocrisy. Due to this perception, the sincerity of

company managers' motives is questioned even when their CSR efforts are genuine (Fassin & Buelens, 2011).

Finally, moral motives refer to personal morality-based values that organizational actors bring into the firm (Aguilera et al., 2007). Hemingway and Maclagan (2004) argue that not all socially responsible activities by corporations are driven solely by commercial or financial objectives. Executives' values and interest in society or a cause can be a motivating factor to engage in CSR practices. According to the authors, "CSR is not so much indicative of corporate policy as it is a result of individual values and actions" (Hemingway & Maclagan, 2004, p.41).

However, one of the main critiques that the development of CSR has received is that it englobes a compilation of codes and standards of conduct that function as a statement of the things that a company intends to do, rather than as operative procedures that are verified as they develop (e.g. Correa et al., 2004; Pope & Waeraas, 2016).

Due to its voluntarist nature, CSR statements and practices do not need to be verified by an independent audit company and there are few sanctions if companies do not fulfil its promises, especially if they are not consumer-facing. Besides, CSR initiatives tend to be oriented to the resolution of a specific problem (for instance, an oil spill) rather than being integrated into the daily management of a business (Correa et al, 2004).

CSR Reporting & the GRI

Despite organizations' efforts to implement CSR practices, it is often difficult for external stakeholders to assess the sustainability performance of a company due to information asymmetries. Therefore, firms might decide to voluntarily communicate their sustainability performance through a dedicated report.

A sustainability report is a report published by an organization about the economic, environmental, and social impacts caused by its everyday activities. A sustainability report also presents the organization's values and governance model and demonstrates the link between its strategy and its commitment to a sustainable global economy (GRI, n.d.). Sustainability reporting can be considered a synonym of other terms employed to refer to non-financial reporting, such as triple bottom line reporting or CSR reporting.

The existing literature on sustainability reporting suggests three predominant views on the topic. Some authors perceive sustainability reporting as a way to introduce transparency and accountability in their practices by giving more information to support stakeholders' decision-making process (e.g. Boiral, 2016; Boiral, 2013; Merkl-Davies & Brennan, 2007).

Others perceive sustainability reports as a legitimizing tool employed to reduce social pressures and limit criticism from external stakeholders (Talbot & Boiral, 2018). Under this perspective, voluntary disclosure may be a response to external pressures for complying with regulations and a way to communicate that a company acts in accordance with the socially constructed system of norms, values, and beliefs (Jamali, 2010).

Furthermore, gaining legitimacy is a way for companies to attract investors or improve corporate image among stakeholders, which does not necessarily reflect an organization's genuine commitment to sustainability development (Prado-Lorenzo, Rodríguez-Dominguez, Gallego-Álvarez, & García-Sánchez., 2009; Cho, Michelon, & Patten, 2012).

Finally, a section of the existing literature suggests that reporting on sustainable performance is a promotional and public relations strategy used to present corporate commitments and image or to misinform stakeholders (e.g. Talbot & Boiral, 2013; Boiral, 2016; Arora and Gangopadhyay, 1995). Critical literature on climate disclosure demonstrates that there is a significant gap between a company's public image and its actual commitment to climate change. For instance, some companies may decide to focus on positive or neutral elements in their annual reports or to disclose the minimum amount of data to avoid criticism. By using these techniques, companies deliberately cover information about their performance (Talbot & Boiral, 2018).

The Global Reporting Initiative (GRI), an independent international organization that pioneers sustainability reporting since 1997, has developed a set of universally recognized GRI Sustainability Reporting Standards. The GRI standards help businesses

and governments understand and communicate their impact on critical sustainability issues such as climate change, human rights, governance, and social well-being. GRI Standards are the first and more widely adopted standards for sustainability reporting (GRI, n.d.).

According to the GRI, a sustainability report is a key platform for communicating sustainability performance and impacts – whether positive or negative (GRI, n.d.). Nevertheless, prior research has found that positive information in corporate sustainability reports is more abundant than negative disclosures (e.g. Cho et al., 2012; Boiral, 2013). According to Adams and Frost (2006), the predominance of positive events over the negative ones is understood as a form of greenwashing.

Stakeholders are often suspicious of the truthfulness of companies' environmental claims and may speculate that communication about sustainable issues is more rhetorical than real. Previous research suggests that companies that do not disclose negative sustainability performance may encounter scepticism regarding the trustworthiness of their sustainability reports (Hahn & Lülfs, 2014).

Nevertheless, disclosing negative aspects regarding an organization's sustainability performance can translate into negative financial performance and increase stock market risk (Bansal and Clelland, 2004). Alternatively, Hahn and Lülfs (2014) suggest that disclosing negative aspects of sustainability performance may also be regarded as a positive signal if a company discloses it while explaining how it is actively managing risk and helping to avoid future issues. Furthermore, previous research conducted by Reimsbach and Hahn (2015) suggests that a company's self-disclosure of negative incidents has no significant effect on the stock price estimates and investment decisions of non-professional investors.

Greenwashing for legitimacy

According to Lyon and Montgomery (2015), any major mechanism of misleading communication can be a variety of greenwash if applied to environmental communication. In general terms, a company engages in greenwashing practices when there is a discrepancy between organizations' green claims and their actual environmental performance (Delmas & Burbano, 2011; Lyon & Montgomery, 2015).

For Delmas and Burbano (2011) greenwashing occurs when there is a gap between a company's poor environmental performance and positive communication about environmental performance. This type of communication misleads people into adopting positive beliefs about an organization's environmental performance, practices, or products (Lyon & Montgomery, 2015). Hence, companies' environmental initiatives may result self-defeating if they are perceived as suspicious of greenwashing (De Vries, Terwel, Ellemers, & Daamen, 2015).

According to legitimacy theory, a company engages in greenwashing practices to ensure its actions are perceived to be desirable, correct, or appropriate (Suchman, 1995). Through impression management tactics, companies can manage green claims that are intentionally false to accomplish legitimacy (Seele & Gatti, 2017). When doing so, companies choose to engage in "green talk" without a "green walk" (Ramus & Montiel, 2005), which may carry consequences.

For instance, earlier research on the effects of greenwashing on consumers and other stakeholders suggest that greenwashing has damaging effects on people's image of a brand or an organization. When greenwashing is detected, it has negative effects on consumer's attitudes and behavioural intentions towards a brand or an organization (Nyilasy, Gangadharbatla, & Paladino, 2014; De Jong, Harkink, & Barth, 2018). This is supported by macro-level studies on greenwashing.

Particularly, a macro-level study conducted by Berrone, Fosfuri, and Gelabert (2017, as cited in De Jong, Huluba & Beldad, 2020) on the conditions under which greenwashing may backfire, which concluded that especially in the presence of vigilant environmental NGOs, greenwashing practices do not seem to pay off.

Recent research by De Jong et al., (2020) further supports the effect that greenwashing has on organizational reputation. Based on a practical case by Lyon and Maxwell (2011), the authors discern between behavioural-claim greenwashing (a discrepancy between environmental claims and environmental behaviour) and motive greenwashing (a discrepancy between communicated and real motives for environmentally friendly behaviour). Their research's findings suggest that behavioural-claim greenwashing has a

larger negative effect on corporate reputation.

Furthermore, their research suggests that organizations that have initiated environmentally friendly behaviours themselves generate higher scores on reputation than organizations guilty of motive greenwashing. Therefore, the authors argue that the only way an organization can benefit from its environmentally friendly behaviour is by being completely honest and transparent about it.

Interestingly, all the aforementioned definitions of greenwashing imply intentionality in the action. According to Mitchell and Ramey (2011), for an act to be considered as greenwashing, it must be deliberate. However, others contend that deliberate dishonesty is only a part of the picture. For instance, Seele and Gatti (2017) postulate that greenwashing only exists when a message or company is blamed by the media, NGOs, or other stakeholders, regardless of the level of the falsehood of the message.

Besides, the authors argued that greenwashing allegations are in the eyes of the beholder. In a similar vein, Lange and Washburn (2012) argue that corporate behaviour is socially irresponsible only to the extent that it is perceived as such by the observer. Therefore, external communication is a vital aspect of corporate environmental legitimacy (Matejek & Gössling, 2014).

Organizational Image & Reputation

As aforementioned, greenwashing has damaging effects on people's image of a brand or an organization. From an external perspective, organizational image corresponds to meanings that receivers construct from their personal observation of reality (e.g. Grunig, 1993). By reporting on their sustainability performance, companies are projecting an organizational image to communicate their organizational behaviour, actions, and achievements.

Ideally, top management is concerned with projecting an image that is based on organizational identity. However, a projected image does not necessarily represent reality, and it can take the form of other projections such as a desired future image, which corresponds to a vision that a company wants to achieve (Alvesson, 1990). Moreover, an organization may shape its image to take the form of a socially desirable

one or of a managed impression. Finally, an organization can project false images in an attempt to misrepresent the organization to its public (Gioia, Schultz, & Corley, 2000).

If an image is perceived as stable, this one can take the form of reputation, which is constructed by outsiders based on an organization's actions and achievements (Fombrun & Shanley, 1990). A reputation is an aggregate evaluation that stakeholders make about how well an organization is meeting stakeholders' expectations based on its past behaviours (Wartick 1992).

Reputations are widely recognized as a valuable, intangible asset (Coombs, 2007), and they develop through the information stakeholders receive about the organization (Fombrun & Van Riel, 2004) through different channels such as reports about an organization, news media, advertising, weblogs, or word of mouth. They compare what they know about an organization to some standard to determine whether or not an organization meets their behavioural expectations. Therefore, reputations are evaluative (Coombs, 2007).

When observers are faced with incomplete information about firms' actions, they rely on evaluative signals presented by actors of the organizational field such as market analysts, professional investors, or reporters (Abrahamson & Fombrun, 1992). From a sociological view, reputations are indicators of legitimacy. Specifically, they are an aggregate assessment of a firm's performance in relation to expectations and norms in an institutional field (Fombrun & Van Riel, 1997).

Crises are understood as a threat to organizational reputation. According to Fombrun and Van Riel (1997), reputations are rarely noticed until they are threatened. When an organization takes an unexpected reputation, organizational members are urged to compare their identity with the constructed external image (Dutton, Dukerich, & Harquail, 1994). If there is a discrepancy between the two perceptions, top management may take some action to resolve it. They can either change aspects of their identity or change the way outsiders perceive the organization by managing the impressions and reputation that outsiders make of them (Gioia et al., 2000).

Judgements made by observers about a firm are rooted in perceptions of the firm's identity and impressions of its image and often occur as a consequence of a triggering event such as environmental damage or human rights violations (Barnett, Jermier, & Lafferty, 2006). According to Fombrun and Van Riel (2004), reputational capital is an organization's stock of perceptual and social assets. In other words, reputational capital refers to the quality of the relationship an organization has established with stakeholders and the regard in which the company and brand are held (Fombrun & Van Riel, 2004).

Organizations accumulate reputational capital over time (Coombs, 2007). When an organization is undergoing a crisis, its reputation may be damaged, therefore losing reputational capital. According to Coombs and Holladay (2005), post-crisis communication can be used to repair a reputation or prevent reputational damage. Stakeholders adversely affected by a crisis include community members, employees, customers, suppliers, and stockholders (Coombs, 2007).

However, a favourable pre-crisis reputation might work as a cushion against a loss of reputational capital during a crisis. Therefore, an organization with a more favourable pre-crisis reputation will still have a strong post-crisis reputation because it has more reputational capital to spend than an organization with an unfavourable or neutral pre-crisis reputation (Coombs, 2007).

Crisis Management

Within crisis management literature, two authors predominate the field of research: Coombs and Benoit. On the one hand, Benoit developed the Theory of Image Restoration Discourse, which is not focused on crisis situations but message options. His theory aims to answer the question "What can a corporation say when faced with a crisis?" and offers five broad categories of image repair strategies to respond to image threats: *Denial, Evasion of Responsibility, Reducing Offensiveness of the Event, Corrective Action,* and *Mortification* (Benoit, 1997).

On the other hand, Coombs & Holladay started testing Situational Crisis Communication Theory (SCCT) back in 2002, as an extension of Coomb's (1995) previous research on matching crisis response strategies to the crisis situation. Contrarily to Benoit, the SCCT proposal of crisis response strategies pays special attention to crisis situations, which include aspects such as crisis history or prior relational reputation. SCCT's framework has formed the basis of my research due to its focus on crisis situations, as the crisis context of the analysed cases is particularly characteristic and relevant.

Situational Crisis Communication Theory

When a crisis occurs, crisis managers must begin their communication by addressing the physical and psychological concerns of the victims. After this, managers may turn their attention to reputational assets. Situational Crisis Communication Theory guides managers in dealing with their reputational assets (Coombs, 2007). Particularly, SCCT suggests that a strategic communicative response can best protect the reputational assets of an organization if the crisis situation is assessed to select the crisis response strategy that best fits the situation (Coombs & Holladay, 2002).

Origins

Research on crisis management draws upon apologia, impression management, and accounts literature. This influences the set of crisis response strategies that SCCT developed by examining how organizations use communication as a symbolic resource to protect their image during a crisis.

Corporate apologia refers to a communicative effort to defend the corporation against reputation attacks (Dionisopolous & Vibbert, 1988, as cited in Coombs, Frandsen, Holladay, & Johansen 2010). The authors argued that corporations, like individuals, have character (reputations). As with individuals' character, there can be attacks on the reputation of an organization, and managers may employ apologia to provide self-defence in response to those attacks.

The next step in the development of crisis communication strategies was to move beyond the strategies offered by apologia. Accounts are statements used to explain one's behaviour and are invoked when one's behaviour is called into question, thereby threatening one's face (image) (Coombs, 1998). Accounts literature offered the possibility to expand crisis communication strategies. For instance, Benoit (1997) developed a list of image threat responses which was inspired by both apologia and account strategies.

Finally, crisis management draws upon literature on impression management (IM), which proposes several strategies that may be used in attempts to re-establish public legitimacy (repair an image) when a crisis threatens an organization's impression (Coombs, 1998).

According to Bolino, Kacmar, Turnley, and Gilstrap (2008), organizational representatives and spokespersons use impression management in an effort to influence the way that others view the organization as a whole. This research perspective suggests that organizations can use IM tactics to create an organizational image in the eyes of different constituencies (Bolino et al., 2008), and examine how persuasion is used to demonstrate how an organization conforms to societal expectations (Higgins & Walker, 2012).

At the broadest level of analysis, research on organizational impression management (OIM) has focused on how organizations use both defensive IM tactics to restore legitimacy in the wake of a controversial or image-threatening event, and assertive IM tactics to increase acceptance of controversial decisions or practices (Bolino et al., 2008).

The most frequently used taxonomy of OIM tactics is that of Mohamed, Gardner, and Paolillo (1999). They developed a $2 \ge 2$ matrix in which OIM tactics could be classified as direct or indirect, and assertive or defensive. Assertive tactics are proactive and aim at the enhancement of the organizational image. In contrast, defensive tactics are reactive and adopted as a response to situations that threaten to damage the organization.

Similarly, Hooghiemstra (2000) classified existing IM typologies at the organizational level of analysis as either acquisitive (or proactive) or protective (or reactive) to study its use in the sustainability reporting practices of Shell. Within the literature on acquisitive or proactive tactics, Hooghiemstra (2000) focuses on "acclaiming" tactics, particularly enhancements and entitlements, which are employed in the case of a successful or desired outcome to maximize its desirable implications for the actor (Schlenker, 1980, as cited in Hooghiemstra, 2000).

Within the literature on protective or reactive tactics, Hooghiemstra (2000) focuses on "accounting" tactics, particularly excuses, justifications, and apologies, which are employed as a form of remedial tactics which objective is to offer to the audience an explanation or apology for a crisis (Schlenker, 1980, as cited in Hooghiemstra, 2000) in order to minimize the negative repercussion of that crisis (Hooghiemstra, 2000).

The influence of impressions management on crisis communication manifests itself in the similarities between organizational impression management tactics and the list of crisis response strategies proposed by Coombs in his academic research "Protecting Organization Reputations During a Crisis: The Development and Application of Situational Crisis Communication Theory" (2007), which will be presented in detail.

Nevertheless, there are tactics of impression management that may look similar to crisis response strategies but differ in terms of organizational responsibility. SCCT's list of crisis response strategies is built around the perceived acceptance of responsibility for a crisis (Coombs, 2007).

Particularly, it is important to highlight that *Deny* crisis response strategies emphasize the absence of connection between the crisis and the organization, while some IM tactics labelled as "Denial" rather discuss the amount of harm caused, or deny any injury. In a similar vein, different IM tactics labelled as "Justifications" or "Excuses" emphasize the denial of responsibility or denial of impacts, while crisis response strategies try to minimize perceptions of responsibility or damage rather than deny them.

In addition to drawing upon apologia, accounts, and impression management literature, SCCT is particularly rooted in attribution theory and neo-institutionalism. From the neo-institutional perspective, organizations should not focus their efforts on claiming the invalidity of a crisis, but in repairing the violation of social norms. Managers should employ the crisis response strategies that reflect efforts to re-establish organizational legitimacy by turning to the norms held by its stakeholders (Coombs & Holladay, 1996).

Attribution theory suggests that people search for the causes of events (make attributions), especially those that are negative and unexpected. Furthermore, a person will not only attribute responsibility for an event but also experience an emotional reaction to this one. Therefore, communication can be used to influence a person's attributions of responsibility or the emotions attached to those attributions (Coombs, 2007).

Neoinstitutionalism and attribution theory get integrated into the symbolic approach to crisis management, which uses both perspectives to explain and predict the dynamics between crisis response strategies and the reputational damage of a crisis, depending on the crisis situation (Coombs & Holladay, 1996). A threat to legitimacy is part of the reputational damage that a crisis may signify for an organization. A symbolic approach to crisis management suggests that the more the attributions of responsibility for a crisis to an organization, the greater the risk of reputational damage.

The Reputational Threat of a Crisis

Generally speaking, there are two strategies for crisis communication: (1) managing information and (2) managing meaning. Managing information focuses on collecting and disseminating crisis-related information. Managing meaning involves efforts to influence how people perceive the crisis and/or the organization involved in the crisis (Coombs, et al., 2010).

Crisis response strategies are resources employed to manage meaning. According to Coombs (2015), there are three categories of crisis response strategies: (1) instructing information, (2) adjusting information, and (3) reputation repair. Instructing information refers to communicative choices made to help stakeholders protect themselves physically from a crisis (Sturges, 1994, as cited in Coombs, 2015). For instance, instructing information could be warning people to evacuate, to not use a product, or to shelter-in-place (Coombs, 2015).

Adjusting information corresponds to efforts to help stakeholders cope psychologically with a crisis (Sturges, 1994, as cited in Coombs, 2015). These efforts include expressions of sympathy, counselling, giving information about the event, or corrective action (Coombs, 2015).

Finally, reputation repair includes strategies aimed at reducing the negative effects a crisis has on the organization's reputation and related assets (Coombs, 2015). This research focuses on crisis response strategies aimed at reputational repair.

As aforementioned, SCCT extends upon neo-institutionalism and attribution theory and suggest that attributions of crisis responsibility by stakeholders cause a reputational threat (Coombs & Holladay, 2002). According to Coombs (2007), the reputational threat of a crisis situation is shaped by three main factors: (1) initial crisis responsibility, (2) crisis history, and (3) prior relational reputation.

Initial crisis responsibility is a function of how much responsibility stakeholders attribute to an organization for a crisis (Coombs, 1995). As stakeholders' attribution of crisis responsibility to an organization increase, the reputational threat of this one also increases (Coombs, 1998). Thus, research on SCCT has established that crisis responsibility is negatively related to organizational reputation (Coombs & Holladay, 1996, Coombs & Holladay, 2001).

Previous research suggests that certain crisis types produce similar attributions of crisis responsibility. Hence, crisis managers can use similar crisis response strategies to address similar crisis types (Coombs & Holladay, 2002). SCCT research has grouped crisis types in three crisis clusters: (1) the victim cluster, (2) the accidental cluster, and (3) the intentional/preventional cluster.

The victim cluster has very weak attributions of crisis responsibility and supposes a mild reputational threat. Under this cluster, the organization is also perceived as a victim of the crisis. Crisis types under this cluster include natural disasters, false rumours, workplace violence, or product tampering (Coombs & Holladay, 2002).

The accidental cluster has minimal attributions of crisis responsibility and supposes a moderate reputational threat. Crisis types under this cluster include challenges, technicalerror accidents, and technical-error product harm. In these crisis types, organizational actions leading to the crisis were unintentional (Coombs & Holladay, 2002). Finally, the intentional or preventable cluster has strong attributions of crisis responsibility and supposes a severe reputational threat. Crisis types under this cluster include human-error accidents, and human-error product harm, organizational misdeed with no injuries, organizational misdeed management misconducts, and organizational misdeed with injuries. In these crisis types, an organization knowingly placed people at risk, took inappropriate actions, and/or violated a law or regulation (Coombs & Holladay, 2002).

The second and third factors that shape the reputational threat of a crisis situation are crisis history and prior relational reputation. Crisis history refers to whether or not an organization had a similar crisis in the past. It is for an organization's best interest to maintain a clean crisis record because similar past crises will complicate the management of the current crisis (Coombs, 2004).

While the lack of prior accidents may keep a crisis at a mild level of reputational threat, crisis history may turn the same crisis into a severe reputational threat (Coombs, 2004). For instance, repeated accidents may be treated like a crisis belonging to the preventable cluster (Coombs & Holladay, 2002).

Prior relational reputation depends on how an organization treated its stakeholders in the past (Coombs, 2007). Coombs and Holladay (2001) conducted an experimental study which suggests that a negative relationship history produces an effect on organizational reputation and crisis responsibility. When an organization has no prior relationship with its stakeholders, this one will be given the benefit of doubt, and a positive relationship will be assumed.

However, a prior negative relationship and crisis history can create a strong and negative "velcro effect", as it attracts additional reputational damage (Coombs & Holladay, 2001). Therefore, SCCT suggests that initial assessments of crisis responsibility based on crisis type should be adjusted upwards or downwards depending on other factors such as crisis history or severity of the crisis (Coombs & Holladay, 2002).

Both an organization's history of crisis and/or a bad prior relationship with its stakeholders increases the reputational threat directly. Moreover, it increases the attributions of crisis responsibility, which additionally increases the reputation threat indirectly (Coombs, 2004).

Crisis Response Strategies

Research on SCCT prescribes crisis response strategies designed to protect reputational assets. If a company is held responsible for a crisis, it must answer for its actions. Crisis response strategies are an organization's response strategies used to repair a reputation, reduce negative affect, and to prevent negative behavioural intentions (Coombs, 2007). Crisis response strategies may help to alter an organization's image, therefore helping to reduce the reputational damage by means of convincing stakeholders there is no crisis, having stakeholders see the crisis as less negative, or having the stakeholders see the organization as more positive (Coombs, 2007). Therefore, a crisis manager should select a response strategy that is appropriate for the potential reputational damage of a crisis (Coombs & Holladay, 2002).

Early work by Coombs (1998) and Coombs and Holladay (2002) suggest that locating crisis along a responsibility continuum is a way for managers to have an idea of the range of crisis communication strategies that may be used. Crisis response strategies can be ordered along a continuum that ranges from defensive (putting organizational interests first) to accommodative (putting victims' concerns first).

When the perceptions of crisis responsibility are stronger, accommodative crisis response strategies, such as a full apology or corrective action, are better suited. Contrarily, defensive crisis response strategies, for instance attacking the accuser or denial, may be used when perceptions of crisis responsibility are weak (Coombs, 1998). Figure 1 illustrates the fit of crisis communication strategies in a continuum developed by Coombs (1998).



Figure 1: Fit for crisis communication strategies (Coombs, 1998)

SCCT's crisis response strategies are built around the perceived acceptance of responsibility. Based on finding from previous SCCT research, Coombs (2007) created a list of useful crisis response strategies and divided them into two groups: primary crisis response strategies and secondary/supplemental crisis response strategies. Primary crisis response strategies are divided into three groups: *Deny* strategies (attack the accuser, denial, and scapegoat), *Diminish* strategies (excuse and justification), and *Rebuild* strategies (compensation and apology). Secondary or supplemental response strategies.

I would like to point out that Coombs (2015) refers to the four groups of strategies with different terms. The terms used are: *Denial, Reducing Offensiveness, Redress, and Bolstering.* However, as this article does not provide a full list of crisis response strategies, and it is not focused on SCCT, I will employ the terminology used in Coombs (2007).

As this list has formed one of the bases of this research, it is essential to recognize the original descriptions of these crisis response strategies:

Primary crisis response strategies (Coombs, 2007):

- Deny crisis response strategies
 - Attack the accuser: "Crisis manager confronts the person or group claiming something is wrong with the organization" (p. 8)
 - Denial: "Crisis manager asserts that there is no crisis" (p. 8)

- Scapegoat: "Crisis manager blames some person or group outside of the organization for the crisis" (p.8)
- Diminish crisis response strategies
 - Excuse: "Crisis manager minimizes organizational responsibility by denying intent to do harm and/or claiming inability to control the events that triggered the crisis" (p. 8)
 - Justification: "Crisis manager minimizes the perceived damage caused by the crisis" (p. 8)

• Rebuild crisis response strategies

- **Compensation**: "Crisis manager offers money or other gifts to victims" (p. 8)
- **Apology**: "Crisis manager indicates the organization takes full responsibility for the crisis and asks stakeholders for forgiveness" (p. 8)

Secondary crisis response strategies (Coombs, 2007):

- Bolstering crisis response strategies
 - **Reminder**: "Tell stakeholders about the past good works of the organization" (p. 8)
 - **Ingratiation**: "Crisis manager praises stakeholders and/or reminds them of past good works by the organization" (p. 8)
 - Victimage: "Crisis managers remind stakeholders that the organization is a victim of the crisis too" (p. 8)

Previous research by Coombs (1998) and Coombs and Holladay (2002) mentioned a strategy named *Corrective Action*, which was defined as a strategy employed when "managers seek to repair the damage from the crisis, take steps to prevent a repeat of the crisis, or both" (Coombs 1998, p.180). However, this strategy is not included in the updated list of strategies that Coombs (2007) proposed later on.

Coombs (2007) further develop SCCT theory and suggested that the aforementioned set of crisis response strategies can be integrated with the three-crisis cluster based upon attributions of crisis responsibility. Therefore, once a crisis event is framed as being a specific crisis type and belonging to a specific crisis cluster, managers can employ the set of crisis response strategies prescribed for that cluster to introduce a new way of framing the event or reinforce an existing frame.

According to the author, *Deny* strategies attempt to remove any connection between the organization and the crisis. Managers may deny the truth to a rumour or refute charges of immoral conduct. Coombs (2007) names this frame as the "no crisis frame of denial" (p. 9). If stakeholders accept this frame, the organization will not suffer any reputation harm from the crisis (Coombs, 2007).

Diminish crisis response strategies can be used to reaffirm that a crisis event resides in the accidental cluster (Coombs and Holladay, 2002). Through the response strategies of *Excuse* and *Justification*, managers argue that a crisis is not as bad as people think, or that the organization lacked control over the crisis. If stakeholders accept the crisis manager's frame, the harmful effects of the crisis will get reduced (Coombs, 2007).

Rebuild strategies are suggested for generating new reputational assets. These strategies may offer material and/or symbolic forms of aid to the victims to improve the organization's reputation. SCCT suggests that rebuild strategies should be used for a crisis that presents a severe reputational threat. This includes crises in the intentional cluster, or crises in the accidental cluster with crisis history and/or unfavourable prior relationship reputation (Coombs, 2007). However, researchers suggest that an *Apology* may not always be the best crisis response strategy an organization can use, as it may be perceived as an admission of guilt and may open an organization to legal liability (Coombs, 1998).

Finally, *Bolstering* strategies are used as supplements to the three primary crisis response strategies by generating goodwill, evoking sympathy, or trying to counter- balance the current negative effects from a crisis with past good works. These strategies can be used by an organization that intends to draw sympathy from being a victim of the crisis (Coombs, 2007).

Methodology

Research Philosophy

Research philosophy refers to a system of beliefs and assumptions about the development of knowledge (Saunders, Lewis, & Thornhill, 2019). According to Burrell

and Morgan (1979, as cited in Saunders et al., 2019), developing a philosophical perspective requires that the researcher makes several assumptions concerning the nature of society and the nature of science. Particularly, research philosophies are defined by three main types of assumptions: epistemological assumptions, ontological assumptions, and axiological assumptions.

Epistemological assumptions are assumptions about human knowledge (Saunders et al., 2019) which help researchers understand the best ways of inquiring into the nature of the physical and social world (Easterby-Smith, Thorpe, & Jackson, 2015). Ontological assumptions are assumptions about the nature of reality and existence (Easterby-Smith et al., 2015; Saunders et al., 2019). Finally, axiological assumptions are assumptions about the researcher's values influence the research process (Saunder et al., 2019).

Business and management research philosophies can be scattered along an objectivistsubjectivist continuum. Both opposing extremes of the continuum have different epistemological, ontological, and axiological assumptions. Objectivism embraces a realist ontology, and a positivist epistemology. It assumes that facts exist independently from the researcher and its activity and can be revealed and accessed directly by the researcher (Easterby- Smith et al., 2015), because the properties of the external social world can be measured through observable, measurable facts from which generalisations can be drawn (Easterby-Smith et al., 2015; Saunders et al., 2019). Axiologically, objectivism defends that due to reality's external and independent existence, researchers try to remain detached from their values and beliefs to avoid bias in their findings (Saunders et al., 2019).

On the other extreme of the continuum, subjectivism embraces a nominalist ontology, and a social constructionist epistemology. It assumes that facts and social reality are created by humans through language and discourse, because reality is not objective and exterior but socially constructed and given meaning by people through its daily interaction via the medium of language (Easterby-Smith et al., 2015). As each person

experiences and perceives reality differently, there are multiple realities (Easterby-Smith et al., 2015; Saunders et al., 2019). Axiologically, subjectivism defends that as researchers are actively using the data, they cannot detach themselves from their values, which are incorporated within the research (Saunders et al., 2019).

This research principally aligns with a relativist ontology, which suggests the existence of many "truths", and that facts depend on the viewpoint of the observer (Easterby-Smith et al., 2015). Things such as the role of an organization in society, the nature of a crisis, or social responsibility are defined and experienced differently by people, which depends on the context in which different social actors are immersed. The two dam collapses that took place in the state of Minas Gerais are differently framed by Vale and its stakeholders. In this case, what accounts for the truth varies among observers.

From an axiological perspective, this research is value- driven. It was initiated and sustained by my doubts and curiosity on topics such as social legitimacy or sustainability reporting. Particularly, this curiosity arose from two electives I took on "Business Strategies in Latin America and the Caribbean" and "Leading and Managing in Latin America".

Although striving to remain detached while conducting this research, I must acknowledge my personal interaction with the data while coding latent content. In qualitative content analysis, data is presented in words and themes, which allows the researcher to draw interpretations from the results. A latent analysis of the content was conducted at the interpretive level as I sought to find the underlying meaning of the text. However, words used by the informants may not correspond to my view of their meaning (Bengtsson, 2016). Therefore, it is important to highlight the subjectivity of this process.

From an epistemological perspective, I have assumed a social constructionist epistemology, assuming that reality is socially constructed by social actors in their daily interactions with others. Moreover, in conducting this research, social phenomena are perceived to be in a constant state of flux and revision, which aligns with the belief that companies can manage how stakeholders frame the organization through the usage of specific statements.

To sum up, the aforementioned philosophical assumptions primarily place this research in the subjectivist side of the continuum, adopting an interpretivist research philosophy. However, and as it will be further discussed, this research employs content analysis as the approach to frame and interpret qualitative data. This method is an interpretive, qualitative method, with an underlying positivist framework, which allowed me to introduce some element of quantification in the process of data analysis (Easterby- Smith et al., 2015). Particularly, I have complemented the coding process with a calculation of the relative frequencies of the different crisis response strategies represented in Vale's post-crisis communication.

Methodological Choices

Research Purpose

The most common classification of research purpose in the literature on research methods is one of exploratory, descriptive, and explanatory (Saunders et al., 2019). The purpose of this research is to conduct an exploratory study of the crisis response strategies employed in two different dam disasters involving the same mining organization. Therefore, the purpose of this research aligns with a subjectivist perspective, under which the aim of social science is to try to understand what is happening, rather than to identify fundamental laws that explain regularities in human social behaviour (Holden, 2004).

This type of study is valuable as it is flexible and adaptable to change (Saunders et al., 2019). While conducting this study, the direction of the research changed as a result of new insights that occurred while conducting data analysis. This change of direction was possible due to the study's exploratory nature, which allowed me to progress from an initially broad research topic to a narrower one.

Research Method and Design

For this research, I have applied content analysis as an interpretative method to case study research. Particularly, I looked in-depth at two particular events that involved the

mining company Vale. This approach was adopted as it enabled me to understand the crises within its broad context and to test the propositions of SCCT against a real-world crisis.

Content analysis allows the researcher to draw systematic inferences from qualitative data that have been structured by a set of ideas or concepts (Easterby-Smith et al., 2015). I have employed content analysis as it allows for the systematic evaluation of texts, in my case evaluating sustainability reports and company responses to allegations of misconduct. Particularly, I have interrogated data for the presence, meanings, and relationships of concepts derived from pre-existing theory, and the data themselves.

As aforementioned, this research follows a constructionist epistemology. Therefore, despite the small number of cases that have been analysed, I believe it provides a rich picture of life and behaviour in mining organizations that undergo different crises. Still, while it is not my intention to generalize across broader populations, I intend to inform practice via identifying "lessons" that may be relevant and useful to other practitioners. It may be that outcomes from this study can help other crisis managers in their choice of crisis response strategies in similar organizations or situations, as those investigated here.

Furthermore, this in-depth inquiry is designed to identify how Vale used crisis response strategies in its post-crisis communication, and to understand the plausible reasons why, as well as possible implications for action. In order to answer my research questions, this research uses a mixed-method approach that employs qualitative and quantitative data analysis techniques sequentially.

Initially, research was conducted using qualitative methods. Qualitative data were analysed employing both a deductive and an inductive approach sequentially. Subsequently, coded qualitative data was analysed quantitatively to count the frequency of occurrence of each strategy. Graphs were employed to illustrate comparisons while examining relationships and trends within the data. A step by step explanation of the process of content analysis will be presented in the Data Collection and Data Analysis section.

Approach to Theory Development

Theory development can be approached inductively, deductively, or abductively. These approaches follow three different logics. Deductive reasoning follows the logic that when the premises are true, the conclusion must also be true. Data collection is used to evaluate hypotheses and test existing theories to conclude its falsification or verification (Saunders et al., 2019).

When following an inductive approach to theory development, known premises are used to generate untested conclusions. The researcher collects data to explore a phenomenon, identify themes, or explain patters to generate or build theory by creating a conceptual framework (Saunders et al., 2019).

When following abductive reasoning, the researcher goes back and forth between data and theory. This approach to theory development follows the logic that known premises are used to generate testable conclusions. Data collection is used to explore a phenomenon, identify themes or explain patterns. Afterwards, these are located in a conceptual framework and tested through additional data collection to generate new theory or modify an existing one (Saunders et al., 2019).

This research began with the collection of data from an extractive company that had more than one environmental crisis of the same nature. Once two cases were selected, I reviewed the existing literature within the fields of reputation and situational crisis communication theory to gain an understanding of the existing theoretical considerations on the subject. After this, I returned to the data to conduct content analysis with predetermined categories based on the crisis response strategies suggested by SCCT. A deductive approach to theory development was employed to test a part of SCCT prepositions.

During the coding process, those fragments of the sustainability reports which did not fit within the pre-determined categories were analysed through open-coding. From this process new strategies emerged. Therefore, this research argues for an abductive approach to theory development, which enables the generation or modification of existing theory on situational crisis communication where appropriate.

Data collection and Data analysis (Techniques and procedures)

Data Collection

For this research, secondary textual data was collected and analysed. Particularly, these data included two types of documents. On the one hand, three sustainability reports from the mining organization Vale which were downloaded from the company's webpage. On the other hand, two company responses to accusations of human rights violations, which were downloaded from the webpage of the Business and Human Rights Resource Center. It is important to highlight that these data were written for a purpose other than research.

The process of data collection focused on organizations that communicated negative aspects of their sustainability performance in their GRI reports, such as environmental disasters. Furthermore, the process focused on finding GRI reports from the same organization that reported on two similar crises, and if possible which took place within the same geographical region. A final third condition was that the chosen organization must have replied to accusations of human rights violations relating to those environmental disasters on the Business and Human Rights Resource Center. The mining company Vale was chosen because it fulfilled the previous conditions.

The selection of reports was conditioned by the date of the dams' failure. There is a time difference between the year covered by the sustainability report and the date in which the report is released. Although the second disaster occurred in January 2019, the sustainability report from 2019 was only released in 2020. Therefore, the 2018 report, which was published in April 2019, destined a specific section to the dam failure of 2019. Because Vale's GRI reports from 2018 and 2019 covered the same dam failure, there were certain repeated fragments. Nevertheless, comparisons have been drawn between disaster and not between reported years. Therefore, information from the 2018 report that is repeated in the 2019 report was discarded.

The sample size was chosen so that a picture of life and behaviour in mining companies is provided while adhering to practical aspects of time availability. The two chosen cases allowed me to conclude whether SCCT theory informs practices or not. Furthermore, it is argued that even single cases can provide convincing tests of theory if they come to find an anomaly in a theory (Easterby-Smith et al., 2015). On the whole, the passages collected from the GRI reports which were deemed relevant represent 35 document pages (following CBS formal requirement of 2,275 characters including spaces per page on average). They accounted for a total amount of 11,014 words. The two company responses represented 25 pages. They accounted for a total amount of 7,145 words.

Data Analysis

As aforementioned, data analysis was based on a qualitative content analysis processes consisting of five steps. Primarily, material that is relevant to answer the research question was delimited. As this research is focused on crisis communication, only the information related to the dams' failure was identified as relevant and extracted from the GRI reports and the company responses.

Once relevant information was identified and extracted, a categorization list was developed to classify data. This list was composed of ten categories based on SCCT's list of crisis response strategies presented by Coombs in his academic research "Protecting Organization Reputations During a Crisis: The Development and Application of Situational Crisis Communication Theory" (2007). Each category was defined and maintained its original definition.

Thirdly, a deductive approach to data analysis was employed. Colour-codes were employed to frame data according to the pre-defined categories. Manual coding was undertaken by highlighting lines and paragraphs of text. Responses were placed in the form of meaning units and subsequently summarized in condensed meaning units. Afterwards, condensed meaning units were placed into categories.

From the preliminary list of categories, only nine were identified and colour-coded. The employed colour-codes were: light blue for *Attack the Accuser*, dark blue for *Excuse*, khaki for *Justification*, pink for *Compensation*, purple for *Apology*, dark green for *Reminder*, and yellow for *Victimage*.

Subsequently, open-coding was employed to identify and label recurring themes in the information that was directly related to the dams' failure but initially deemed as
irrelevant as it did not fit in one of the pre-existing categories. In this inductive process of data categorization, codes were not predefined but emerged from the data, which created a process of constant adaptation of the list of categories.

Four new categories were identified and colour-coded as follows: orange letters for *Immediate Support*, purple letters for *Recovery*, light-blue letters for *Non-Repetition*, and green letters for *Transparent Communication*. In order to increase reliability, the three reports were recurrently analysed and interpreted at different times and starting from different parts to determine whether the same code applied. Please see Appendix A, B, C, D, and E for the coded reports and company responses.

Fourthly, the new categories were compared with the original ones. *Immediate Support* and *Recovery* were clustered in a new category labelled as *Crisis Support*. Subsequently, all new categories were further clustered into one of SCCT's pre-existing four broader groups of strategies: *Deny, Diminish, Rebuild*, and *Bolstering*. Lastly, the final categories were compared, interpreted, and discussed in the light of the objective of the study.

Through this process, memo writing was employed to reflect on the categories and connect them to the research question. I refer the interested reader to Appendix F, G, H, and I to see the tables which portray the mental process I followed to code all statements. In them, I have employed the term "categories" to refer to crisis response strategies and "themes" to refer to the group of strategies.

Research Quality

In this final section, I judge the quality of this research. The trustworthiness of every research study must be evaluated in relation to the procedures used to generate the findings. However, the concepts used to describe trustworthiness differ between qualitative and quantitative research traditions (Graneheim & Lundman, 2004).

There is no consensus on which concepts should be used to judge the quality of research based on content analysis (Bengtsson, 2016). On the one hand, there is a group of scientists that employ the same criteria and concepts as for quantitative research: validity, reliability, and generalizability (e.g. Downe-Wambolt, 1992; Long & Johnson,

2000). On the other hand, another group defends the usage of other concepts and criteria which include: credibility, dependability, transferability, and confirmability (e.g. Graneheim & Lundman, 2004). In general, one can say that credibility corresponds to validity, dependability to reliability, and transferability to generalisation (Bengtsson, 2016). For this thesis, I have applied the second group of concepts.

Dependability

Dependability is the extent to which data change over time and the alterations made in the researcher's decisions during the analysing procedure (Lincoln and Guba, 1985, as cited in Bengtsson, 2016). Memo writing was used to reflect on codes and categories and connect them to the research question through the different stages of the coding process. This technique was used to keep track of all coding decisions, as re-coding and re-labelling were necessary during the process.

Credibility

Credibility refers to establishing how the data and the analysis procedures are carried out, and to ensure no relevant data have been excluded (Bengtsson, 2016). One way in which credibility can be increased is by getting agreement from co-investigators (Graneheim & Lundman, 2004). However, this was not a feasible option as I conducted this research alone. Nevertheless, I created tables where the process from raw data to results is presented transparently to increase the quality of the research. I refer the interested reader to Appendix F, G, H, and I to see the tables.

Another critical issue for achieving credibility is the selection of suitable meaning units. Meaning units which are too broad, such as paragraphs, are difficult to manage since they are likely to contain various meanings. There is always the risk of losing meanings of the text along the process of data analysis (Graneheim and Lundman, 2004). To reduce the effect that it might have in judging the credibility of the findings, I reduced my meaning units to sentences, or pieces of sentences if they represented multiple ideas.

Finally, credibility is also a question of how to judge the similarities within and differences between categories (Graneheim and Lundman, 2004). To increase the credibility of my process of categorization, I show representative quotations from the

transcribed text in the findings section.

Transferability

Transferability refers to the degree to which the results may apply to other research settings or groups (Polit & Hungles, 1999, as cited in Bengtsson, 2016). However, qualitative studies, especially those with small samples or single cases, may make generalisation problematic. Due to its characteristics, this research aims at internal generalisability as its purpose is to explain what is going on in this particular research setting, and not to produce a theory generalisable to all populations.

Nevertheless, further research could explore the robustness of the conclusions by exposing them to other research settings. In this regard, the categories that emerged as a result of inductive coding are made clear and transparent so that others may transfer the results of this study to other research settings.

Confirmability

The last criterion deemed relevant is confirmability. Polit and Beck (2006, as cited in Bengtsson, 2016) define confirmability as an issue of presentation which refers to the objectivity or neutrality of the data. As aforementioned, I recognize that this research is value-driven. In my attempt to minimise the potential bias, I have conducted different rounds of coding which were initiated on different days, and on different parts.

Findings

In this research, I have analyzed two cases of dam collapses involving the mining company Vale S.A, and which happened in the same area within a short period. The scope of this research was narrowed by focusing on two different means of communication: GRI reports, and company responses to allegations of human rights violations.

As presented in the literature review, Situational Crisis Communication Theory suggests four groups of strategies: *Deny, Diminish, Rebuild*, and *Bolstering*. These groups comprise ten crisis response strategies: *Denial, Scapegoat, Attack the Accuser, Excuse, Justification, Apology, Compensation, Reminder, Ingratiation*, and *Victimage* (Coombs, 20, 20).

2007). Appendix J includes a diagram which portrays the way in which crisis response strategies are grouped.

From this set of strategies, only seven are present in Vale's communicative choices regarding the Bento Rodrigues and the Brumadinho dam disasters. The following quotes on Table 1 exemplify how Vale employs SCCT's strategies:

"Vale clarifies that, according to the MPF (Federal Public
Prosecutor) complaint, the stated value is not based on the Samarco
dam accident, but rather on an unjustified comparison with the
Deepwater Horizon oil spill in the Gulf of Mexico." (Vale, 2016, p.
33)
"The dam had a Stability Condition Statement issued by TÜV SÜD
do Brasil, a company specializing in Geotechnics, dated June 13 and
September 26, 2018" (Vale, 2019, p. 11)
"The diagnosis carried out by a specialist consultancy (ACQUA
Consultoria) confirms that shoals of fish continue to live along Rio
Doce river." (Vale, 2016, p. 83)
"Considering the emergency character of the situation, Vale has
agreed to provide monthly payments – as emergency indemnification
- to the inhabitants of Brumadinho and the riverside from
Brumadinho to Retiro Baixo Hydroelectric Power Plan Dam, in the
municipality of Pompéu." (Vale, April 2019, p. 4)
"Vale apologizes to society and deeply regrets the 270 fatalities, of
whom two were young pregnant women and 11 victims have not yet
been located." (Vale, 2020, p. 14)
"It is also worth mentioning that from 2015 to 2019 Vale has
applied around 5 billion Brazilian reais in dam maintenance and
health and safety" (Vale, April 2019, p. 2)

Victimage (*Bolstering*)

"We know that our efforts will never be enough to bring back the lives that were lost, to compensate the people who have lost everything or almost everything, and to erase the impact on our employees and the communities neighbouring our dams, we are in mourning." (Vale, 2019, p. 10)

Table 1: Examples of Vale's usage of SCCT's strategies

In this research, I propose a revised and extended version of the list of crisis response strategies suggested by SCCT. Through the process of open-coding, I identified three new categories: *Crisis Support, Non-Repetition*, and *Transparent Communication*, not covered by Coombs (2007) or elsewhere in the literature on crisis communication. *Crisis Support* strategy encompasses two new sub-strategies: *Recovery*, and *Immediate Support*. As presented in the section of data analysis, these new categories emerged from the second round of coding which I conducted manually. These categories will be further explored in this section. Each new category was clustered within one of the four main groups of strategies. Appendix K presents an updated version of the diagram in Appendix J, but portraying the way in which these new strategies are integrated into SCCT's groups of strategies.

The following quotes on Table 2 exemplify how Vale employs the newly identified strategies:

Recovery (Crisis	"Implementation of actions that aim at recovery of impacted				
Support/ Rebuild)	economic and productive activities, such as agriculture, fisheries,				
	services and trade." (Vale, 2016, p. 84)				
Immediate	"Emergency construction works were ready stated in order to de-				
Support (Crisis	obstruct and rehabilitate the roads." (Vale, April 2019, p. 3)				
Support/					
Rebuild)					

Non-Repetition "The memorial will be a way of affirming the company's (Rebuild) commitment to "never forget Brumadinho" and never to repeat what happened." (Vale, 2020, p. 24)

Transparent Communication (Bolstering) "Periodic meetings were also held with communities, municipal authorities, state and federal governments, the environmental authorities, the Public Prosecutor Service, the Public Defender's Office and other responsible authorities, to provide clarifications and information about Samarco's action" (Vale, 2016, p. 82)

Table 2: Examples of Vale's usage of the new proposed strategies

This chapter is divided into four parts to presents the findings of the content analysis. This chapter will first discuss crisis response strategies employed by Vale in its GRI reports concerning each disaster. Subsequently, these strategies will be compared in order to present similarities and differences in the way Vale communicates in its sustainability reports. I draw this comparison to investigate whether the strategies used by Vale to communicate on the second dam collapse differ from the choices made to communicate on the first one.

Secondly, crisis response strategies employed in company responses to allegations of human rights violations are analysed. These strategies are also compared to present similarities and differences in the way Vale communicates through company responses to allegations. Once more, this comparison inquires whether the strategies employed when a company has a history of crises are different.

Thirdly, the strategies employed in GRI reports are compared and contrasted with the responses offered to allegations of human rights violations. I draw this comparison to contrast Vale's choice of response strategies to communicate on the same accidents, but through two different communication means. The objective of this comparison is to inquire whether the choice of a specific means of communication influences the usage of SCCT.

Lastly, I cite different quotes from Vale's GRI reports and company responses to allegations. The goal of this section is to explain the different ways in which Vale

employs each strategy. To do so, the different themes which were identified through the two rounds of inductive and deductive coding are presented.

The usage of crisis response strategies is presented through illustrative graphs. The relative frequency of each strategy was calculated in relation to the total amount of strategies employed to communicate on each of the disasters. This way, graphs provide a visual representation of the most used strategies by Vale.

Post-crisis Communication in Sustainability Reports

Bento Rodrigues Dam Disaster

Vale's GRI report from 2015 displayed a predominant usage of crisis response strategies belonging to the *Diminish* and *Rebuild* groups, which together account for more than 82% of the total amount of strategies employed to communicate on the Bento Rodrigues dam disaster. Particularly, *Rebuild* strategies predominate and represent 51.28% of the strategies. These types of strategies aim the improvement of stakeholders' impression of the organization:

"Proactively, Vale's PAEBMs (Tailings Dam Emergency Action Plan) are being revisited in order to incorporate the learnings accrued from the failure of Fundão dam, as well as results obtained in several discussions that the company has been promoting with the communities located near the dams, with the state and municipal Civil Defenses and regulatory agencies." (Vale, 2016, p. 81)

In the second place, *Diminish* strategies represent a 33.33%. The following statement exemplifies Vale's usage of a *Justification* in an attempt to minimize the perceived impact caused by the dam's collapse:

"The results of analyses Samarco commissioned from SGSGeosol Laboratorios, a company specializing in environmental and geochemical soil analysis, attests to the fact that the waste from the Fundão dams is characterized as not dangerous." (Vale, 2016, p. 83)

Secondary *Bolstering* strategies represent a 12.82% of the total, and *Deny* strategies were the least utilized, representing only 2.56% of the total amount of coded meaning units

referring to the first dam disaster. Figure 2 represents the relative frequency of each group of strategies in the GRI Report regarding the Bento Rodrigues Dam Disaster.



Figure 2: Relative frequency of strategies' groups in GRI Reports - Bento Rodrigues Dam Disaster

As aforementioned, *Rebuild* strategies are predominant in Vale's communication on the Bento Rodrigues Dam disaster through sustainability reports. Interestingly, if we break down each group of strategies, findings suggest a predominance of *Crisis Support* statements, followed by *Justifications*. Figure 3 represents the relative frequency of each crisis response strategy regarding the Bento Rodrigues Dam Disaster.



Figure 3 – Relative frequency of crisis response strategies in GRI Reports - Bento Rodrigues Dam Disaster

In further detail, findings suggest that 2.56% of crisis response strategies belonging to the *Deny* group corresponds uniquely to the strategy *Attack the accuser*. The 33.33% of *Diminish* crisis response strategies correspond to *Justifications* and *Excuses*, being the former more present. The 51.28% of strategies from the *Rebuild* type correspond to the strategies of *Compensation, Crisis Support,* and *Non-repetition*. Finally, *Bolstering* 44

strategies are uniquely displayed through Transparent Communication.

Particularly, the appearance of *Crisis Support* responses in the GRI report from 2015 was subdivided into two sub-strategies: *Recovery*, and *Immediate Support*. 69.23% of the sub-strategies composing the *Crisis Support* category correspond to *Recovery* responses, while the other sub-strategy is equally displayed, representing 30.77% each.

As aforementioned, the predominance of *Rebuild* strategies originates in the significant presence of the new strategies which I propose in this research: *Crisis Support* (*Recovery*, and *Immediate Support*), *Non-Repetition*, and *Transparent Communication*. To further confirm the importance of these new categories on the results, I re-calculated the relative frequency of the strategies if only deductive coding was conducted. In other words, I only took into account SCCT's original crisis response strategies presented by Coombs (2007). Figure 4 illustrates this comparison:



Figure 4 – Comparison of original SCCT strategies and my new suggested list of strategies in GRI Reports - Bento Rodrigues Dam Disaster

As this comparative figure shows, if Vale's documents were coded only to detect the presence of SCCT's original crisis response strategies, *Diminish* strategies would predominate. However, if the new strategies which I propose in this research are considered in the calculation of the relative frequencies, *Rebuild* strategies come to predominate. Therefore, this analysis suggests that the *Rebuild* and *Bolstering* nature of the new proposed strategies influence this research's findings. The causes and implications of this phenomenon will be further discussed in the discussion section of this research.

Brumadinho Dam Disaster

The aim of this research is not to compare communication tactics employed by Vale across different GRI reports, but to compare the crisis response strategies employed after each disaster. Therefore, all relevant statements from the 2018 and 2019 GRI reports regarding the Brumadinho Dam Disaster were analysed jointly.

Vale's GRI reports from 2018 and 2019 displayed a predominant usage of *Rebuild* strategies, which account for 80% of the total amount of strategies employed to communicate on the Brumadinho dam disaster. This suggests that Vale dedicated the majority of its communicative efforts in impressions management to enhance its reputation amongst its stakeholders:

"Focused on rebuilding people's lives and the territory, the company has been developing assistance programs, aiming to contribute so that communities can deal with the new reality, resume their routines and plan for the future." (Vale, 2020, p.17)

Secondary *Bolstering* strategies represented 11.58% of the total, being the second most frequent type of crisis response strategies. The *Diminish* group only represented 8.42%. Interestingly, no *Deny* strategies were employed, which importantly, indicates that the organization did not try to convince its stakeholders that there was no crisis. Figure 5 represents the relative frequency of each group of strategies in the GRI Reports regarding the Brumadinho Dam Disaster.



Figure 5: Themes Distribution in GRI Reports - Brumadinho Dam Disaster

Breaking down the composition of each group of strategies, the 8.42% of strategies belonging to the *Diminish* group correspond to *Excuses* and *Justifications*. The 80% of *Rebuild* strategies correspond to *Compensations*, *Apologies*, *Crisis Support*, and *Non-*

repetition. Crisis Support as a response strategy stands out from the other *Rebuild* strategies as it accounts for 37.89% of the total. Finally, 11.58% of *Bolstering* strategies are displayed through *Reminder, Victimage*, and *Transparent Communication* strategies. Figure 6 represents the relative frequency of crisis response strategies in GRI Reports concerning the Brumadinho Dam Disaster.



Figure 6 – Relative frequency of crisis response strategies in GRI Reports - Brumadinho Dam Disaster

The appearance of *Crisis Support* responses in the GRI reports from 2018 and 2019 was subdivided into two sub-strategies: *Recovery*, and *Immediate Support*. The most predominant sub-category is *Immediate Support*, which represents 63.89% of the *Crisis Support* strategy.

As with the Bento Rodrigues disaster, *Rebuild* strategies predominance in communication regarding the second crisis also originates in a significant presence of the new suggested strategies. Once more, to further confirm the importance of these new categories on the results, I re-calculated the relative frequency of the strategies if only deductive coding was conducted. In other words, I only took into account SCCT's original crisis response strategies presented by Coombs (2007). Figure 7 illustrates this comparison:



Figure 7 – Comparison of pre-existing and the new suggested list of crisis response strategies in GRI Reports - Brumdinho Dam Disaster

As this comparative figure shows, relative frequencies are slightly different if Vale's documents were coded only to detect SCCT's original crisis response strategies. Nevertheless, in both analyses crisis response strategies belonging to the *Rebuild* group are employed most. The causes and implications of this phenomenon will be further discussed in the following section of this research.

Changes in communication through sustainability reports

Findings suggest a trend in crisis response strategies to portray the organization as more positive when there is a history of crises. Figure 8 provides a visual illustration of the declines and increases in the usage of each group of crisis response strategies in sustainability reporting between crises:





The numbers indicate an increasing dominance of *Rebuild* strategies. Contrarily, the usage of the other crisis response strategies decreased, especially the usage of strategies belonging to the *Diminish* group. Interestingly, the limited usage of *Deny* strategies regarding the first dam disaster was not repeated in the second one.

Post-crisis Communication in Company Responses to Allegations of Misconduct

Bento Rodrigues Dam Disaster

Vale referred to the Bento Rodrigues dam collapse in both company responses which were analyzed. The statements show a predominant usage of crisis response strategies belonging to the *Rebuild* group:

"After the event the Fundação Renova was created under the observance of a public agreement among SAMARCO, Vale, BHP and public bodies of different federative levels. The foundation has already spent 745 million Brazilian reais in the Mediated Indemnifications Program and other 845 mi on Emergency Financial Support." (Vale, April 2019, p. 2)

Secondary *Bolstering* strategies represent 27.27% of the total. For instance, one of the *Bolstering* strategies which Vale employed was the following *Reminder*:

"It is also worth mentioning that from 2015 to 2019 Vale has applied around 5 billion Brazilian reais in dam maintenance and health and safety" (Vale, April 2019, p. 2)

The absence of *Deny* and *Diminish* crisis response strategies suggests that the organization dedicated all its communicative efforts in managing impressions to ensure stakeholders see the organization as more positive. Figure 9 represents the relative frequency of each group of strategies in company responses regarding the Bento Rodrigues Dam Disaster.



Figure 9 – Relative frequency of strategies' groups in Company Responses – Bento Rodrigues Dam Disaster

Breaking down the composition of each group of strategies, findings suggest that only three *Rebuild* strategies were employed: *Non-Repetition* (27.27%), *Compensation* (18%), and *Crisis Support* (27.27%). *Bolstering* strategies are uniquely displayed through *Transparent Communication* (9.09%) and *Reminder* (18.18%) strategies. Figure 10 represents the relative frequency of each group of strategies in company responses regarding the Bento Rodrigues Dam Disaster.



Figure 10 – Relative frequency of crisis response strategies in Company Responses – Bento Rodrigues Dam Disaster

The usage of *Crisis Support* responses can be subdivided into two sub-strategies: *Recovery*, and *Immediate Support*. 33% of the sub-strategies composing the *Crisis Support* strategy correspond to *Recovery* responses, while the other sub-strategy is displayed in 67% of the times a *Recovery* strategy is used.

In this case, I also re-calculated the relative frequency of the strategies if only deductive coding was conducted. In other words, I only took into account SCCT's original crisis response strategies presented by Coombs (2007). Figure 11 illustrates this comparison:



Figure 11 – Comparison of pre-existing and new suggested list of crisis response

strategies in Company Responses - Bento Rodrigues Dam Disaster

As this comparative figure shows, when coding is conducted taking into account the new proposed strategies, *Rebuild* strategies predominate over *Bolstering* ones. Once more, this result aligns with the previous comparisons which also display a major relative frequency of *Rebuild* strategies if the new strategies are taken into account. The causes and implications of this phenomenon will be further discussed in the following section of this research.

Brumadinho Dam Disaster

Vale's statements regarding the Brumadinho disaster through company responses display a predominant usage of strategies belonging to the *Rebuild* group, which represent 81.82% of the total amount of strategies employed to communicate on this dam disaster. These types of statements take, for instance, the shape of a *Compensation*:

"Considering the emergency character of the situation, Vale has agreed to provide monthly payments – as emergency indemnification – to the inhabitants of Brumadinho and the riverside from Brumadinho to Retiro Baixo Hydroelectric Power Plan Dam, in the municipality of Pompéu." (Vale, April 2019, p. 4)

Secondary *Bolstering* strategies represent 18.18% of the total, being the second most used type of strategy. In this context, the majority of *Bolstering* strategies enhance *Transparent Communication*:

"Finally, regarding the leverage of Vale's shareholders, business partners and suppliers it is important to restate that Vale is in constant dialog and open to contributions and inquiries from any shareholders and stakeholders including NGOs and social movements." (Vale, April 2019, p. 8)

The absence of *Deny* and *Diminish* crisis response strategies suggests that the organization dedicated all its communicative efforts in having stakeholders see the organization as more positive. Figure 12 represents the relative frequency of each group of strategies in company responses regarding the Brumadinho Dam Disaster.



Figure 12 – Relative frequency of strategies' groups in Company Responses – Brumadinho Dam Disaster

Breaking down the composition of each group of strategies, findings suggest that Vale employed all strategies from the *Rebuild* group. Particularly, *Compensation* and *Crisis Support* were the most used, representing a 36.36% each. The appearance of the *Crisis Support* strategy in company responses was uniquely displayed through statements of *Immediate Support*.

Bolstering strategies are mainly displayed through the strategy of *Transparent Communication*, which represents 15.15% of the total amount. *Reminder* only represents 3.03%. Figure 13 represents the relative frequency of each group of strategies in company responses regarding the Brumadinho Dam Disaster.



Figure 13 – Relative frequency of crisis response strategies in Company Responses – Brumadinho Dam Disaster

For the second dam disaster, I have also drawn a comparison of the relative frequencies of each group of strategies if only original SCCT's categories were employed in the first round of the coding process. Figure 14 illustrates this comparison:



Figure 14 – Comparison of pre-existing and the new suggested list of crisis response strategies in Company Responses - Brumdinho Dam Disaster

As this comparative figure shows, results analysing only pre-existing crisis response strategies suggested by SSCT's show similar relative frequencies. In both analyses, crisis response strategies belonging to the *Rebuild* group are the most employed. The causes and implications of this phenomenon will be further discussed in the following section of this research.

Changes in communication through company responses

Findings suggest a trend in crisis response strategies to portray the organization as positive when replying to allegations or accusations. Figure 15 provides a visual illustration of the declines and increases in the usage of each group of crisis response strategies in company responses.



Figure 15 – Comparison of groups of crisis response strategies in company responses

Findings suggest that the organization does not employ any *Deny* or *Diminish* strategy when replying to allegations or accusations. The numbers indicate an increase in the

usage of *Rebuild* strategies when referring to the second dam disaster. This increased usage of primary response strategies is compensated by a decrease in the usage of secondary *Bolstering* strategies.

Proactive vs. Reactive post-crisis communication

In this section, I present a comparison of Vale's post-crisis communication in both means of communication. Table 3 presents the variations in terms of relative frequencies that Vale's communication experiments between disasters:

	Deny	Diminish	Rebuild	Bolstering
Bento Rodrigues GRI	2.56%	33.33%	51.28%	12.82%
Brumadinho GRI	0%	8.42%	80%	11.58%
Variation GRI Reports	- 2.56%	- 24.91%	+ 28.72 %	- 1.24%
Bento Rodrigues Response	0%	0%	72.73%	27.27%
Brumadinho Response	0%	0%	81.82%	18.18%
Variation Company Responses	0%	0%	+ 9.09%	- 9.09%

 Table 3: Variations in the relative frequencies of crisis communication strategies

 between disasters

Findings suggest two similarities in the usage of the groups of strategies in sustainability reports and company responses. In both cases, there is a predominant use of *Rebuild* strategies, and the usage increases when referring to the second crisis. And in both cases, the usage of secondary *Bolstering* strategies decreases when there is crisis history. The main difference suggested by this display is the complete lack of usage of *Deny* and *Diminish* strategies in company responses.

Vale's Usage of Crisis Response Strategies in Practice

In this final part of the findings section, I present in detail each of the strategies that Vale has employed. This set of strategies include some from SCCT: *Attack the accuser, Excuse, Justification, Apology, Compensation, Reminder, and Victimage*; and the new

strategies that emerged from my manual process of open coding: *Crisis Support* (*Reminder*, and *Immediate Support*), *Non-Repetition*, and *Transparent Communication*. Quotes are presented as examples to familiarize the reader with the usage Vale made of each strategy.

Deny Strategies

Attack the Accuser

According to SCCT, crisis managers may employ a crisis response strategy consisting of *attacking the accuser* to have stakeholders see the crisis as less negative. This type of response is used to confront the person or group that is claiming something is wrong with the organization.

This particular crisis response strategy was the only one from the *Deny* cluster employed by Vale in its crisis communication. Nevertheless, its presence is minimal, as this response was only employed by the organization on one occasion. The Federal Public Prosecutor filed a Public Civil Action relating to Samarco's tailing dam accident which requested a payment of R\$155 billion distributed between different actors, including Samarco, Vale, and BHP Billiton Brasil Ltda. In its 2015 Sustainability Report, Vale employed this crisis response strategy in the following statement:

"Vale clarifies that, according to the MPF (Federal Public Prosecutor) complaint, the stated value is not based on the Samarco dam accident, but rather on an unjustified comparison with the Deepwater Horizon oil spill in the Gulf of Mexico." (Vale, 2016, p. 33)

Diminish Strategies

Justification

In order to have stakeholders see the crisis as less negative, a *Justification* may be employed as a crisis response strategy. According to SCCT, a *Justification* should be employed when the intent is to minimize the perceived damage caused by the crisis (Coombs, 2007).

Findings suggest that Justifications were only employed in crisis communication through

sustainability reports. This type of crisis response is mostly focused on impact minimization and usually takes the form of a statement intended at evincing the small scope of the damage caused by the crisis:

"Less than 1% of the river basin was affected by the accident." (Vale, 2016, p. 83)

"The Rio Doce river's water quality was compatible with results found before the mud plume of turbidity passed down the river." (Vale, 2016, p. 83)

In addition, *Justifications* may also take the form of a statement aimed at evincing the absence of harm or impact caused by certain consequences of the crisis:

"Studies were also carried out to evaluate the potential toxic effects of the tailings present in the water and sediments of the Paraopeba River, by means of analyses of labouratory organisms. Such analyses have not indicated toxic effects on the river water to date." (Vale, 2020, p. 28)

"The waste is mostly composed of silica (sand) arising from iron ore processing, and it does not contain any chemical elements harmful to health." (Vale, 2016, p. 83)

Excuses

Excuses are a type of crisis response strategy suggested by SCCT. Coombs (2007) indicates its usage when crisis managers intend to minimize organizational responsibility by denying intent to do harm and/or claiming an inability to control the events that triggered the crisis. This type of statement tends to explain the organizational accomplishments to prevent disasters, therefore excusing itself from the ability to control the event.

A recurring type of statements employed by Vale to communicate on the crises were those intended to enhance that proper prevention measures were taken and technical consultants were employed. Findings suggest that *Excuses* were only employed in crisis communication through sustainability reports. By employing *Excuses*, the organization emphasizes its inability to prevent the event, as no indicators were warning of the dam failure. The following examples illustrate these statements:

"Vale has never had a recommendation type 5 and currently has no recommendation

type 4. That is, there are only recommendations classified as programmable or of corrective maintenance and/or preventive character." (Vale, 2016, p. 81)

"We had complied with all procedures related to the safety of our operations, including conducting periodic onsite audits. But even so, due to causes that are being duly cleared, Dam I of the Córrego do Feijão Mine in Brumadinho failed." (Vale, 2019, p. 10)

Rebuild Strategies

Apology

Another approach to portraying the organization as less negative is to express regret through an apology. According to SCCT, *apologies* indicate that the organization takes full responsibility for the crisis and asks stakeholders for forgiveness (Coombs, 2007). Interestingly, clear and short apologetic statements were only employed in crisis communication related to the Brumadinho disaster. This type of statement was present in the 2019 sustainability report and in the company response from April 2019:

"We deeply regret the 270 lives lost due to the rupture of Dam I of the Córrego do Feijão Mine in 2019" (Vale, 2020, p. 66)

"On behalf of Vale we deeply regret the event" (Vale, April 2019, p. 1)

Compensation

SCCT defines *Compensation* as offering money or other gifts to the victims of a crisis (Coombs, 2007). *Compensation* statements were identified in all GRI reports and both company responses during the first round of deductive coding. The following examples illustrate some of these statements:

"In January 2016, each family with missing or deceased members due to the accident, received R\$100,000 (US\$31.6 thousand) in advance compensation payment from Samarco." (Vale, 2016, p. 82)

"Day-care center allowance of R\$ 920.00, to care for children up to three years old of deceased workers" (Vale, 2020, p. 26)

I have considered statements referring to donations as *Compensation* statements, as a donation could be on a level with a gift. The following example illustrates a *Compensation* statement concerning a donation:

"The donation in the amount of 100,000.00 Brazilian reais is intended for representatives of Vale's direct employees and contractors and members of the community that are missing or deceased." (Vale, April 2019, p. 3)

Crisis Support

Crisis Support responses are statements in which a company expresses the intention or action plan to support those affected by the crisis. The process of open-coding allowed for the identification of two types of statements that express the organization's interest in rebuilding the community and the region where the disaster took place. I have labelled these two sub-strategies as *Recovery*, and *Immediate Support*.

Recovery

Recovery responses refer to statements that enhance organizational efforts to rebuild the previous environmental conditions and the community affected by the crisis. This type of crisis response was employed in all sustainability reports and in the company response from June 2016. *Recovery* responses were employed either as a general statement of an intention or plan to restore the environment and the community or through the description of a concrete action that was being developed or was going to be developed.

Particularly, this group of statements is characterized by the usage of a set of terms that allow the reader to recognize the organization's intention to recreate the context prior to the crisis. These terms include restoration, regeneration, treatment, reconstruction, development, or refurbishment. The following examples illustrate some of these statements:

"On March 2nd, 2016, Samarco Mineração S.A (Samarco) and its two shareholders, Vale (Vale) and BHP Billiton Brasil LTDA (BHPB Brasil), have entered into an agreement with the Federal Government, represented by the Attorney General of Brazil, the States of Espírito Santo and Minas Gerais and certain other public authorities (Brazilian Authorities) for the restoration of the environment and communities affected by the Samarco dam failure on November 5th, 2015 ("Agreement")." (Vale, June 2016, p. 5)

"Vale also plans to replenish the local flora, through reforestation and environmental reintegration in the impacted area." (Vale, 2020, p. 32)

"Implementation of actions that aim at recovery of impacted economic and productive activities, such as agriculture, fisheries, services and trade." (Vale, 2016, p. 84).

Immediate Support

This third subcategory includes statements which indicate that material or moral support is provided by the organization as emergency assistance right after the crisis. *Immediate support* statements were identified in all GRI reports and both company responses during the second round of inductive coding. These statements are mostly descriptive and explain the organization's assistance and support measures and the management of provisions immediately after the accident. The following examples illustrate some of these statements:

"The company has provided human and material resources, such as helicopter and emergency equipment, to support Samarco in the rescues, water distribution and removal of the risky places for people displaced by the accident." (Vale, 2016, p. 82)

"Immediately after the rupture of the dam, we began providing assistance in the form of shelter, psychological help, medical care, infrastructure repair, transport to move displaced people at risk to shelters and hotels, rescue of and veterinary care for animals." (Vale, 2019, p. 10)

"In November 2015, Vale started emergency additional support to the Indigenous People Krenak focused on water supply among other inputs in order to minimize the immediate effects resulting from the Fundão Dam accident." (Vale, June 2016, p. 6)

Some *Immediate Support* statements may include references to monetary assistance. However, this one differentiates from *Compensation* statements aim to offer reparation to the victims for the physical or moral damage caused, while monetary assistance as immediate support aims to support and assist with emergency issues such as rescuing injured people or helping families cope with all extraordinary costs in which they may incur after the dam failure. The following statements exemplify *Immediate Support* statements which reference money and/or payments:

"Funeral assistance to the victims' families, in the amount of R\$ 3,928.34, in addition to payments to cover notary fees, body transfers, urns, ornaments, graves, burial services and other expenses." (Vale, 2019, p. 13)

"BRL 2.6 million transferred to the City of Brumadinho to purchase of emergency equipment and hire health and psychosocial professionals, among others" (Vale, 2020, p. 27)

Non-Repetition

The process of open-coding allowed for the identification of *Non-Repetition* crisis responses, which are in statements that express the organization's commitment to avoid the repetition of a similar event in the future and presents actions taken to ensure this. This type of response was employed in all GRI reports and both company responses. I decided to cluster it under the group of *Rebuild* strategies because it is a type of statement that is usually paired with an *Apology*.

The major part of this type of statements were explanations of how the organization is going to intensify its preventive and security measures, including changes in its risk management policy. These types of indirect statements express the organization's intention to change and improve its practices to avoid future disasters. The following examples illustrate some of these statements:

"After the accident in Mariana (MG), to bring greater comfort to society, Vale carried out a detailed extraordinary verification of the structural conditions of all its tailings dams" (Vale, 2016, p. 81)

"In all Vale structures, the frequency of monitoring safety variables and stability inspections were intensified to strengthen preventive and corrective actions in a timely manner" (Vale, 2019, p. 21)

These statements may also express the organization's adoption of new practices to avoid the occurrence of a similar event:

"We anticipated the implementation of the Geotechnical Monitoring Centre (CMG) at the Águas Claras Mine in Nova Lima, Minas Gerais, responsible for monitoring 24 hours, seven days a week all upstream and some conventional dam structures by means of big screens." (Vale, 2019, p. 21)

Finally, *Non-Repetition* responses also took the form of short statements which directly express the organization's commitment to avoid similar events in the future:

"Vale adopted a set of measures after the Fundão dam break in Mariana, in 2015, aiming to prevent the occurrence of a similar event in its direct operations." (Vale, April 2019, p. 1)

Bolstering Strategies

Reminder

According to SCCT, *Reminders* are employed to tell stakeholders about the past good works of the organization to have them see the organization as more positive (Coombs, 2007). This type of response was employed in the sustainability reports dealing with the second disaster and in both company responses. The following examples illustrate some of these statements:

"Over the last few years, several investments were made in other community safety initiatives." (Vale, 2019, p. 27)

"It is also worth mentioning that from 2015 to 2019 Vale has applied around 5 billion Brazilian reais in dam maintenance and health and safety" (Vale, April 2019, p. 2)

Victimage

According to SCCT, crisis managers employ *Victimage* as a crisis response to remind stakeholders that the organization is a victim of the crisis too (Coombs, 2007). This type of response was not employed by Vale recurrently. Concretely, it was only employed in two statements of the 2018 Sustainability Report referring to the Brumadinho accident.

When the dam failed, Vale and third-party employees were working on the maintenance of the dam. Furthermore, part of the tailings spread reached the operational and administrative areas of the dam, taking employees' lives and destroying different infrastructures from Vale. The direct impact of the dam failure on Vale's human and material resources was presented by Vale through the following *Victimage* responses:

"We know that our efforts will never be enough to bring back the lives that were lost, to compensate the people who have lost everything or almost everything, and to erase the impact on our employees and the communities neighbouring our dams, we are in mourning." (Vale, 2019, p. 10)

"At 12:28 p.m. on January 25, 2019, Dam I of the iron ore tailings of the Córrego do Feijão Mine collapsed. In just over three minutes, most of the 11.7 million cubic meters of tailings spread over approximately 295 hectares, reaching the operational and administrative areas of the mine, where about 600 of our own employees and those of third-party suppliers worked. Offices, maintenance workshops, locker rooms, refectory, mill, and loading terminal, among other structures, were impacted by the tailings." (Vale, 2019, p. 11)

Transparent Communication

Through the process of open-coding, I identified different statements which aimed at transparency to bolster the organizational image and have stakeholders see the organization as more positive. *Transparent Communication* is a crisis response strategy employed when the organization enhances the transparency of its organizational practices. This type of response is present in all sustainability reports and both company responses. It is mostly displayed through different types of statements. Some statements highlight the transparency of Vale with affected populations and affected stakeholders:

"All projects may be accompanied by the affected populations, there will be external audits and an ombudsman to serve the community." (Vale, 2016, p. 83)

Other statements intended to highlight Vale's transparency by enhancing the availability of organizational documents related to the dam failures:

"The official list of beneficiary families has been validated by the Civil Defense and is 62

available on Vale's website." (Vale, 2019, p. 12)

"The registry for receiving these donations began on February 11th, 2019 observing the widely publicized criteria also available in Vale's website" (Vale, April 2019, p. 4)

Vale's collaboration with the authorities investigating the dam failures was also expressed:

"In all cases, the company has contributed proactively with the inspection agents, promptly submitting the documents requested and attending to any recommendation and/or demand set during inspections and surveys." (Vale, 2016, p. 82)

"Moreover, Vale has widely collaborated with all investigations voluntarily handing information, registries and files to the authorities as well as determining that all employees openly collaborate with the authorities." (Vale, April 2019, p. 7)

Finally, this type of response could also take the form of a statement mentioning that Vale's practices are transparent:

"The open, transparent and clear dialogue was and continues to be a guide for performance within a continuous learning cycle." (Vale, 2020, p. 17)

"Samarco opened a channel for the public aiming to clarify, in a transparent manner, all the details about the case." (Vale, June 2016, p. 1)

Summary of the Findings

In this research, I have analysed two cases of dam collapses involving the same company, and which happened in the same area within a short period. This offers a very unique test case to analyse how crisis communication strategies evolve. The scope of this research was narrowed by focusing on two different means of communication: GRI reports, and company responses to allegations of human rights violations. First, I have analysed Vale's communication on the Bento Rodrigues and the Brumadinho dam disasters through GRI reports. Subsequently, I have run the same analysis but on company responses to allegations of human rights violations.

As aforementioned, SCCT suggests a list of strategies which managers may employ to

communicate on crises. Strategies are categorized into four groups: *Deny, Diminish, Rebuild*, and *Bolstering*. In this research, I propose new additions to these groups, which emerged from my analysis of data. On the one hand, *Transparent Communication* emerged as a new *Bolstering* category.

On the other hand, *Non-Repetition* and *Crisis Support* emerged as new strategies which I have placed in the *Rebuild* group of strategies. The latter one is sub-divided into two strategies: *Recovery*, and *Immediate Support*. As previously presented in the findings section, Figure 3 provides a visual representation of the updated groups of crisis response strategies. The new strategies and sub-strategies emerged from a process of open-coding. I conducted this process manually where I sensed certain themes emerged that initially did not seem relevant because they did not fit in one of SCCT's pre-set list of categories.

The first objective of this research is to investigate the strategies used by Vale in its sustainability reports to communicate on both dam disasters. Findings suggest a predominant usage of *Rebuild* strategies in both cases. However, as highlighted, this is due to a predominant usage of the new strategies that emerged from the inductive process of coding: *Crisis Support (Immediate Support, and Recovery), Non-Repetition, and Transparent Communication.*

As presented in the literature review, SCCT proposes a set of suggestions regarding the usage of crisis response strategies, particularly when there is a history of crises. To inquire whether these suggestions were followed, I have drawn a comparison of the communicative strategies employed by Vale in its GRI reports to communicate on each of the dam disasters. Findings suggest a significant increase in the usage of *Rebuild* strategies to communicate on the second dam disaster, in relation to the first one. This increase is explained by a decrease in the *Deny*, *Diminish*, and *Bolstering* groups of strategies.

Subsequently, I have drawn the same analysis to company responses to allegations of human rights violations. Findings suggest a predominant usage of *Rebuild* strategies to communicate on both dam disasters. Once more, the usage of *Rebuild* strategies

increases when there is crisis history. In other words, Vale uses *Rebuild* strategies with more frequency when communicating on the second disaster. An interesting finding from this research is the complete lack of usage of *Deny* and *Diminish* strategies in company responses to allegations.

Finally, I have drawn a comparison of the results obtained in the GRI reports and company responses in order to explore whether the choice of a specific mean of communication influences the usage of SCCT's strategies. As aforementioned, findings suggest two similarities in the usage of the groups of strategies in sustainability reports and company responses. In both cases, there is a predominant use of *Rebuild* strategies, and the usage increases when referring to the second crisis. And in both cases, the usage of secondary *Bolstering* strategies decreases when there is crisis history. The main difference suggested by this display is the complete lack of usage of *Deny* and *Diminish* strategies in company responses. The implications of this will be discussed in the following section of this research.

Discussion

This study examined the communicative choices made by the Brazilian extractive company Vale to communicate on two similar crises: The Bento Rodrigues dam disaster, and the Brumadinho dam disaster. Particularly, this research aims to answer the research questions:

RQ1: How did Vale employ crisis response strategies to communicate on the Bento Rodrigues and the Brumadinho dam disasters?

RQ2: What can we learn from Vale's usage of crisis response strategies in two mining crises?

This section reflects on the conducted data analysis in relation to my research questions. First, I will discuss how Vale and its stakeholders framed the dam disasters and Vale's practical usage of crisis response strategies in comparison with SCCT theory. Subsequently, I will discuss the nature and role that the new strategies and sub- strategies have in relation to previous research on sustainability and crisis communication. Finally, I will present contributions and "lessons" that could be learned from Vale's usage of crisis response strategies in two mining crises.

Rebuilding organizational reputation through company responses

Communication on a mining disaster

To assess the extent to which SCCT's suggestions were followed, it is necessary to discuss how Vale frames the disaster. It could be argued that Vale frames the Bento Rodrigues dam disaster from 2015 as a technical-error accident, enhancing that a technical or equipment failure was the cause of the accident, and therefore implying that organizational actions leading to the crisis were unintentional.

According to SCCT, *Diminish* crisis response strategies can be used to reaffirm that a crisis resides in the accidental crisis. In addition, framing a crisis as an accident could result very effective as psychological research demonstrates that people are more willing to forgive trust violations related to competence (accidental acts) than those related to integrity (intentional acts) (Coombs, 2015). However, although *Diminish* strategies are employed in Vale's 2015 Sustainability report, these are not the predominant ones. Moreover, Vale's usage of *Diminish* crisis response strategies disappears in the responses to accusations of human rights violations. In both means of communication, *Rebuild* strategies are the predominant ones. This could be explained by an adjustment of Vale's frame to the stakeholders' one.

Existing research on agenda setting and reputation suggests that media coverage or internet discussion can help establish a frame (Carroll, 2004, as cited in Coombs, 2007). Besides, Coombs (2007) suggests that *Deny* and *Diminish* claims may fail when the news media or people posting messages online reject the managers' frame and continue understanding reality under their frame. Allegations or accusations found in the BHRRC are messages posted online which do not necessarily frame reality as Vale's managers would like them too. Hence, the BHRRC is a good source for managers to sound out how stakeholders are framing the crisis.

As presented in the introduction, it becomes clear that stakeholders frame the Bento Rodrigues dam disaster as a preventional crisis. Thus, Vale's adjustment of strategies in its company response seems adequate as the level of crisis responsibility, and potential reputational damage, is higher than the organization may have originally expected from what Vale portrayed as an accident.

Lastly, another reason that could explain Vale's predominant usage of *Rebuild* strategies to communicate on the first disaster is the history of its sector. According to Coombs, Frandsen, Holladay, and Johansens (2010), there are crisis-susceptible organizations that are prone to have a history of crises.

Academic literature, investigative reports, governments, NGOs, and other stakeholders have repeatedly drawn attention towards the impact of the operations of various extractive companies around the world such as BP, Barrick Gold, or Shell, among others. For most of its history, the mining industry has taken a devil-may-care attitude to the environmental and human rights abuses in its areas of operation (Jenkins, 2004, as cited in Sethi, Martell, & Demir, 2016).

SCCT suggests the usage of *Rebuild* strategies for accidents of organizations with a history of crises. Using the same type of strategies seems like a safe option to control the reputational damage of a crisis for organizations belonging to a sector which itself has a history of environmental and human rights abuses.

This is supported by Ericsson (2008, as cited in Fonseca, McAllister, & Fitzpatrick, 2014) who argues that the resulting publicity from anti-mining campaigns inevitably damages the industry's reputation. Because large mining corporations have become responsible for more than 80% of the world's non-fuel mineral production, the reputational problems arising from anti-mining campaigns are often associated with these corporations. This could explain Vale's predominant usage of *Rebuild* strategies to communicate on the first crisis.

Communication after two crises

It is harder to assess whether Vale clustered the Brumadinho dam disaster from 2019 as one belonging to the accidental or the preventional cluster. Vale's GRI reports from 2018 and 2019 do not employ the word "accident" to refer to the dam collapse. When talking about the disaster, the words used are "rupture", "failure" or "collapse". Therefore, although Vale avoids attributions of organizational negligence, it did not put as much emphasis on highlighting a possible accidental nature or in diminishing the effects of the second dam failure. Instead, it focused on having stakeholders see the organization as less negative through *Rebuild* crisis response strategies, as SCCT suggests.

As accidental crises paired up with crisis history produce higher attributions of crisis responsibility, Vale could prevent the fact that stakeholders were going to frame the crisis as a one that could have been prevented. Interestingly, Conectas' accusation of negligence took place in April 2019, a year before Vale published the 2019 sustainability report.

This allowed Vale to sound out that stakeholders were indeed framing the second disaster as a preventional crisis. As it was presented in the findings section, the usage of crisis response strategies to communicate on the second dam disaster further supports the idea that Vale distanced itself from the accidental frame and used the resources proper to manage a preventional crisis.

What did Vale change in terms of communication over the years?

When choosing to analyze two similar mining disasters that took place in different years, the intention was to explore whether Vale changed something in terms of post- crisis communication. After conducting the data analysis, it becomes clear that Vale tends to portray the organization as more positive when communicating on the second crisis. This is done through increased usage of *Rebuild* strategies both in sustainability reports and in the company response referring to the Brumadinho dam disaster. Particularly, Vale doubled the usage of *Non-Repetition* statements between crises and employed apologetic statements only in communication related to the second disaster.

As aforementioned, another significant change in Vale's communication through crises is the usage of the word "accident". While Vale employs this word significantly in the sustainability report of 2016, they are careful to use other words to refer to the second dam failure. While this doesn't seem to be a coincidence, it could be argued that Vale learned that clearly expressing your managerial frame (for instance, by referring to the disaster as an accident) may be contraindicated if you haven't sounded out the stakeholders' frame first. This is further supported by the different usage of strategies that Vale employs in each mean of communication. Compared to sustainability reports, Vale eliminated the usage of *Deny* and *Diminish* strategies in company responses. This could indicate that Vale learned that the usage of these strategies is not useful if stakeholders are not willing to adopt the no crisis frame or an accidental frame.

As presented in the literature review, early work by Coombs (1998) and Coombs and Holladay (2002) placed crisis response strategies along a continuum that ranges from defensive (putting organizational interests first) to accommodative (putting victims concerns first). In the same way, I believe primary groups of crisis response strategies could be placed in a similar continuum that ranges from *Deny* (defensive) to *Rebuild* (accommodative) strategies. *Diminish* strategies would be placed at a medium stance.

Overall, this research's findings place Vale's post-crisis communication on the accommodative side of the spectrum. This aligns with Coombs (2015) suggestion that crisis managers should employ the most accommodative strategies possible for crisis with a high level of crisis responsibility.

As aforementioned, I am aware that another reason why *Rebuild* and *Bolstering* strategies predominate is the nature of the new categories that emerged from the process of open-coding. The fact that the new proposed strategies belong to the *Rebuild* and *Bolstering* groups of strategies decreases the relative frequency that *Diminish* and *Deny* strategies represent over the total.

This tendency is further supported by the fact that *Deny* and *Diminish* strategies are not used at all in post-crisis communication through company responses. The following section will explore in detail the three new strategies and two sub-strategies that Vale has consistently employed in its post-crisis communication.

Expanding crisis response strategies

Originally, SCCT suggests four groups of crisis response strategies aimed at reputational repair: *Deny, Diminish, Rebuild*, and *Bolstering*. These strategies seek to reduce the negative effects a crisis has on the reputation and related assets of an organization

(Coombs, 2015). In total, Coombs (2007) presented a list of ten crisis response strategies. During the manual process of open-coding, three new strategies and two sub-strategies emerged. Interestingly, all the new strategies belong to the *Rebuild* and *Bolstering* groups, which has an impact on the results of this research.

Crisis Support

Immediately after starting the process of deductive coding, I noticed that SCCT's strategies of *Apology* and *Compensation* did not capture all statements that Vale employed to manage stakeholders' impressions and have them see the organization as more positive. According to Coombs (2007), *Compensation* is employed to offer money or other gifts to victims.

While this is one clear *Rebuild* strategy, I observed that, in addition to money or gifts, the company offered immediate emergency support and/or recovery programs to bring the previous environmental and social conditions back. From this observation, two new strategies emerged: *Immediate Support* and *Recovery*.

Due to its similar nature, I have designated *Immediate Support* and *Recovery* as substrategies of a broader strategy which I have named *Crisis Support*. Cambridge Dictionary defines the verb support as "to help someone emotionally or in a practical way" ("Support", n.d) or as "to provide the right conditions, such as enough food and water, for life" ("Support", n.d). I believe these two definitions englobe the essence of the *Crisis Support* strategy, which I have defined as: statements in which a company expresses the intention or action plan to support those affected by the crisis.

According to SCCT, a *Rebuild* strategy is best suited when a crisis is paired up with crisis history or when a crisis is framed within the preventional cluster. Though, the usage of the *Crisis Support* strategies has proved to be very present in Vale's post-crisis communication on both disasters. This is supported by this research's findings, which suggest that *Crisis Support* is the most used strategy in all analyzed documents.

Vale disseminates information about negative incidents, in this case, dam collapses, through the explanation of corporate actions taken to solve or reduce the issue or prevent

its occurrence in the future. This usage of *Rebuild* strategies aligns with suggestions from the existing literature. Reimsbach and Hahn (2015) argue that presenting this information can be a substantial legitimation approach.

Besides, the usage of this strategy also aligns with signalling theory which suggests that the disclosure of negative incidents might be regarded as a positive signal in terms of proactivity and awareness of risks, which would help avoid similar issues in the future (e.g. Yang, 2007, as cited in Hahn & Lülfs, 2014).

Vale's usage of *Crisis Support* strategies exemplifies how organizations may seize the positive side of a crisis by showing active involvement in confronting the negative effect of their actions. It could be argued that although these strategies are not directly targeted at decreasing attributions of crisis responsibility like *Diminish* strategies are, they may reduce the reputational threat that a crisis inflicts to an organization and its legitimacy if this one is portrayed as having a conscience. As Yang (2007, as cited in Hahn & Lülfs, 2014) posits "strategic communication means not to hide bad information, but to disclose it in a way that is conductive to its solution" (p. 83).

Moreover, Vale complements the usage of *Crisis Support* statements by offering a substantial amount of information regarding the development of recovery and compensation programs through the company's webpage and the Fundao Renova. This practice is a way for Vale to prove that *Rebuild* strategies are more than statements of intention, which may increase the credibility of future *Rebuild* stratements to communicate on other crises. Overall, previous research suggests that substantive strategies that link communicative discourses to actual behaviours seem to be better suited to gaining legitimacy, or in the case of a crisis, to restore it (Hahn & Lülfs, 2014).

However, crisis managers should keep in mind that *Rebuild* strategies may be regarded as statements of intention to manipulate the reader's attention to focus on the positive aspects to conceal the negative ones. Furthermore, it can play against an organization if stakeholders perceived this as intent from the organization to manipulate their perceptions (Hahn & Lülfs, 2014). This could happen if the statements are an unprecise provision of ideas or intent.

Non-Repetition

During the process of open-coding, I also detected specific statements designated to guarantee the non-repetition of the events. I have defined *Non-Repetition* crisis responses as *statements that express the organization's commitment and the actions taken not to repeat the event that caused the crisis.*

As aforementioned, I included this strategy within the *Rebuild* group of strategies, as it is normally combined with an *Apology*. I believe *Non-Repetition* is a strategy that can complement an *Apology* and increases the credibility of this one by going beyond the present regret to a future compromise of never repeating the same.

Findings suggest that this type of crisis response strategy is especially relevant in communicating when there is a history of crises. The usage of this strategy doubled its presence in sustainability reports regarding the Brumadinho disaster in terms of relative frequency.

This suggests that statements that show the organization's commitment to avoid the same incident in the future are especially relevant when there have been other incidents in the past. Crisis history creates higher attributions of crisis responsibility in new disasters, and as organizations have less reputational capital to spend every time, *Non- Repetition* can be used to present an organization's compromise to avoid future harm, which enhances the idea that an organization has a conscience.

Nevertheless, from a critical perspective, the usage of *Non-Repetition* may be perceived as an admission of guilt. As aforementioned, researchers suggest that an apology may not always be the best crisis response strategy an organization can give, as it may be perceived as an admission of guilt (Coombs, 1998). Similarly, the usage of *Non-Repetition* indirectly implies that an organization takes responsibility for the disaster. This consideration should be specially taken into account if an organization is trying to communicate that they have no connection to the crisis, or if they are trying to detach
themselves from it.

Finally, I would like to point out that previous research by Coombs (1998) and Coombs and Holladay (2002) mentioned a strategy named *Corrective Action*, which was defined as a strategy employed when "managers seek to repair the damage from the crisis, take steps to prevent a repeat of the crisis, or both" (Coombs 1998, p.180).

However, this strategy is not included in the updated list of strategies that Coombs (2007) proposed later on. Other scholars have proposed crisis communication strategies which are similar to *Non-Repetition*. For instance, Benoit's (1997) integrative theory of image restoration which included *Corrective Action*, a strategy which can take the form of restoring the state of affairs existing before the offensive action, and/or promising to prevent the recurrence of the offensive act.

While these authors' definitions mix recovery actions and non-repetition measurements, I believe the two types of statements indicate different organizational commitments. While statements of *Crisis Support* tend to specify actions taken to reestablish the environmental and social conditions prior to an accident, *Non-Repetition* usually takes the form of broad statements of intention.

Transparent Communication

The last category that emerged from open-coding is *Transparent Communication*, which I have placed within the group of *Bolstering* strategies. I believe this strategy complements primary crisis response strategies by enhancing positive aspects of the organization. Vale's usage of this strategy is key to enhance organizational transparency and accountability, which satisfies the public's appetite for information.

Bansal and Kistruck (2006) highlighted that the opacity and uncertainty surrounding environmental issues seems to incite organizations to make a symbolic commitment and focus on impression management rather than substance. However, a discrepancy between environmental claims and environmental behaviour may backfire, especially in the presence of vigilant NGO's. Therefore, the emergence of *Transparent Communication* as a crisis response strategy could be explained by the current business environment in which organizations are constantly under public scrutiny as stakeholders develop comparisons of an organization's communication and its real practices.

In the current business environment, environmental disasters of the size of Bento Rodrigues and Brumadinho rapidly reach the public scope, which submits an organization's sustainability statements to public scrutiny. In this context, making pure symbolic commitments puts the organization's reputational and legitimacy under an important risk. Therefore, using *Transparent Communication* as a crisis response strategy is a way to overcome part of the information asymmetries between organizations and external stakeholders, which may function as a key resource to counteract the potential reputational threat of a crisis.

The usage of this strategy allows the public to know what is happening while providing them resources to confirm or de-confirm the provided information. Crisis managers should be aware that statements of *Non-Repetition* or *Crisis Support* may be considered as insufficient by a report's readers if they are unspecific. This is exemplified by the accusations of human rights violations, which normally ask for further explanations on an organization's practices or commitments. This was the case with Vale's accusations of human rights violations. In its response, Vale increased the usage of *Transparent Communication* statements. Using this strategy can avoid stakeholders' accusations of strategic omission or disclosure of non-compliant information.

Previous research proves that for organizations that want to use green positioning as an organization asset, only honest and transparent communication about environmentally friendly behavior pays-off (De Jong, et al., 2020). Based on this, I believe *Transparent Communication* to be a beneficial crisis communication strategy in all contexts.

It renders a function as a *Bolstering* strategy by complementing and accompanying *Rebuild* statements so the organization distances itself from possible accusations of greenwashing. This is supported by Lyon and Maxwell (2011) previous research which argues that the only way an organization can benefit from its environmental friendly performance is by being completely honest and transparent about it.

Moving away from defensive strategies

Beyond the general contribution of this research in understanding the usage of crisis response strategies in practice, I have noted another trend as being of particular interest. That is the little presence of defensive strategies in Vale's post-crisis communication.

As aforementioned, Vale's post-crisis communication is characterized by a significant predominance of accommodative strategies over defensive ones. Particularly, *Deny* strategies are only used in one statement. Interestingly, this tendency has been observed in another major environmental crisis: the Deepwater Horizon incident. Research by Harlow and Harlow (2013) show that BP's response in press releases throughout the crisis focused on describing compensation to the victims and efforts to remedy the problem while there was no apparent attempt to blame another party, nor to minimize the crisis.

I believe the usage of *Deny* and *Diminish* strategies is a risky strategy in the current business world. Nowadays, stakeholders demand organizations to be accountable and responsible for the community, even if the event was an accident. Despite the nature of the disaster, companies are expected to take corrective action. This aligns with Coombs' (2015) suggestion that public safety and welfare must be shown as the organization's top priorities, even for crises with minimal attributions of responsibility.

I believe that a lack of intentionality in a crisis does not imply that companies can wash their hands of the matter and detach themselves from the accident. Therefore, using *Deny* and *Diminish* strategies may backfire, for instance, if the use of these strategies is understood as greenwashing practices.

Finally, I believe another factor that makes the usage of *Deny* and *Diminish* strategies hazardous is the global institutional context in which companies operate. From a sociological view, reputations are indicators of legitimacy. Specifically, they are an aggregate assessment of a firm's performance in relation to expectations and norms in an institutional field (Fombrun & Van Riel, 1997).

Nowadays we are living a 'glocal' environmental movement, a movement that does not only defend local livelihood, culture, and environment but is also a matter of justice claims and global environmental values (Urkidi, 2010). For multinationals, strategic management of stakeholders requires a broader scope, encompassing concerns from groups all around the world.

This puts organizational activities under constant scrutiny by a broad number of international watchers such as NGOs, the Business and Human Rights Resource Center, or the OECD Watch. And when observers are faced with incomplete information about firms' actions, they rely on evaluative signals presented by actors of the organizational field such as market analysts, professional investors, or reporters (Abrahamson & Fombrun, 1992).

Therefore, I believe the usage of defensive strategies, especially *Deny strategies*, might be a risky practice when different trusted actors are constantly monitoring your performance. This is further supported by Coombs (2015) whom himself points out the critical caution of the *Denial* strategy. According to the author, if an organization uses denial and is later found to bear any responsibility, the damage inflicted upon the organization is intensified. Furthermore, Grebe's (2013, as cited in Coombs, 2015) research which found that scandals can easily descend into a secondary or "double crisis" if incorrectly managed.

What can we learn from Vale's usage of crisis response strategies in two mining crises?

I conclude this discussion by exploring the implications of this research. The nature of the new strategies and the observed predominant usage of accommodative strategies over defensive ones by Vale may demonstrate an increasing preference for communicating open and transparently, expressing commitment to not repeat the events, and explaining how crisis damage is going to be managed. As discussed, this aligns with previous research findings and suggestions on the communication of sustainability performance.

Furthermore, it may also demonstrate an increased preference for assuming the highest level of attributions of crisis responsibility and the reputational threat of a crisis. This way, if stakeholders frame a crisis as one of the preventional kind, the organization is ready to cushion the reputational damage of it. Contrarily, if stakeholders accept the accidental frame, organizations will benefit positively from the predominant usage of *Rebuild* strategies.

As aforementioned, reporting on negative issues can turn positive if stakeholders perceive it as an organizational effort to repair the negative impact of their activities (Hahn and Lülfs, 2014). *Crisis Support* strategies function as an approach to show active involvement in the negative effect of your business activity, even if this one is unintentional.

Even if you want to minimize attributions of crisis responsibility through *Excuses* or *Justifications*, using *Crisis Support* strategies is an interesting way to portray your organization as one having a conscience and avoid a higher reputational damage by making amends for the damage that an organization directly or indirectly caused.

Finally, I would like to point out how managing post-crisis communication through platforms like the Business and Human Rights Resource Center may be interesting for an organization. This particular platform allows individuals to directly confront organizations about aspects of their sustainability performance. And as reputations are evaluative, it allows an organization to get an insight into how respected stakeholders or international watchers are framing a crisis. As these actors' frames are likely to be adopted by the majority of stakeholders, an organization may consider managing a crisis within their frame, rather than attempting to impose another one.

Contribution

This master thesis contributes to the literature on situational crisis communication theory. However, this research does not intend to represent best practices but rather insights regarding the practical usage of crisis response strategies. First, this research evidences that Vale did not match crisis types to SCCT's recommended usage of crisis response strategies. Although SCCT developed a set of evidence-based guidelines, only a few case studies have contributed to understanding whether companies' practices match theory (e.g. Fussell Sisco et al., 2009; Richards et al., 2017).

Second, this research contributes to the existing list of crisis response strategies employed by organizations in their post-crisis communication. As presented in previous sections, I suggest the incorporation of three new strategies and two sub-strategies that Vale has consistently employed in its post-crisis communication: *Non-Repetition*, *Transparent Communication*, and *Crisis Support* (which includes the sub-strategies *Recovery* and *Immediate Support*).

Conclusion

The purpose of this research was to investigate Vale's usage of crisis response strategies to communicate on two mining disasters. In this case, two dam failures in the Brazilian state of Minas Gerais. Particularly, I examined and calculated the relative frequency of the specific strategies that Vale employed to communicate on each of the disasters. Furthermore, I discussed the particularities of Vale's post-crisis communication in light of previous research.

Although my intention is not to generalize across broad populations, I intended to inform practice via identifying "lessons" that may be relevant and useful to other practitioners dealing with crises. With this, I hope to contribute to painting a greater picture of the practical usage of crisis response strategies in post-crisis communication.

In order to answer my research questions, I conducted two rounds of inductive and deductive content analysis on three sustainability reports and two company responses to accusations of human rights violations. My abductive approach to theory development allowed me to test part of SCCT's propositions while allowing the emergence of new strategies that enable the generation of new theory on situational crisis communication. Coded qualitative data was analysed quantitatively to count the frequency of occurrence of each strategy. Afterwards, I discussed the implications of the analysis in light of the existing theory.

The first research question focused on Vale's usage of crisis response strategies. The central findings of this research have led to the detection of three new crisis response strategies and two sub-strategies: *Non-Repetition*, *Transparent Communication*, and *Crisis Support* (formed by *Recovery* and *Immediate Support* strategies). Particularly, I detected a predominant usage of *Crisis Support* strategies to communicate on both dam disasters.

As presented in this research, Vale's post-crisis communication is mostly focused on transparency, expressing commitment not to repeat the events, and explaining how crisis damage is going to be managed. The interpretive method I chose to develop this case study research enabled the speculation of whether my findings may indicate a tendency for companies to move away from defensive strategies and employ accommodative ones even for crisis intended to be framed as accidents. As organizations are held accountable for disasters directly or indirectly involving them, the usage of the new proposed strategies seems suitable to manage all crises.

Furthermore, Vale's usage of crisis response strategies supports the premise that situational crisis communication theory does not always inform practice. According to SCCT, a crisis framed within the accidental cluster should be mostly communicated through *Diminish* strategies, and a second accident or a preventional crisis should be communicated through *Rebuild* strategies.

However, Vale displayed a predominant usage of *Rebuild* strategies in its company responses and sustainability reports referring to both dam disasters. Although Vale attempted to impose an accidental frame for the first dam disaster, it still chose to employ more *Rebuild* strategies than *Diminish* strategies. However, accusations of human rights violations clearly portray that stakeholders did not accept the accidental frame and believed that the organization acted with negligence. Interestingly, Vale could sound this out through the BHRRC and adjusted its communication in the company response relating to the first disaster.

The elimination of defensive strategies in Vale's company responses further supports the premise that organizations may decide to manage a crisis within stakeholders frame if the organizational one does not get accepted. Moreover, the increased usage of *Rebuild* strategies in the second dam failure, supported by a more careful choice of the words used to refer to it, indicates that Vale changed its communicating style between crises and chose to manage the second crisis within stakeholders' frame since the beginning.

Finally, I believe there are two main things that can be learned from Vale's usage of

crisis response strategies. First, the fact that the three strategies and two sub-strategies that emerged are *Rebuild* or *Bolstering* strategies opens a door for the usage of accommodative strategies even for crises that get framed as accidents. This way, if stakeholders frame a crisis as one of the preventional kind, the organization is ready to cushion the reputational damage of it. Contrarily, if stakeholders accept the accidental frame, organizations will benefit positively from the predominant usage of *Rebuild* strategies.

Second, as stakeholders are likely to adopt the opinions found on internet discussions, crisis managers may find themselves managing a crisis within stakeholders' frame. Keeping an eye on platforms such as the BHRRC, where professional stakeholders present their frame on the crisis, allows an organization to make better-informed decisions to manage crisis communication and avoid unexpected reputational damage due to lack of frame alignment.

Limitations

This section highlights some of the limitations of this research. One common limitation of research on crisis communication is that it forgets about the real constraints that managers may face in crisis situations. Financial and legal concerns can limit how crisis managers respond to a crisis (e.g. Fitzpatrick & Rubin, 1995).

Another significant limitation of this research is the limited possibility of drawing generalisations of the results of this study. This research focuses on two case studies from the same mining organization. Therefore, it is questionable whether results are transferable to other organizations or industry sectors. As this research focused on exploring communicative choices made by Vale, no solid conclusion can be drawn on the actual effect that new strategies have on stakeholders' attributions of crisis responsibility.

Furthermore, due to its qualitative and exploratory nature, it is hard to completely eliminate subjectivity in the interpretation of data (Saunders et al., 2019). Although validations mechanism such as double-coding procedures, and ensuring a good understanding of the categories were employed, it is impossible to completely detach myself from the analysed data. Finally, as I only employed secondary data, they may not 80

represent Vale's underlying intentions when communicating on both crises.

Future Research

This research proposes new additions to the list of crisis response strategies. Future research could explore whether the strategies that emerged from this research are present in the post-crisis communication of other organizations, which could increase the possibility of drawing generalisations. Moreover, additional research could also be conducted in other documents produced by organizations in a context of crisis, such as press releases, which could also test the validity of the new strategies. Additionally, it would be also interesting to investigate similar cases in other industries or types of crises to see whether results find significant variations across sectors or types of crises.

Vale displayed a majoritarian usage of *Rebuild* strategies to communicate on the first dam disaster, although they framed it as an accident. This contradicts SCCT's suggestion of using *Diminish* strategies for accidents. Future research on SCCT could explore the effect that this has on attributions of crisis responsibility, and the reputational threat that a crisis poses to an organization. This would entail exploring stakeholders' reactions to other crises that were framed as accidents but are mainly communicated through *Rebuild* strategies.

Finally, regarding the role that platforms such as the BHRRC play in managing a crisis within stakeholders' frames, further research could analyse a bigger sample of accusations and company responses to inquire whether the dynamic of adjusting the crisis frame to stakeholders' frame applies indiscriminately. This would be done by analysing how accidents get framed by stakeholders in the accusation, and the frame employed by the organization in the response.

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Appendices

Appendix A - Sustainability Report 2015 – Vale S.A

Internal and External Governance - Legal Compliance – Environmental

In 2015 four significant cases of environmental non-compliance were filed against the company, while 20 significant environmental cases were settled, with agreements being entered into. A non-financial penalty was also applied against the company. Among these cases, the following is of particular note:

The company is involved in a number of cases referring to the bursting of the Samarco tailings dam in the village of Mariana, Minas Gerais. In March 2016, Samarco and its shareholders, Vale and BHP, entered into an agreement with the Union's Public Prosecutor's Office, with the state governments of Espirito Santo and Minas Gerais, as well as other authorities such as IBAMA, the Espirito Santo State Institute for the Environment and Water Resources (IEMA in Portuguese), and the Minas Gerais State Environment Foundation (FEAM in Portuguese), properly approved by the court, to set up programs and initiatives in light of the environmental and socio-economic impacts of the bursting of the Samarco dam.

In April 2016, Vale became aware of the new Public Civil Action that has been filed by the Federal Public Prosecutor (MPF in Portuguese) relating to the accident at the tailings dam of Samarco. This new action was distributed because of Samarco, BHP Billiton Brasil Ltda. (BHP), Vale, the Brazilian Government, the states of Minas Gerais and Espírito Santo, the National Water Agency (ANA in Portuguese), the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA in Portuguese), the National Department of Mineral Production (DNPM in Portuguese), the Chico Mendes Biodiversity Institute (ICMBio in Portuguese), the National Foundation for Indigenous People (FUNAI in Portuguese), the National Historical and Artistic Patrimony (IFAN in Portuguese), the Brazilian National Development Bank (BNDES in Portuguese), the State Forestry Institute (IEF in Portuguese), the Minas Gerais Water Management Institute (IGAM in Portuguese), the State Environmental Foundation (FEAM in Portuguese), the Minas Gerais State Institute for Historical and Artistic Patrimony

(IEPHA in Portuguese), the States Environmental and Water Resources Institute (IEMA in Portuguese), the Espírito Santo Agriculature and Forestry Institute (IDAF in Portuguese) and the State Water Resources Agency (AGERH in Portuguese), being shown the value of R\$155 billion (approximately US\$49.1 billion).

Vale clarifies that, according to the MPF complaint, the stated value is not based on the Samarco dam accident, but rather on an unjustified comparison with the Deepwater Horizon oil spill in the Gulf of Mexico. Vale also clarifies that Samarco adopted all the necessary emergency measures related to the accident and that studies and remedial measures of environmental and socio-economic nature are already in execution, as it was signed in agreement by Samarco, BHP and Vale with federal and state authorities of Minas Gerais and Espírito Santo.

Relationship with People – Territorial Development

Mining, in general, is located in areas that have significant socio-economic deficits, where its activities generate potential impacts that can be both positive and negative. The installation and operation of the various undertakings can interfere with the way of life in neighbouring communities, resulting in disturbance, but also creating jobs and incomes.

Relationship with the Environment and Climate Change – Dam Management

In the state of Minas Gerais, Normative Deliberations COPAM No. 62, 02/17/2002, and No. 87, 06/17/2005, determine the implementation of periodic external audit, but Vale already executes it in frequency beyond the established by legislation, with renowned external auditors who are recognized for their skills in identifying risks associated with dams. Additionally, Vale has internal controls in accordance with the recommendations of the auditors.

Vale has never had a recommendation type 5 and currently has no recommendation type 4. That is, there are only recommendations classified as programmable or of corrective maintenance and/or preventive character. For all recommendations Action Plans are elaborated, registered with the state environmental agency and accompanied by the company's managers, by inspection agents and the auditors.

The dams security management is performed by dedicated and qualified staff whose
mostly professionals hold master's, doctoral or specialization degree in Geotechnical
Engineering and/or Dam Engineering. These structures experience visual inspections 94

inspections are performed every two weeks and include detailed checklist that different items for evaluating the conservation status of the structure and identifying potential problems with it. This allows management to be proactive and preventive.

The information seized in the inspections and the data obtained from monitoring the instruments implemented in the dams are recorded in auditable systems and analyzed by geotechnical engineers, who often assess whether the conditions raised in the field and the reading levels of the instruments are consistent with the conditions of normal operation of the structures.

In addition to the inspection and monitoring routines, they undergo periodic and routine maintenance, such as cleaning of drainage structures and extravasation, weeding, recovery of small erosions, restoration of embankments covers, among others; to ensure proper storage conditions for their good performance. At Vale, all dams, although they adopted during its

are no longer in operation, remain under the company's responsibility and are monitored, audited and maintained usually under the same criteria and safety operation.

Proactively, Vale's PAEBMs (Tailings Dam Emergency Action Plan) are being revisited in order to incorporate the learnings accrued from the failure of Fundão dam, as well as results obtained in several discussions that the company has been promoting with the communities located near the dams, with the state and municipal Civil Defenses and regulatory agencies. These actions are being implemented in all states where Vale operates.

Furthermore, in spite of compliance with current legislation and investing in security and dam risks management mechanisms after the accident in Mariana (MG), to bring greater comfort to society, Vale carried out a detailed extraordinary verification of the structural conditions of all its tailings dams, including access roads, tailings ponds, crests, berms, slopes, surface drainage, internal drainage systems, abutments and overflow systems.

From the Vale's ferrous metal division, 18 geotechnics professionals, as well as a number of office teams, worked on an emergency basis, contributing to the speed of the inspection results. No alterations were found in any structure.

Since the failure of Fundão dam, on November 5, 2015, Vale has undertaken several inspections and surveys of regulatory agencies, especially the DNPM. During the inspections, the professionals of the agencies have been accompanied by teams of Vale while visiting the dams to assess the conservation status of the structures. Documents related to monitoring have been assessed and the results compared to the normal operation of the structures. Also during the surveys, Vale has been asked to provide documentation related to the dam management as well as action plans related to external audit recommendations. In all cases, the company has contributed proactively with the inspection agents, promptly submitting the documents requested and attending to any recommendation and/or demand set during inspections and surveys.

At the end of 2015, as an immediate response to the accident and with the objective of increasing the good operational practices, Vale created a unified area dedicated to managing iron ore dams, performed before separately for each operation. In this first stage, the area will be responsible, among other activities, for Geotechnical management case (dams, piles, embankments, etc.) and plans and actions in case of any emergencies. Actions for incorporation of other businesses have been started and throughout the year they will be expanded to other business units of the company.

Relationship with the Environment and Climate Change – Mariana Accident

November 5, 2015 joined the mining history as a sad milestone. The failure of Samarco's Fundão dam, a mining company, in Mariana (MG), to which Vale is a shareholder along with BHP Billiton, resulted in 18 deaths and a missing person, and hundreds of families were made homeless. From the first moment, Vale is committed to support Samarco in serving the affected people, and is making every effort to minimize impacts on the environment. The company has provided human and material resources, such as helicopter and emergency equipment, to support Samarco in the rescues, water distribution and removal of the risky places for people displaced by the accident.

Samarco was formed in 1977 as a Brazilian unlisted company. Between 2000 and 2001, Vale acquired a stake in Samarco, ending up with 50% of the company's shares together with BHP, holder of the other 50% of Samarco's shares.

According to Samarco, 99% of the families in Mariana and Barra Longa impacted by the

accident ended 2015 in rented homes or at relative's homes, and all the houses rented by the company were equipped with furniture, home appliances, domestic utensils and bed linen and towels, preferably acquired from region's suppliers. Before each family moved in, the company also supplied the homes with food, cleaning and personal hygiene products, and drinking water.

In January 2016, each family with missing or deceased members due to the accident, received R\$100,000 (US\$31.6 thousand) in advance compensation payment from Samarco. The family groups who had to move, i.e.those who lost their homes, Samarco released R\$20,000 (US\$6.3 thousand), with 50% of this amount not being considered as part of the advance compensation.

Periodic meetings were also held with communities, municipal authorities, state and federal governments, the environmental authorities, the Public Prosecutor Service, the Public Defender's Office and other responsible authorities, to provide clarifications and information about Samarco's action, and to develop joint initiatives.

Also, service centres were set up in Colatina, Linhares, Marilandia and Baixo Guandu, in the state of Espírito Santo, and in Mariana and Barra Longa, Minas Gerais. The objective is to centralize demands, questions and claims from the community, facilitating the services and the tracking of solutions.

Relationship with the Environment and Climate Change

Through the use of debit and credit cards, Samarco provided emergency financial assistance to those families that lost their monthly incomes as a result of the accident. This involves the payment of a monthly minimum salary to the family, plus an additional 20% of a minimum salary to each dependent, as well as a basic foodstuff basket in monetised form, to the value of **R\$338.61** (US\$107.1– reference value from the Union for Socio-Economic Statistics and Studies – Dieese for Minas Gerais). In the Rio Doce river region, 811 fishermen and other riverside dwellers received these cards.

In both municipalities, Samarco and its partner companies hired local inhabitants to take part in the refurbishment of property, fencing and rehabilitation of agricultural properties, revegetation, organization of donations and care of the animals rescued.

With regard to the residues, Samarco monitored the behaviour of the plume of turbidity in the

sea and it stressed that there was no technical evidence that the material observed in the region of Abrolhos, in Bahia, originated from the failure of the Fundão dam. The waste is mostly composed of silica (sand) arising from iron ore processing, and it does not contain any chemical elements harmful to health. The results of analyses Samarco commissioned from SGSGeosol Laboratorios, a company specializing in environmental and geochemical soil analysis, attests to the fact that the waste from the Fundão dams is characterized as not dangerous. This information is based on the results of leached extracts, once the results of solubilized extracts remain in the analysis process. Samples were collected on November 8 near Bento Rodrigues, Monsenhor Horta, Pedras, Barretos and Barra Longa, in Minas Gerais, and they were analysed in accordance with the Brazilian standard ABNT NBR 10004:2004. In addition to this, the diagnosis carried out by a specialist consultancy (ACQUA Consultoria) confirms that shoals of fish continue to live along Rio Doce river. This study was carried out from December 3 to 11, 2015 at 215 points along the river and it also revealed that less than 1% of the river basin was affected by the accident. The results of the new analyses performed by the Geological Survey of Brazil (CRPM) and the National Water Agency (ANA), disclosed on December 15, 2015, also show that the Rio Doce river's water quality was compatible with results found before the mud plume of turbidity passed down the river. With respect to the presence of heavy metals dissolved in the water, the levels of arsenic, cadmium, mercury, lead, copper and zinc, among others, are in general similar to the results of studies carried out by the

CPRM in 2010.

Vale, Samarco and BHP Billiton signed, on March 2, 2016, a full agreement with the Attorney General of the Union, representing the Union's Public Prosecutor's Office, with the state governments of Espírito Santo and Minas Gerais, as well as other authorities such as IBAMA, the Espírito Santo State Institute for the Environment and Water Resources (IEMA in Portuguese), and the Minas Gerais State Environment Foundation (FEAM in Portuguese), for the environmental and socio-economic recovery in the regions impacted by bursting of the Fundão dam.

The agreement tells the creation of a private right foundation that will be responsible for the performance of about 40 repair programs. The programs will be gathered into two main work fronts: one socio- economic and other environmental. The foundation will be maintained with resources from Samarco. All projects may be accompanied by the affected populations, there

will be external audits and an ombudsman to serve the community.

The amounts provided for in the agreement for the first three years are R\$4.4 billion to fund the projects. From 2019, annual contributions to the foundation will be set according to the forecast of annual project execution. In 2019, 2020 and 2021, the annual values for these contributions will be between R\$800 million and R\$1.6 billion.

Additionally, it is decided that in the next 15 years, from 2016, will be invested R\$240 million per year for compensatory actions. These annual values for compensatory actions are already included in the total for the first six years. Additional R\$500 million will be made available by the company, as a compensatory measure, for basic sanitation construction, which will be held by impacted municipalities by the end of 2018.

The foundation headquarter will be located in Belo Horizonte (MG) and will have a Board of Trustees, Executive Board, Advisory Board and Fiscal Council, with autonomy to manage and perform all recovery actions and compensation for damage caused by failure of the Fundão dam. Also, it will hire technical experts and independent audits. It will also set up an Inter-Federative Committee, external and independent body of the foundation, constituted of 12 government representatives, to monitor and validate the proposed plans, monitor and verify results.

Relationship with the Environment and Climate Change – Mariana Accident – Examples of Environmental Projects

- Availability of resources, as compensation and with the amount of R\$500 million, for certain affected municipalities to use in the preparation and execution of plans for capture and sewage and landfills treatment.
- Recovery of Permanent Preservation Areas (APP in Portuguese) of Rio Doce river and affluent through reforestation of 10,000 hectares and conducting natural regeneration of 30,000 hectares over ten years as compensation and the amount of R\$1.1 billion.
- Recovery, as compensation, of 5,000 springs to be defined by the Watershed Committee of Rio Doce.

Relationship with the Environment and Climate Change – Mariana Accident – Examples of Socioeconomic Projects

- Reconstruction of the affected sites, as Bento Rodrigues, Paracatu de Baixo (Mariana) and Gesteira (Barra Longa), ensuring their participation in the dialogue process with the affected communities to define measures for the recovery or relocation.
- Performance of compensation and reparations program, through coordinated negotiation, designed to repair and compensate the affected people, of optional adherence.
- Establishment of permanent communication and dialogue channels with the community, as well as carrying out agendas to present the progress and results of the programs to be implemented.
- Implementation and maintenance of support measures for affected indigenous peoples.
- Recovery of cultural goods of material nature and preservation of cultural property that was impacted.
- Implementation of actions that aim at recovery of impacted economic and productive activities, such as agriculture, fisheries, services and trade.
- Health programs, social protection and education for the restoration of impacted public services and monitoring of individuals and families affected are also planned.

Appendix B - Sustainability Report 2018 – Vale S.A

We are mourning

January 25, 2019 will be forever recorded in Vale's history and in the memory of our employees, our partners, the population of Brumadinho, Minas Gerais, and Brazilians in general. We had complied with all procedures related to the safety of our operations, including conducting periodic onsite audits. But even so, due to causes that are being duly cleared, Dam I of the Córrego do Feijão Mine in Brumadinho failed.

We know that our efforts will never be enough to bring back the lives that were lost, to compensate the people who have lost everything or almost everything, and to erase the impact on our employees and the communities neighbouring our dams, we are in mourning.

We have mixed emotions between consternation for the victims and families and our commitment to attend to them as quickly as we can and in the best way possible. Immediately

after the rupture of the dam, we began providing assistance in the form of shelter, psychological help, medical care, infrastructure repair, transport to move displaced people at risk to shelters and hotels, rescue of and veterinary care for animals. In addition, we monitored the Ferro-Carvão Stream and the Paraopeba and São Francisco Rivers, and made financial contributions to institutions participating in these efforts.

Dams – The Collapse

At 12:28 p.m. on January 25, 2019, Dam I of the iron ore tailings of the Córrego do Feijão Mine collapsed. In just over three minutes, most of the 11.7 million cubic meters of tailings spread over approximately 295 hectares, reaching the operational and administrative areas of the mine, where about 600 of our own employees and those of third-party suppliers worked. Offices, maintenance workshops, locker rooms, refectory, mill, and loading terminal, among other structures, were impacted by the tailings. Also, the road access from the mine to the Córrego do Feijão village and the concierge road to the access ramp of the Alberto Flores Road were also reached.

Dams – The Collapse - History

The dam was constantly monitored and received biweekly field inspections, all to the National Mining Agency (ANM). It also had a video monitoring system, siren alert system and downstream population registration. A total of 94 piezometers (46 them automated) and 41 water level indicators were used to monitor the structure, with periodic information gathering and analysis by the geotechnicians responsible for the dam. External and internal emergency simulations were also carried out periodically the last external simulation took place on June 16, 2018, under Civil Defense coordination. The last recorded inspection occurred on January 22, 2019.

The dam had a Stability Condition Statement issued by TÜV SÜD do Brasil, a specializing in Geotechnics, dated June 13 and September 26, 2018, related to the Periodic Safety Review of Dams and Regular Safety Inspection of Dams, as determined by DNPM decree 70.389/2017.

According to the legislation, the Mining Dam Emergency Action Plan (PAEBM in Portuguese) for Dam I of the Córrego do Feijão Mine was filed at the City Hall of Brumadinho and municipal, state and federal Civil Defenses in July, August and September of 2018. The sound

warning system, which is part of the PAEBM, was

located outside the mine area. Before that, in October 2018, employees had in an internal simulation for emergency procedures.

At the date of the failure, Dam I was not under construction and the project to modify the structure was under development. At the time the failure occurred, there were professionals at the dam performing data collection to comply with legal requirements determined by the National Mining Agency. The presence of people in dams is routine; measures must be taken to ensure the basic safety and maintenance of these structures, even when inactive; for example, reading instruments, performing inspections, and evaluating the need to cut the grass in these places.

Dams - The Collapse - Immediate Assistance and Emergency Actions

Since the failure of Dam I, all our efforts have been focused on supporting those affected and working together with the Fire Department and Civil Defense, both of which have continued up to the publication of this report. To speed up actions, on the day of the dam's collapse, we created an Immediate Response Group responsible for consolidating all emergency actions.

Subsequently, a Humanitarian Aid Committee was set up, with a team of social workers and psychologists to provide assistance to victims and families. The top priority at that time was to receive the families, support the rescue, and assist all employees, both our own and those of third- party suppliers, and the local population. For this we mobilized all the necessary resources.

We provided 40 ambulances, backhoes, a rescue helicopter, communication radios, 15 lighting towers, and balloons equipped with infrared technology and wi-fi for aerial monitoring. Partnerships with hospitals in the region made available 800 beds and medical and psychological care. About R\$ 1.3 billion was spent to purchase medicines, water, equipment and other logistical resources.

Services for the community and the families of those affected were carried out in seven Service Stations (PAs in Portuguese): Estação Conhecimento de Brumadinho, Centro Comunitário Córrego do Feijão, Escola Municipal Carmela Caruso Aluotto (Casa Branca), Ginásio Poliesportivo, Associação Comunitária Parque da Cachoeira, in addition to Legal Medical Institute (LMI) and Intercity Hotel, in Belo Horizonte.

At these services stations, professionals such as doctors, nurses, psychologists, social workers and volunteers directed their full attention to those affected and their families

24 hours a day. We registered and referred homeless people and victims' family members to hotels and provided them with food, transportation, clothing and hygiene supplies, among other supports. Documents such as birth and marriage certificates and Identity Cards were issued by the Civil Police of Minas Gerais, with Vale's support.

We hired a team of professionals from the Albert Einstein Hospital based in São Paulo, which included specialists in trauma, mourning and catastrophe response, to provide psychosocial care at the service stations and telephone channels.

In PAs, we also provided 407,000 liters of mineral water to the community, up to 9,000 meals/snacks per day, animal feed, as well as personal hygiene kits, medicines, fuel and construction material.

Since the dam failure, we have made available toll-free numbers to enable the population to request assistance (Alô Brumadinho, Alô Indenizações, Alô Ferrovia, Alô Animal and the Vale's Ombudsman). In the first week after the collapse, more than 3,000 calls had been answered.

Rural producers with activities in fifteen municipalities received water supplies for human and animal consumption and irrigation – we have so far provided about 145 million liters of water. Water service was directed to the cities of Betim, Brumadinho, Curvelo, Esmeraldas, Florestal, Fortuna de Minas, Juatuba, Maravilhas, Mário Campos, Pará de Minas, Papagaios, Paraopeba, Pompéu, São Joaquim de Bicas, São José da Varginha, and also to farmers and families mapped by Vale, the Secretaria de Agricultura de Brumadinho and the Minas Gerais State Technical Assistance and Extension Company (Emater-MG).

We also provided transportation for community relocations between the Córrego do Feijão Community Centre, Casa Branca Community and the Brumadinho Bus Station to respond to demands arising from access interruptions caused by the rupture. Transport service was offered all days of the week, including Saturday and Sunday, with departures every two hours.

Dams - The Collapse - Voluntary Financial Support to Affected Families

On January 31, 2019, we began registering the people eligible to receive funds from the emergency donation of R\$ 100,000 offered by Vale to support families who have had deceased or disappeared due to the collapse. The official list of beneficiary families has been validated by the Civil Defense and is available on Vale's website. To date, 276 payments have been made.

We also financially supported people living in the Self-Rescue Zones (ZAS in Portuguese) of Dam I: R\$ 50,000 per property located in the ZAS; 101 payments have been made. In addition, we have given R\$ 15,000 per family household of rural producers or merchants who have productive activity in the area; 95 of these payments have been made.

These voluntary donations from Vale are not tied to the indemnities that will be negotiated individually with those affected, with the support of the Public Defender or private lawyers, as well as indemnities that may be paid according to what is determined in future through collective bargaining and authorities.

Other financial support provided to those affected has included:

- Funeral assistance to the victims' families, in the amount of R\$ 3,928 .34, in addition to payments to cover notary fees, body transfers, urns, ornaments, graves, burial services and other expenses.
- Vale entered into an agreement with the city of Brumadinho to donate to the city approximately R\$ 80 million over the next two years. We have also signed an agreement to donate R\$ 100 million to the Association of Mining Cities of Minas Gerais (AMIG in Portuguese) and agreements to donate to other institutions a total of R\$ 114 million. The agreement signed with the AMIG will cover ten municipalities: Barão de Cocais, Belo Vale, Congonhas, Itabirito, Mariana, Nova Lima, Ouro Preto, Rio Acima, São Gonçalo do Rio Abaixo and Sarzedo.

Dams – The Collapse – Preliminary Agreements and Emergency Indemnifications

In order to take action to repair the damage caused by the rupture of Dam I in a fast and efficient way, on February 20, 2019, we signed a Preliminary Adjustment Agreement (TAP in Portuguese), which allowed us to anticipate the payment of emergency compensation for all

residents in the city of Brumadinho on the date of the breach, and up to one kilometer from the Paraopeba River gutter, from Brumadinho to the city of Pompéu, at the Retiro Baixo Dam.

In an hearing at the Court of Justice of Minas Gerais (TJMG in Portuguese), the preliminary agreement was signed with the General Law Office of the State of Minas Gerais, the Public Prosecutor's Office of the State of Minas Gerais, the Public Defender's Office of the State of Minas Gerais, the Federal Public Prosecutor, and the Federal Public Defender's Office, as well as representatives of those affected. The agreement established, among others, the following measures:

- Payment of a monthly minimum wage for each adult, half (1/2) the monthly minimum wage for each teenager and one quarter (1/4) the minimum wage for each child of families living in regions located up to one kilometer from the Paraopeba River, from Brumadinho to the city of Pompéu, at the reservoir of Retiro Baixo, beginning on January 25, 2019, for a term of one year. More than 76,000 people have received payments so far.
- Provision of a basic food basket for each household in the communities of Córrego do Feijão and Parque da Cachoeira for 12 months. The value of the basic basket will be determined by the Inter-union Department of Statistics and Socioeconomic Studies (Dieese in Portuguese).
- Provision of independent technical advice so that those affected can negotiate their individual indemnities.
- Reimbursement for or direct funding of the extraordinary expenses of the State of Minas Gerais, its direct agencies and its indirect administration, including the cost of transport, accommodation and food for the employees involved in rescue work and other emergency actions.
- Maintenance of 2/3 of the salaries of all employees, both our own and those of thirdparty suppliers, who died, until a definitive indemnification agreement is formalized.
- Maintenance of the salaries of employees who are missing.
- The guarantee of employment or salary for Vale employees in Brumadinho, including those of our third-party suppliers, until December 31, 2019.
- Maintenance of the medical plan for family members of the victims, both our own and those of third-party employees, under the accreditation regime, covering the

entire state of Minas Gerais. Widows or companions are covered for life and dependents are covered up to 22 years of age.

- Psychological assistance to workers until they are medically discharged.
- A day-care centre allowance of R\$ 920.00, to care for children up to three years old of deceased workers.
- An educational allowance of R\$ 998 .00 for children of deceased workers until the date they become.

These commitments are independent of the donation of R\$ 100,000 that Vale already made.

Dams – The Collapse – Hiring Health Professionals

At the beginning of February 2019, representatives of the Public Prosecutor's Office of Minas Gerais, the Public Defender's Office of Minas Gerais, the Federal Public Defender's Office, the State Department of Social Impact, the Municipal Secretariats of Health and Social Development of Brumadinho and the Movement of People Affected by Dams (MAB in Portuguese) signed a commitment with Vale, which paid the costs of hiring 142 professionals to integrate the health and social assistance teams of the city of Brumadinho for the initial term of six months . In all, R\$ 2.6 million was transferred to the municipal administration.

Dams – Control and Management of Dams

With the failure of Dam I of the Córrego do Feijão Mine, procedures for monitoring the structural conditions of all dams were intensified, causing emergency actions to be taken for Dam VI, which was impacted by the tailings flow from Dam I, since its results demonstrated the anomalies predicted in the Level 1 alert. In parallel preventive efforts, the alert level of structures located in other municipalities was raised to three according to the Emergency Action Plan for Mining Dams (PAEBM in Portuguese, resulting in the evacuation of residents in the Self-rescue Zone (ZAS). In addition, simulations were performed, reinforcing sirenactivated evacuations to the residents of the Secondary Security Zones (regions not defined as ZAS).

Altogether, four Vale structures in Minas Gerais had their alert level raised to three: the B3/B4 Dam of the Mar Azul Mine, in Macacos/Nova Lima (on February 16), the Sul Superior Dam of the Gongo Soco Mine in Barão de Cocais (on March 22), and the Forquilha I and Forquilha III Dams of the Fábrica Mine in Ouro Preto (on March 27).

The decision to raise the alert level to three of the PAEBM was taken after external safety audits concluded that the structures did not meet the new technical ordinance established by the National Mining Agency (Agência Nacional de Mineração or ANM) on February 15, 2019, to certify their physical and hydraulic stability. In municipalities where preventive evacuation was necessary, operations are paralyzed as a safety measure until the soundness of their structures meets the new technical criteria.

In all Vale structures, the frequency of monitoring safety variables and stability inspections were intensified to strengthen preventive and corrective actions in a timely manner. We anticipated the implementation of the Geotechnical Monitoring Centre (CMG) at the Águas Claras Mine in Nova Lima, Minas Gerais, responsible for monitoring 24 hours, seven days a week all upstream and some conventional dam structures by means of big screens.

Dams – Control and Management of Dams – Innovation

In parallel to emergency work to mitigate impacts on communities and the environment, the Company's leaders and technicians have been mobilized to rethink, discuss and propose solutions for the future of the business. Among the immediate actions evaluated is the project of filtering and stacking tailings as an alternative solution to building new dams.

In the search for disposal alternatives to replace tailings dams, the Company had already been developing conceptual waste disposal projects using new technologies aim to reduce dependence on dams for our operations in the future.

Vale invested nearly R\$ 66 billion (US\$ 17 .5 billion) over the last 10 years to install and expand the use of the dry process – or natural moisture – of the iron ore produced in its operations in Brazil. By not using water in the process, the dry method does not generate tailings and, therefore, does not use dams. Over the next five years, we will apply an estimated additional R\$ 11 billion (US\$ 2 .5 billion) in similar processing facilities. Today, about 60% of Vale's production is dry and the goal is to reach 70% by 2024.
Dams - Incidents Prevention and Company Response

To support the safety of communities and strengthen our emergency response, Vale signed an agreement with the Government of the State of Minas Gerais, through which R\$ 5 million was donated to be invested in Civil Defense equipment, R\$ 4 million of which is designated for the Military Police.

Over the last few years, several investments were made in other community safety initiatives. One of the examples began in August 2018 – the construction of a new tailings pipeline connecting the pumping station CB3 to Arm 5 of the Pontal Dam. This new layout will keep the Itabira community out of the impact zone in the event of an incident.

The new pipeline, which passes through the Pontal dam, is more than 90% complete. Construction was scheduled to be complete by August 2019; however, the judicial embargo occurred in February of that same year and interrupted its progress. Construction will resume as soon as the operation of the Pontal Dam is authorized by the appropriate agent.

In parallel, crisis management procedures define the criteria for treating, minimizing and containing the impacts arising from major incidents, with clearly defined roles, responsibilities and autonomy of the various internal actors. This routine goes beyond legal compliance; following the Brumadinho event, we responded with temporary shelters, humanitarian assistance and efforts to re-establish essential services such as provision of drinking water.

Dams - Incidents Prevention and Company Response – New Global Structure for Safety of Operations

After the failure of Dam I of the Córrego do Feijão Mine, we implemented a global structure of Asset Integrity and Geotechnical Risks (dams, dikes and waste rock dumps) and Operational Risks. This structure is responsible for ensuring the best management practices and specialized technical knowledge in the most critical disciplines, defining standards and technical norms to be implemented by operations

Appendix C - Sustainability Report 2019 – Vale S.A

Brumadinho: the challenge of repairing and rebuilding

The rupture of Dam I of the Córrego do Feijão mine, on January 25, 2019, in Brumadinho – Minas Gerais State (MG), forever marked the history of Vale, its employees and the impacted people and communities. Vale apologizes to society and deeply regrets the 270 fatalities, of whom two were young pregnant women and 11 victims have not yet been located.

Special Office for Reparation and Development

One of the first steps in our efforts to fully repair of the affected territory, after the dam rupture, was to create of the Special Office for Reparation and Development. Throughout 2019 and in the beginning of 2020, in view of the need to repair the damage, as well as to provide assistance to those affected, Vale has gradually been moving from an emergency action mode to the recovery of these territories. Its priority is to coordinate the socio-economic and environmental restoration actions of the impacted municipalities, with social engagement and transparent performance, also aspiring to act as a vector for improving Vale's policies and processes, through a close collaboration with the communities.

The program for the reparation and development of Brumadinho and the municipalities of the Paraopeba Basin was established, which includes structural actions to fully repair the damage caused to families, the environment and society in Brumadinho and the affected region by 2025. With the objective of guaranteeing respect for Human Rights, this program is based on three pillars: Socioeconomic, Environmental and Infrastructure.

Public Commitment to Integral Reparation

In the last fifty years, despite all the technological evolution, we have seen some tragedies with companies where human rights have been dramatically disregarded. Lives have been lost, families, communities and social relations have been broken. Environmental issues cause chronic and/or fatal diseases for many years after the

disaster. Many of these tragedies, despite the passed time, leave open and deep wounds. Compensation, economic or otherwise are still discussed without building sustainable solutions for those affected. Consequently, the efforts and resources employed in the reparation are put to the test head-on. And with that the credibility of the reparative agent.

Vale has made a commitment to its stakeholders and society in general to implement Integral Reparation since the first drafts of its reparation plan for Brumadinho and the

affected areas. The decision is consistent with the company's recognition of the United

Nations' Guiding Principles on Business and Human Rights. The commitment implies great challenges and discipline in the implementation. It is not only a short-term decision to demonstrate adherence to best environmental, social and governance practices. It is a strategic decision of enormous relevance. It demands a cultural transformation, already underway, because it has to touch on how its employees, direct agents of Reparation, understand and deal, today and in the future, with the steps of Reparation in their daily lives. It opens a path that, if firmly followed, will create precedents both in the mining industry and in others, bringing new references to society.

And what else is key in this decision on how to repair? It is necessary to identify the parametres that will guide its implementation in order to provide greater assurance that the Reparation will be effective. These parametres include a public apology, a guarantee of non-repetition, participatory governance involving the different stakeholders, a commitment to return to the status quo ante, economic or otherwise compensation, among others.

To ensure that these parametres are being followed, concrete and tangible actions must be taken involving all levels of the company. To ensure this, the reparation plan must be monitored, evaluated and adjusted throughout its implementation in the short, medium and long term.

Integral Reparation is a long-term commitment. There will be moments of challenge and moments of recognition. And in order to be recognized as a whole, it needs continuous and resilient mobilization by all.

Thus, Vale must improve existing channels of dialogue and be proactive in developing new ones. These channels must ensure that the losses of those affected are understood, evaluated, respected and compensated in a clear and unmotivated manner. This is what the company has committed to and has made public! And this is what will bring greater credibility and a new image!

Socioeconomic Reparation

Since the first hours after the rupture of Dam I of the Córrego do Feijão mine, Vale has sought to apply considerable human, financial, technological and material resources to align the reparation actions are aligned with the expectations of those affected.

Focused on rebuilding people's lives and the territory, the company has been developing assistance programs, aiming to contribute so that communities can deal with the new reality, resume their routines and plan for the future.

In an effort to optimize the reparation and compensation process with the communities, Vale also created the Social Engagement Plan (SEP), implemented both in Brumadinho and the Paraopeba River canal, areas affected by the rupture of Dam I of the Córrego do Feijão mine, and evacuated territories due to alerts related to other dams of the company. The SEP is divided into five stages: organization of the process; understanding of the current situation; strengthening the basis of community relationships; participatory implementation; and knowledge management.

In 2019, Vale focused on organizing the reparation and compensation process with the communities to understand the situation caused by the disruption and the evacuations. The company's challenge, since then, consists of implementing actions where community participation has been essential to mitigate the impacts of the disruption and evacuations. The open, transparent and clear dialogue was and continues to be a guide for performance within a continuous learning cycle.

In the last quarter of 2019, two external evaluations were carried out in order to seek references that would contribute to the mission of repairing the damage to the people and territories affected. One of them, carried out by Fundação Dom Cabral, resulted in a study on qualifying the reparation process, considering the dimensions of governance,

social participation, prevention and mitigation of social and economic impacts and risks in the evacuated territories and those affected by the dam rupture.

Following the recommendations of the Independent Support and Reparation Extraordinary Advisory Committee (CIAEAR), another assessment was also carried out on providing specialized technical advisory services in Mental Health and Psychosocial Support (SMAPS acronym in Portuguese). Focused on the victims' families and evacuated populations, the methodology used involved interviews with stakeholders, among family members of the victims and Vale employees, in addition to documentary analysis provided by the company. Throughout 2020, Vale plans to analyze the survey results and use them to influence the planning and actions related to the theme.

Relationship Building and Engagement with Communities - Water for Human and Animal Supply

Vale also built 24 artesian wells in cities supplied by the Paraopeba Basin in an effort to supply of drinking water to the communities. The water supplied by Vale has come from COPASA (Sanitation Company of Minas Gerais) sources in Juatuba, Pompeu and Três Marias. Water quality monitoring is carried out by the concessionaire and the results are available on its website.

In addition, the company continues to make water filtration equipment available to rural producers using wells and cisterns near the Ferro-Carvão stream and the Paraopeba River. The forecast is that by June 2020, about 250 systems will be available in 20 municipalities, from Brumadinho to Três Marias.

The filters have the objective to make the water drinkable, complying with the drinking water regulations. The different treatment technologies have been selected for each property, according to the level of water quality in wells and/or cisterns, in order to promote user's safety.

Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works, (the Pará de Minas Pipeline, expected completion July 2020; the Brumadinho Pipeline to connect the Velhas and Paraopeba River systems, expected completion September/October 2020; the Carlos Prates Pipeline, which is linked to the interconnection works, expected completion April 2020) is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte.

Relationship Building and Engagement with Communities – Provisional Housing

The company has provided extensive support to help minimize the impact on the lives of people who have lost or had to leave their homes due to the rupture of the dam. From the first moment, when approximately 360 affected people were hosted in hotels, inns and the houses of friends and relatives, until they had temporary housing, Vale has aimed to carry out the process with respect, care and agility. In Brumadinho, 98 families are already in temporary housing, and their rent paid is by Vale.

The process of providing temporary housing includes the involvement of families in the choice, with respect to their profile and way of life, in order to minimize the inevitable impacts generated by the process of change. The benefit constitutes a package that includes payment of rent, IPTU, water and electricity bills; gas assistance; basic food basket proportional to the number of residents in the house of origin at the time of removal; complementation of furniture and trousseau, when necessary; transportation to move goods of interest; and adjustments that ensure animal welfare, in the case of families that have domestic animals. These families are also eligible for a one-time donation in the amount of BRL 5,000 and the payment of compensation for material and moral damages.

During and after the moving process, the families are accompanied by professionals - psychologists and social workers - linked to the Family Reference Program, who offer them psychosocial support.

The full assistance to the affected person, however, does not end with the compensation process. For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese), which includes five lines of support: planning and financial education, support for the purchase of residential, rural or commercial properties, support for the resumption of farming activities and rural technical

assistance, support for the resumption of small business activities and assistance for microentrepreneurs and income supplement activities.

Re-Signification

One of the most important aspects of the reparation process takes place in the symbolic field, that is, in respect for the feelings and memories aroused in people impacted by the dam rupture.

One of these initiatives will be a memorial in honour of the victims of the disruption, to be built on land near the village headquarters. The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened.

Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief.

Território Parque

The Território Parque Project, in Córrego do Feijão, presented by Vale in December 2019, aims to requalify the region through infrastructure improvement. It involves renovating, paving and urbanizing streets, houses and structures, economic reactivation and development of local tourism, in addition to memorial initiatives to honour victims of the rupture.

To make the region a socio-environmentally sustainable destination, the company is in the process of implementing an Urbanization Plan for the central area, which ideally will adding value to its potential as a tourist destination and improving its public facilities and road infrastructure. The forecast is that the works will be completed and delivered to the community in 2021.

Emergency indemnities

In November 2019, the Preliminary Agreement Term (PAT) was renewed to pay of emergency aid until October 2020, to those affected by the rupture of Dam I, in Brumadinho.

The new agreement established:

- Emergency payment will continue for another 10 months, beginning from January 25, 2020, in the same parametres established in the previous PAT:
 - For people who lived, on the date of the rupture, in the communities of Córrego do Feijão, Parque da Cachoeira, Alberto Flores, Cantagalo, Pires and on the margins of the Ferro-Carvão stream on the date of the rupture;
 - For affected people, including those residing in locations other than those mentioned, who are currently participating in the support programs developed by Vale: housing, social assistance, agricultural assistance and assistance to local producers assistance;
- For other people, not covered by the previous criteria and who currently receive the emergency payment, continued the payment will be equivalent to the amount of 50% of the values established in the previous PAT;
- The extension reaches people who are already registered as eligible in the emergency indemnity database and those who were registered by the date of the term approval (November 28, 2019), whose process is under analysis and who will be recognized as eligible;
- The amounts mentioned will be paid as a new emergency indemnity and will be discounted and considered as a future collective indemnity;
- Communities may be included or excluded by agreement between the parties or by the initiation of their own procedural incident.

Up to April 2020, on the date of closing this report, the payment of emergency aid relating to this TAP totaled BRL 1,292 million.

The payment of emergency aid is an issue that gives rise to many discussions and complaints in the territory, as many affected people question the criteria defined and declare that the solution made available to the collective does not meet their individual demands. Vale believes that emergency payment is only one of the elements that make up its reparation to the affected parties and its function should be analyzed in an integrated manner that includes consideration of the other mechanisms and actions implemented.

Labour agreement

Vale and the Public Labour Prosecutor's Office of Minas Gerais signed in July 2019, an agreement through which the phase of knowledge of the Public Civil Action was ended, establishing the following compensation parameters for the families of the deceased workers, victims of the rupture of Dam I: parents, spouses or partners and children will receive, individually, BRL 500,000 for moral damages and also the payment of an additional insurance for work accidents in the amount of BRL 200,000. Siblings will receive BRL 150,000. There will also be the payment of material damage to the nucleus of dependents, the minimum amount of which is BRL 800,000.

There will be the benefit of day-care assistance in the amount of BRL 920 per month for children up to the age of 3, and education assistance in the amount of BRL 998 per month for children between the ages of 3 and 25. A lifetime health plan will be granted for spouses or partners and for children up to 25 years of age and, by Vale's own decision, the lifetime health plan has also been extended to parents.

The agreement also provides stability to the own and outsourced workers, who were crowded into the Córrego do Feijão Mine on the day of the rupture, and to the survivors who were working at the time of the rupture, for a period of three years, starting on January 25, 2019, and can be converted into cash benefits. In August 2019, Vale deposited in court the amount of BRL 400 million as payment of collective moral damages, due to the signing of the agreement.

As a result of this payment, the Judiciary ordered the release of the amount of BRL 1.6 billion, initially blocked from Vale. By the first week of April 2020, 624 agreements had been entered into, including 1,591 family members of 244 workers, out of a total of 250 deceased. The total value of the agreements entered until the beginning of April 2020 was approximately BL 1 billion.

Vale is also making individual agreements with the surviving workers, being those who were working at the Córrego do Feijão Mine at the time of the dam's rupture, as well as with the workers who were linked to Córrego do Feijão and Jangada Mines on the day of the rupture.

By the beginning of April 91 agreements had been signed, including 109 beneficiaries, worth

approximately BL 28 million.

Individual agreements

In addition to emergency compensation, Vale and the Public Defender's Office of the State of Minas Gerais signed a Term of Commitment establishing parametres by which those affected can receive compensation individually or by family group, through formalizing extrajudicial agreements, taken to court, with an average processing time of 60 days. The community can look for the indemnity offices in Brumadinho, Barão de Cocais, Nova Lima and Belo Horizonte. By April 2020, at least 4,866 out-of-court civil settlements had been signed, of which 4,105 have been ratified; of these, 62 are in the process of being paid and 4,043 had already been paid, totaling approximately BRL 843 million.

Financial support for maintaining the service offer and support to institutions

Vale made an agreement with the Association of Mining Municipalities of Minas Gerais and Brazil (AMIG) to make financial contributions in order to support the cities where the company's operations were paralyzed and contribute to maintaining the provision of essential services to the municipalities' populations. Such contributions were equivalent to:

- BRL 80 million in financial compensation for the city of Brumadinho, due to the interruption of productive activities, to be transferred within two years after the agreement;
- BRL 14.5 million transferred to the Brumadinho Tourism Association to support the advertising campaign to encourage tourism;
- BRL 2.6 million transferred to the City of Brumadinho to purchase of emergency equipment and hire health and psychosocial professionals, among others;
- BRL 30 million for Social Assistance and Health to those affected by the rupture of the dam, via agreement with the City Hall;

• A contribution of BRL 5 million to the Civil Defense of Minas Gerais and BRL 4 million to the Military Police of Minas Gerais to purchase equipment, structural improvement and professional training for the corporation;

• A BRL 20 million contribution to the Military Fire Brigade of Minas Gerais, to acquire of more than 7,000 pieces of equipment, make structural improvements

and provide professional training, in recognition of corporation's work and heroism;

- An investment of BRL 70 million to acquire 77 operational vehicles delivered to the public security agencies of Minas Gerais: 50 vehicles for the Military Police; 13 vehicles for the Fire Department (buses, trucks and vans); two vehicles for the Civil Police and 12 vehicles for the Civil Defense (automobiles, vans and trucks);
- BRL 258.7 million, only in 2019, in financial contributions to support the cities covered by the agreement with AMIG, where operations were halted, covering 10 municipalities in addition to Brumadinho (Barão de Cocais, Belo Vale, Congonhas, Itabirito, Mariana, Nova Lima, Ouro Preto, Rio Acima, São Gonçalo do Rio Below and Sarzedo).

• An additional BRL 107 million per year, transferred to the State Government, in ICMS taxes on the sale of Vale's ore to steel companies in another state.

• The company imported and donated DNA recognition equipment (Illumina) to the Belo Horizonte Forensic Medicine Institute (IML), which contributes to the work and speeds up the process of identifying the victims of the rupture. In addition the company purchased BRL 6.5 million worth of equipment to donated to the Institute.

Environmental Reparation

After almost a year of studies focusing on recovering the water quality of the Paraopeba River, more than 31,000 samples were collected at approximately 90 points along the Paraopeba and São Francisco Basin that resulted in more than four million analyses of water, soil, tailings and sediment, which meant to help monitor the conditions of the Paraopeba River. Such monitoring was carried out in consonance with the Instituto Mineiro de Gestão das Águas (IGAM in Portuguese) and showed that the sediment

plume did not reach the São Francisco River, which makes it possible to concentrate environmental recovery efforts in the Paraopeba River Basin.

Studies were also carried out to evaluate the potential toxic effects of the tailings present in the water and sediments of the Paraopeba River, by means of analyses of labouratory organisms. Such analyses have not indicated toxic effects on the river water to date. The company also collected more than 100 tailings samples along the basin of the Ferro- Carvão stream (including within Dam I).

The samples collected supported the characterization of the tailings to be "Non- Dangerous -Inert and Not Inert" waste according to ABNT Standard NBR10.004. The research and analysis work was performed by specialized labouratories and consultants, hired by Vale. The monitoring evaluated the effects of ongoing mitigation actions to act more effectively in reducing impacts.

At the end of May 2019, Vale invested in the construction of the River Water Treatment Station (ETAF acronym in Portuguese), located in the Alberto Flores region. Three months later, ETAF had already managed to return more than 1 billion litres of clean water to the Paraopeba River. The water treated at the station arrived with values around 6,300 NTU (turbidity measurement unit) and was returned to Paraopeba with turbidity below 29 NTU, on average.

The turbidity standard set by the National Environmental Council (Conama) for a class II river, such as Paraopeba, is up to 100 NTU. Still in 2019, Vale installed the second River Water Treatment Station in Brumadinho to work in integration with the dredging process of the Paraopeba River.

Dredging, an important stage in the environmental recovery of the Paraopeba River, the work is planned to continue in 2020, starting at the confluence of the Ferro-Carvão Stream with the Paraopeba River and continuing for about two km downstream from this point. In this stretch, it is estimated that between 300,000 m³ and 350,000 m³ of the material discharged by Dam I failure are deposited.

Through dredging, the accumulated waste is removed in the silted region of the Paraopeba. The removed material is stored and dehydrated in large bags, and then transported to an appropriate area in the Córrego do Feijão Mine. The water drained from these bags is pumped to a treatment plant and returns cleanly to the Paraopeba River. By December 2019, approximately 5.8 billion liters of treated water had been returned clean to the Paraopeba River and Ferro-Carvão stream.

Treatment of the Paraopeba River – Biome recovery

One of the main actions to rescue and care for animals after the dam rupture involved a multifunctional team of veterinarians, biologists, zootechnicians, among other environmental experts. These professionals who worked to track, rescue, monitoring and care for the local fauna throughout the affected area, covering both domestic and wild species.

Vale also plans to replenish the local flora, through reforestation and environmental reintegration in the impacted area. In 2019, it was possible to revegetate approximately 12 hectares. Other actions will start as soon as the set of tailings removal and containment works are at a more advanced stage. By 2024, five million seedlings are expected to have been planted to restore native vegetation throughout the impacted area. Part of these seedlings are grown simultaneously in Reserva Vale, in Espírito Santo, and in partnership with regional nurseries in the Cerrado biome.

To rescue seedlings, seeds and epiphytes from the target areas of suppression, we developed the Flora Conservation Program. By December 2019, nearly 1,600 specimens, from around 160 different species, were rescued. Among these species, orchids, cacti and bromeliads stand out, in addition to threatened or protected species. In addition, actions to conserve DNA from endangered species were part of our Recovery of Degraded Areas activities.

Treatment of the Paraopeba River – Ground Zero

The Ground Zero Project consists of reconstructing of the original conditions of the Ferro-Carvão Stream and the revegetation with native plants from the riparian forest region, in addition to recovering of the Paraopeba River. The area covered by the project starts at the curtain of metal piles, installed near the new bridge on Avenida Alberto Flores, continues for around 400 metres downstream along the Ferro- Carvão Stream and, after joining the Paraopeba River, goes for around another two kilometres along the river.

Dam Safety Recovery

After the Dam I rupture at the Córrego do Feijão Mine, Vale has accelerated its plan to decharacterize its upstream dams. The goal is to reintegrate these structures into the environment and, therefore, mitigate the risks they pose to people in surrounding communities. The plan considers all the upstream structures, including the drained piles, which were required to be decharacterized after a change in National Mining Agency (ANM in Portuguese) legislation. The project of de- characterizing of these structures has a foreseen investment of approximately USD 2.6 billion.

Dam Safety Recovery - Territories Evacuated by Dam Security Measures

One of Vale's priorities in 2019 was to invest in actions to ensure community safety and minimization of impacts. To this end, it launched a set of integrated actions for the communities of Macacos (Nova Lima), Barão de Cocais and Itabirito, which are part of the Impacted Territories Development Plan. Prepared according to the economic and social profile of each of these locations, the plan aims to develop the regions' economic vocations of the regions, in addition to promoting social well-being after changes in the emergency levels of the B3/B4 Dams, Sul Superior and Forquilhas.

With an investment of around BRL 190 million, the company aims to promote tourism, infrastructure, education, health, environment and professional training initiatives. The planning was built based on the demands and needs of the impacted territories, ongoing dialogue with the communities involved and municipal public authorities.

As a way to compensate the communities evacuated in Barão de Cocais, Macacos and Itabirito, Vale undertook a series of actions and programs, always focusing on caring for families and seeking to improve the living conditions of the affected populations. In these communities, the company aims to provide vital assistance to families. In total, 334 families (196 in Barão de Cocais, 125 in Macacos and 13 in Itabirito) are residing in houses rented by the company, hotels, regional inns, or in houses of friends and relatives, according to choices of those affected.

In addition, the company has placed multidisciplinary teams of psychologists, social workers and doctors at the disposal of these communities. This assistance aims to provide, for example, access to medicines and special food for those in need. Vale commitment is to continue supporting the hosted population until the situation is normalized.

New pact with society: proximity and transparency

The Dam I rupture changed the company's management - not only in terms of reviewing its governance, standards of operational excellence and safety, but also in its engagement with its stakeholders and commitments to local communities and society as a whole.

Vale is focused on regaining the trust of communities and stakeholders in general. For this reason, since the Dam I rupture, the company has been aiming to improve the community's ability to listen to and become involved in its participatory and decision- making processes. This will help the company to incorporate different views and finding more convergent paths, which generate value not only for shareholders, but for all the parties involved. The company also strives to implement actions to prevent events such as the rupture of Dam I from happening again. Vale's objective is to increasingly share its commitments and performance on all fronts of the company's operations and on all matters relevant to society.

The company has also assumed a commitment to implement actions to guarantee the non-repetition of events such as Brumadinho.

Commitment to People and Human Rights

However, the rupture of Córrego do Feijão Dam I in Brumadinho, caused the company to review the governance and processes of operational risk assessment, human rights and remediation, among others, seeking to make the necessary adjustments in its performance with the goals of ensuring respect for people and regaining the trust of society.

Health and Safety

Life matters most is one of our values. We believe that life is more important than results and material goods, and we incorporate this vision in business decisions.

The rupture of Dam I at Córrego do Feijão Mine, in Brumadinho, like every catastrophic event of this magnitude, produced a revision of the risk management model practiced by Vale so far,

leading it to reformulate the safety management model of production processes, while maintaining advances achieved.

We deeply regret the 270 lives lost due to the rupture of Dam I of the Córrego do Feijão Mine

in 2019. Among them, we recorded a total of 240 confirmed fatalities among company employees, with 123 employees, 117 contractors from outsourced companies, in addition to 11 people not yet located. In addition to these fatalities, Vale also recorded a fatality with a third party in Tubarão (Espírito Santo State) and a fatality with its own employee in São Luís (Maranhão State).

Commitment to the Planet

Respect for the environment is an essential condition to ensure the continuity of Vale's operations, which depends on these environmental resources. Nevertheless, mining has great impact on the territories and its natural attributes where it is undertaken. Therefore, within this context, Vale has developed and uses, in all areas where it operates, an environmental management system that maps environmental risks and attempts to prevent and mitigate those risks, and minimize, compensate and remediate environmental impacts caused.

However, in 2019, the rupture Córrego do Feijão Mine Dam I in Brumadinho led the company to review its behaviours, processes and relationships both with the environment and the communities. We have reviewed our policies and procedures, many of which are related to environmental aspects.

Dams Management

Although the proper management of tailings storage facilities was always considered a critical aspect for Vale, the company has redoubled its efforts to increase the rigor of the process Risk Management following the rupture of Dam I at the Córrego do Feijão mine, in Brumadinho (MG).

Since then, the company has revised its dam management model, starting by the implementing a new governance model with global reach. One of the initial steps was to create a corporate area called the Tailings Department within the new Executive Office of Safety and Operational Excellence, which reports directly to the company's CEO.

Another action taken was the adequacy of the dam safety management system to the three-line 124

defense model adopted by Vale for its risk management. Within this logic, the 1st Line of Defense is formed by the risk owners and business processes executors in project and administrative and support areas of the company. They are directly responsible for identifying, evaluating, monitoring and managing risk events in an integrated manner. The 2nd Line of Defense corresponds to the areas of occupational safety, risk management, standardization, legal compliance and specialized areas such as operational excellence and asset management, supervising and supporting the First Line of Defense. The 3rd Line of Defense is composed of areas totally independent from the administration, which are the Internal Audit and the Ethics and Conduct Office.

Taking into account their respective areas of operation, these areas produce evaluations and inspections that result in an exempt validation and that includes the effectiveness of risk management, internal controls and compliance.

Other structural actions to improve dam management were:

- Technical analysis of all dams' history and current conditions, with preparation of studies "As-Is", paying special attention to structures whose original projects do not have the required data completion and precision (most of these structures were acquired by Vale in past mergers);
- Additional reinforcement to increase the safety factor of the dam when necessary;
- Creation of the Independent Committee for Extraordinary Dam Safety Advisory (CIAESB in Portuguese), reporting directly to the Board of Directors;
- Formation of a specific Executive Committee for geotechnical risks;
- De-characterization of upstream dams, according to state and federal legislation, to remove the function of these dams and reintegrate the areas into the environment;
- Projects to develop alternative methods of tailings deposition to avoid new dams construction of or the need to elevate existing ones;
- Implementing and operationalizing Geotechnical Monitoring Centres (CMG in Portuguese);
- Implementing of the Basic Geotechnical Guidelines (DBG acronym in Portuguese), a tool that aims to improve the routine safety management of geotechnical structures and give their owners greater visibility on their performance.

To intensify the frequency of monitoring its structures, Vale has implemented the Geotechnical Monitoring (CMG) at the Águas mine Claras, in Nova Lima (MG) and Itabira (MG), with the monitoring 24 hours a day, 7 days week, from a group of dams, including upstream.

Appendix D - Vale's Response at the BHRRC – June 2016

Rio de Janeiro, June, 2016

Vale response to the allegations publicized at / Resposta da Vale às alegações publicadas em:

http://www.cidse.org/articles/business-and-human-rights/extractive-industries-inlatinamerica/shareholders-denounce-vale-s-irresponsible-social-environmental-andmanagementpolicies-at-annual-general-meeting.html

The responses are available in English and in Portuguese. As

respostas estão disponíveis em inglês e português.

Response in English

Causes of the Samarco accident

The Fundão dam of Samarco suffered a partial rupture on the afternoon of November 5, 2015, in the municipality of Mariana, in Minas Gerais, which resulted in the dragging of part of the mining tailings contained therein and the overtopping of the dam of Santarém. It is not possible at this time to confirm the causes of the accident.

Samarco opened a channel for the public aiming to clarify, in a transparent manner, all the details about the case. Access: <u>http://bit.ly/Samarco.</u>

The Samarco accident and Vale's results

As a shareholder in Samarco, together with BHP Billiton, Vale has been participating actively in measures to guarantee the safety and the fundamental rights of the people affected by the accident. Since the first day, we have been providing human and material resources to aid Samarco. However, these expenses did not affect the Vale's 2015 results, as reported in our Form 20-F.

It is important to highlight that in Vale's 2015 20-F there is the following risk factor disclosed

to investors: "Our obligations under a settlement agreement arising from the failure of Samarco's tailings dam could have a material impact on our financial condition."

Samarco and its shareholders, Vale and BHPB Brasil Ltda. ("BHPB"), a Brazilian subsidiary of BHP Billiton plc ("BHP Billiton"), entered into a settlement agreement on March 2, 2016 with governmental authorities, including the federal Attorney General of Brazil and the two Brazilian states affected by the failure (Espírito Santo and Minas Gerais). Under the agreement, Samarco, Vale and BHPB will create a foundation to develop and implement remediation and compensation programs in substantial amounts over many years."

"Samarco is currently unable to conduct ordinary mining and processing. Samarco's management is working on a plan that would permit it to resume operations, but the feasibility, timing and scope of restarting remain uncertain. If Samarco does not meet its funding obligations, each of Vale and BHPB is obligated to provide funding to the foundation in proportion to its 50% interest in Samarco. Vale does not currently expect to record a provision in its financial statements in respect of these obligations, but if Samarco is eventually unable to resume operations or to meet its funding obligations, Vale could determine that it should recognize a provision."

Agreement established between Samarco, Vale e BHP Billiton and Federal, Minas Gerais and Espírito Santo governments

The Agreement provides for a long-term remedial and compensation framework to address the impacts of the Samarco accident. Samarco, Vale and BHP Billiton Brasil will establish a Foundation that will develop and execute environmental and socio- economic programs to remediate and provide compensation for damage caused by the Samarco dam failure.

The funds to the Foundation will be provided primarily by Samarco. Samarco is currently unable to conduct ordinary mining and processing. Samarco management is working on a plan that would permit it to resume operations, but the feasibility, timing and scope of restarting remain uncertain.

Samarco and its shareholders are hopeful that Samarco will be able to resume operations and to generate all or a substantial part of the funding required under the agreement. To the extent Samarco does not meet its funding obligations, each of Vale and BHP Billiton Brasil is liable in proportion to its 50 per cent shareholding in Samarco.

The agreement was ratified by the Federal Court of Brazil, at a conciliation hearing held on May 5th, at the Federal Regional Court of the 1st Region.

Belo Monte

Vale's 4.59% interest in Belo Monte is in line with its strategy to guarantee availability of electric power in the long term for its operations and in line with the Brazilian commitment to reduce greenhouse gases emissions.

In March 2015, Vale transferred its 9% stake in Norte Energia Participações S.A. (the Belo Monte hydroelectric power plant) to Aliança Norte Energia Participações (Aliança Norte), a joint venture between Vale and Cemig Geração e Transmissão S.A. (Cemig GT).

Vale now indirectly holds a 4.59% interest in Belo Monte, while Cemig GT has a 4.41% stake in the project through Aliança Norte. This reduction in Vale's interest in Belo Monte is in line with its global strategy to focus on its core business, without harming the availability of electric power for its operations.

Since its entry into the Belo Monte project, Vale has hired professionals with extensive experience in the implementation and operation of hydropower projects, especially in studies of environmental and socioeconomic impacts and indigenous issues. This allows Vale to track and verify that these issues are being addressed appropriately, from planning to execution of the project, aiming at positive results and improving the quality and living conditions of the communities established in the region where the project is being built.

Throughout its development, the plant design was deeply modified in order to restrict the impact of the activities on the environment and on the local population. The flooded area was reduced by 60 %, compared to the original design. The plant complex,

including reservoirs, roads, transmission lines, camps and other auxiliary structures, will occupy 559 Km2. Of this total, 156 km2 (27%) needs to be deforested as the rest of the area consists of the riverbed and nonnative vegetation types, such as pastures, cultivated areas, and areas of mineral extraction.

The Belo Monte project has taken necessary precautions not to flood any indigenous lands and to avoid impacts in implementing the construction of sites, access roads, dam and other engineering structures needed to build the project. There are also no plans to resettle villages, in line with the project's commitment to reduce its impacts on the surrounding area and local communities.

During its implementation phase, the project is investing around R\$4.23 billion in social and environmental initiatives, of which R\$3.74 billion had been spent by March 2016 (88% of the total planned amount). The remaining disbursement will happen until 2019.

The management of social and environmental aspects is guided by the Basic Environmental Plan, which is being implemented through 117 programs, plans and projects, encompassing social, indigenous, land-related and physical-biotic investments, aimed at compensating for and mitigating the potential impacts identified in the environmental viability studies.

Social investments in local municipalities and indigenous communities represent around 60% of the budget, covering social, cultural, economic and infrastructure aspects.

In December 2015, about R \$ 2.282 billion had been invested in social investments, being R\$ 497.83 million in health and sanitation, R\$ 769,81 million in land acquisition and regularization, social communication, economic recovery for the population, preservation of cultural heritage and support for surrounding municipalities.

The modernization of the infrastructure of the city of Altamira was made, with the construction of a linear park with 20 hectares, 7 new bridges in concrete and two pedestrian bridges. The entire city waterfront was also revitalized with the construction of artificial beaches and structures for marketing of fish and maintenance of vessels.

We highlight initiatives to monitor and improve health, education, training, income generation and appreciation of cultural and intangible heritage. Of these investments,

108 projects have been completed to build or renovate schools, benefiting 12,000 students from public education.

In the health area, 20 new primary health care units and a hospital with 104 beds were built and already delivered to Altamira Prefecture. Until October 2015, R\$ 5.220 million had been invested in teams for the implementation of the Family Health Program (PSF). We highlight the strategic investments to reduce cases of malaria in the region, achieving significant results with the reduction of 99.1 % of recorded cases in the period from 2011 to 2015.

In the area of public safety, US\$ 70 million were addressed to infrastructure and equipment investment through an agreement between Norte Energia and the Secretariat of Public Security of the State of Pará.

As part of social and environmental requirements related to the creation of Belo Monte's reservoir, work is under way to comply with the National Solid Waste Plan, which has involved remediating existing dumps, completed in October 2012, and implementing sanitary landfills, in operation since early 2013, for the municipalities of Altamira and Vitória do Xingu, benefiting a population of approximately 120,000 people.

Also in 2013, work began on building these municipalities' entire water and sewage systems, involving investments of around R\$500 million and completed in late 2014, significantly improving the way urban waste is disposed of in the region, where conditions used to be much worse than in Brazil as a whole.

As the reservoir is formed, the urban population previously living in areas of "palafitas" (houses on stilts) in the city of Altamira has being resettled in new neighborhoods. R\$ 727.36 million were invested in the construction of five new neighborhoods with all sanitation infrastructure, education and leisure in the city of Altamira, where the families living in the bayous region were relocated.

The implementation of the Basic Environmental Plan also involves actions for the physical biotic environment, including research, monitoring and environmental conservation activities. These mitigation and compensation initiatives include a Conservation Unit Implementation and Management Action Support Project, an Action Plan to Conserve Endangered and Endemic Fauna and Flora Species in the Lower and Middle Xingu Region, and an agreement with the Chico Mendes Institute for Biodiversity Conservation (ICMBio), encompassing more than 90 conservation initiatives. Other notable measures include the implementation of a tree nursery, the restoration of degraded areas, water quality monitoring and control, and encouragement for sustainable fishing.

To meet the commitments provided for in the environmental licenses, the programs defined for the Basic Environmental Plan – Indigenous Component (PBA-CI), overseen by the National Indian Foundation (FUNAI), establish thematic areas of activity that consider the indigenous people's expectations identified in consultation meetings held before the issuing of the environmental licenses.

These programs cover Territorial Management, Special Indigenous People's Health, Indigenous People's School Education, Material and Intangible Cultural Heritage, Institutional Strengthening, Reallocation and Resettlement of Indigenous City Dwellers in Altamira, Environmental Supervision, Non-Indigenous Communication, and productive activities involving a variety of subsistence and income-generation projects for indigenous communities.

There is also an infrastructure program for villages in the Belo Monte hydroelectric power plant's area of influence, involving various works already executed, such as the following: Territorial Protection Units to support government actions to monitor indigenous lands; construction of an Indian House in Altamira to support indigenous village dwellers who are passing through the city; landing strips to support aeromedical removals; highway renovation and maintenance; construction of flour mills; installation of a water supply and distribution system in villages (including artesian wells); and construction of sewage collection and treatment facilities.

Work is also under way to build schools and basic health facilities in the 34 villages located in the project's area of influence, besides other initiatives contained in the PBA- CI's Operating Plan.

In programs for indigenous peoples, of the R \$ 463.35 million expected to be invested by the end of 2016, more than R\$ 287.7 million were already employed in the construction of 711 houses, 34 basic health units , 29 water supplies systems, 21 airstrips and 34 houses for production of cassava flour in the villages. The Basic Environmental Plan – Indigenous Component benefits now about 3 500 indigenous residents of the villages located in the vicinity of the project.

During the first two years, heavy investment was also made to support indigenous communities by donating a wide range of items, such as boats, boat engines, motor-generators, vehicles and fuel to support subsistence activities and cultural activities, as well as other items to improve the people's quality of life.

The project's environmental licensing process also required the execution of initiatives to contribute to governmental strategies for the socioeconomic development of the Xingu region. To this end, in partnership with the state and federal governments, we highlight the Xingu Regional Sustainable Development Plan (PDRSX), which has a total budget of R\$500 million. This plan is aimed at implementing public policies in the following areas: Territorial Ordering and Land Use Regularization; Infrastructure; Promotion of Productive Sustainable Activities; Social Inclusion; and a Management Model for Large Construction Projects.

Environmental and social issues, among other strategic topics, are discussed by the Environmental Advisory Committee, whose members are appointed by Norte Energia's shareholders. Vale, through Aliança Norte, appoints one representative to this committee and a respective alternate member until the end of the Belo Monte hydroelectric project's implementation phase.

Starting from the operational phase, Cemig GT and Vale will then alternately appoint their representative every three years. The committee's main objective is to analyze social and environmental subjects and recommend whether or not to approve measures

to Norte Energia's Board of Directors, which is composed of 12 members appointed by shareholders

Through Aliança Norte, Vale appoints one member and a respective alternate member to NorteEnergia's Board of Directors, with the right to one vote at meetings, where subjects need to be approved by a vote of at least eight members. Vale and Cemig GT alternately appoint Aliança Norte's member of the Board of Directors every three years, as determined in Aliança Norte's shareholders agreement.

Regarding the media reports about the corruption scheme related to Belo Monte, as a result of these allegations, Eletrobrás hired specialists to conduct an internal investigation on Norte Energia. To date, there was no conclusive report.

We emphasize that the acquisition by Vale of stakes in the project occurred in 2011, a year after the auction was done, and when the construction contracts were already signed.

Vale's administrator's remuneration

Under our bylaws, our shareholders are responsible for establishing the aggregate compensation we pay to the members of our Board of Directors and our Board of Executive Officers, and the Board of Directors allocates the compensation among its members and the Board of Executive Officers.

Our shareholders determine this annual aggregate compensation at the general shareholders' meeting each year. In order to establish aggregate director and officer compensation, our shareholders usually take into account various factors, which range from attributes, experience and skills of our directors and executive officers to the recent performance of our operations. Once aggregate compensation is established, our Board of Directors is then responsible for distributing such aggregate compensation in compliance with our bylaws among the directors and executive officers. The Executive Development Committee makes recommendations to the Board concerning the annual aggregate compensation of the executive officers. In addition to fixed compensation, our executive officers are also eligible for bonuses and incentive payments.

Fixed compensation and in kind benefits include a base salary in cash, paid on a monthly basis, reimbursement for certain investments in private pension plans, health care, relocation expenses, life insurance, driver and car expenses.

Variable compensation consists of (i) an annual cash bonus, based on specific targets for each executive officer, approved by our Board of Directors, and (ii) payments tied to the performance of our shares under two programs, the Matching Program and the Performance Shares Units (PSU).

Profit Sharing of Vale employees

The Profit Sharing of employees is calculated based on individual and team results and on company's performance, having the cash flow and the spending on current investments as a trigger. This indicator was below the set trigger, so there was no payment of Profit Sharing in 2016.

The value of the trigger, measured by the cash generation indicator (Operating Cash Flow minus Current Investment), is \$ 5.9 billion. As the value obtained was below the trigger, the Profit Sharing was zero.

The current model was created with the aim of strengthening the emphasis on meritocracy and more accurately reflect the company's results. This methodology was negotiated and approved by the Unions through Collective Agreements signed in 2014, to take effect in 2014 and 2015.

Resources allocated for repairing and compensation of Samarco's accident

On March 2nd, 2016, Samarco Mineração S.A (Samarco) and its two shareholders, Vale S.A (Vale) and BHP Billiton Brasil LTDA (BHPB Brasil), have entered into an agreement with the Federal Government, represented by the Attorney General of Brazil, the States of Espírito Santo and Minas Gerais and certain other public authorities (Brazilian Authorities) for the restoration of the environment and communities affected by the Samarco dam failure on November 5th, 2015 ("Agreement").

The Agreement establishes the obligation for Samarco, Vale and BHPB to create a private foundation, that will be responsible for implementing about 40 socio-economic

and environmental programs to address the impacts of the accident. The document contains the emergency actions that have been conducted by Samarco since November, 2015, and proposes mid-term and long-term projects to remediate and compensate the impacts arising from the dam rupture.

According to the Agreement, Samarco shall contribute to the Foundation the total amount of R\$ 4.4 billion, during its first three years, to fund the projects. From 2019 to 2021, annual contributions to the Foundation will be set according to the annual implementation of the remaining planned remediation and compensation projects. The annual reference values for these contributions will be between R \$ 800 million and R\$

16 billion. In the following years, Samarco's contribution will be set on amounts sufficient for the execution of the remaining projects of the programs established under the Agreement. To the extent Samarco does not meet its funding obligations, each of Vale and BHP Billiton Brasil is liable in proportion to its 50 per cent shareholding in Samarco.

Samarco accident and the Krenak

Since 1997, Vale has established a relationship and support actions with the Indigenous People Krenak, when the group had its his territory officially established, boarding 6.5 km along the Doce River and the Estrada de Ferro Vitória Minas (EFVM), operated by Vale since 1940.

In November 2015, Vale started emergency additional support to the Indigenous People Krenak focused on water supply among other inputs in order to minimize the immediate effects resulting from the Fundão Dam accident. Currently, Samarco is assuming the conduction of the actions related to the accident.

Appendix E - Vale's Response at the BHRRC – April 2019

To Business & Human Rights Resource Centre

Rio de Janeiro, April 8th, 2019.

Referent to Invitation to Respond dated of March 23rd, 2019.

Dear Sirs/Madams

On behalf of Vale we deeply regret the event. We ensure you efforts are not being measured in order to adequately assist the families of the victims and the affected communities as well as to ensure the safety of our operations and the non-repetition of this event.

On March 23rd, 2019, we received the "Invitation to Respond" related to the online publication *Brumadinho dam: NGOs urge companies and investors to use leverage and require Vale to remedy the situatio¹*. The online publication mentions the weblink to 2 letters signed by 86 NGOs: (i) one directed to "companies linked to the activities of Vale", mentioning investors and business partners, and (ii) another to "companies linked to the supply chain of Vale".

In these letter – identical in content – there is an introduction with the presentation of some information and some inferences regarding Vale's operations and the dam breaks on 25/01/2019, in Brumadinho, and on 05/11/2015, in Mariana – ran by SAMARCO. Then, in a second part, the letter then mentions 4 points towards which the signing organizations urge the recipients to leverage and influence Vale to observe.

Vale respectfully thanks for the opportunity of this Invitation to Respond by means of which will be able to share up to date information and publicly present its position.

Firstly, in is worth mentioning that Vale adopted a set of measures after the Fundão dam break in Mariana, in 2015, aiming to prevent the occurrence of a similar event in its direct operations. Even though Fundão was operated by SAMARCO – a joint-venture of Vale itself and BHP Billiton – Vale could observe and learn lessons with the event and about the tragedy. Since then Vale has revised its structured dam management system which encompasses technical and governance measures. Important investments were made for the improvement of processes seeking always the best operational techniques and technologies in order to ensure the stability of the structures. Some of the main actions part of the safety system are:

- Periodical Dam Safety Reviews, with specialized companies;
- Detailed Emergency Action Plans;
- System of alert in events of emergency (sirens);
- Detailed dam break studies, with in field data collecting using the high precision equipment;
- Registration of populations downstream of structures;
- New owned seismological network for assessment of seisms;
- Hiring of an International Specialists Panel with reputed professionals on world Geotechnics and Risk Management.
- Hiring of a National Specialists Panel with reputed professionals on Brazil Geotechnics and Risk Management.

Monitoring management system and structure inspections by means of which the identified actions for ensuring the stability of each structure is automatically attributed to the person responsible to perform it;

- Automated system of dam monitoring with direct communications to the monitoring management system;
- Video monitoring system;

- Structures information management system to ensure transparency and reliability of information;
- Integration of geotechnics systems to ensure automated update of the Plan of Dams Safety.

It is also worth mentioning that from 2015 to 2019 Vale has applied around 5 billion Brazilian reais in dam maintenance and health and safety. Specifically, regarding dams and sterile piles 3,14 bi were invested in the period, 784 mi only on dams. Thus, the investments on dam management went from 92 million Brazilian reais per year in 2015 to 256 in 2019, an increase of approximately 180%.

Regarding the Fundão dam break, it is important to reclarify that after the event the Fundação Renova was created under the observance of a public agreement among SAMARCO, Vale, BHP and public bodies of different federative levels. The foundation has already spent 745 million Brazilian reais in the Mediated Indemnifications Program and other 845 mi on Emergency Financial Support. In total more than 5.5 billion Brazilian reais were spent so far, of which 5.06 mi on reparatory measures and 0.43 on compensatory ones. These funds correspond to social-economic (3.55 mi) and to (1.95 mi) programs. Half of all the funds to Fundação Renova come from by Vale itself and the other from BHP. This and more information is available at the foundations' website.

Regarding the humanitarian immediate assistance and the integral reparation to the persons affected in Brumadinho Vale has set up, from the very dam break moment, a wide response.

In consequence to the dam break that reached the Paraopeba river the use of water of the river was contraindicated from Brumadinho to Retiro Baixo Hydroelectric Power Plan Dam, in the municipality of Pompéu. Such recommendation was issued by the State Secretariats for Health, Environment and Sustainable Development and Agriculture, Livestock and Supply. The National Water Agency, the Minas Gerais Sanitation

Corporation the Mineral Resources Explorations Corporation and the Minas Gerais Institute of Water Management conduct a daily assessment of the river and publish it at SEMAD's website⁻

Since the dam break Vale has been offering potable water for irrigation, animal and human consumption to the ones affected. Firstly, Vale has used the data base provided by the Minas Gerais Company for Rural Technical Support and Extension¹⁴ to map rural properties in the affected area. Besides that, Vale's teams stated active searches of rural properties with possible difficulties with water.

Vale also received information and water requests directly in the Help Center set in Brumadinho, by means of the free hotlines *Alô Ferrovias* 0800 285 7000, *Alô Brumadinho* 0800 031 0831 and *Ouvidoria Vale* 0800 821 5000 (and also bay means of the Water Line

(21) 3485-6632 – for collect calls as well), and by the email: <u>frenteagropecuaria brumadinho@vale.com</u>, and in local meetings with farmers and communities.

So far, more than 56.44 million liters of potable water¹⁵ were delivered by Vale to the affected persons for irrigation and for consumption by livestock and domestic animals, and persons themselves. Of that total 1.22 million liters are mineral bottled water. Besides the direct provision of water, Vale has offered water tanks to the affected families having delivered 118 units so fat.

Emergency construction works were ready stated in order to de-obstruct and rehabilitate the

roads. The main obstruction, in the Alberto Flores road, is under work and will be solved by means of the construction of a bridge/overpass over the waste on the road. Construction works are expected to be concluded by mid-April. Besides that, secondary roads are constantly

under maintenance in order to ensure its usability. Also in order to provide an alternative

pathway for the community Vale has permanently authorized on February 14th, 2019 the use of its private road that goes through the Córrego do Feijão Mine.

Besides the alternative pathways, Vale has provided school transportations, ambulances (29/day at peak demand), cars/taxis (3786 trips so far), vans and busses (1856 seats available per daily at peak demand, 1445 currently) to assist the needs of the persons affected, including fixed routs of transportation.

In order to provide emergency support to the affected persons and families Vale has provided – apart from any future indemnification – donations to the families of missing or deceased persons, as well as for persons with residence and/or commercial/productive activities in the "Self-Saving Zone". These donations, with no legal nature of indemnification, are being paid to the persons affected under the following terms:

- The donation in the amount of 100,000.00 Brazilian reais is intended for representatives of Vale's direct employees and contractors and members of the community that are missing or deceased, according to the official list validated by the Civil Defense State Coordination and made available on the vale.com/Brumadinho. The registry for receiving these donations began on January 31st, 2019 observing the widely publicized criteria also available in Vale's website. So far 271 donations have been paid.
- For the persons whose homes were completely or partially in the "Self-Saving Zone" Vale has made available the donation of 50,000.00 Brazilian reais. The registry for receiving these donations began on February 11th, 2019 observing the widely publicized criteria also available in Vale's website. So far 94 donations have been paid and 3 other are under payment process.

• For the persons with their productive and/or commercial activities completely or partially in the "Self- Saving Zone" Vale has made available the donation of 15,000.00 Brazilian reais. The registry for receiving these donations began on February 11th, 2019 observing the widely publicized criteria also available in Vale's website. So far 78 donations have been paid and 3 other are under payment process.

It is important to explain that these three categories of donations have no indemnification character and will be agreed upon with participation of the authorities. The donations may be cumulative, is the person in in more than on category. So far 33,020,000.00 Brazilian reais were paid to the persons affected in Brumadinho.

Besides these actions, Vale has been offering transportation and accommodation for the persons affected that were forced out of their homes because of the dam break. Vale has been providing transportation and accommodation also for families accompanying persons in hospitals, search for survivors/corpses and for body identification in the Institute of Legal Medicine of Minas Gerais.

Moreover, Vale has provided temporary housing for the persons accommodated in hotels that cannot return home either because their homes have been directly affected by the dam break or because such homes are located in restrict areas isolated by public authorities for

security or phytosanitary reasons. There are currently 90 families in this condition. 70 of those families have already been accommodated in temporary homes, rented by Vale, other 13 are in process of accommodation, waiting in hotels, and other 7 are living in houses of relatives, because they preferred so. For the cases when it was possible to transport the furniture was it was taken to the temporary homes and complemented as needed. On the other cases, complete new furniture was provided.

The temporary homes include the payment of rent and fixed expenses (real estate tax, water, power and gas bills) until the conclusions of the indemnification process; a standard furniture and layette kit; transportation of the previous furniture of the families and pets; pet food; basic goods basked until the beginning of payment of the indemnification anticipation. For families that chose to move in with other members of their families, complementary furniture and layette are also provided.

Considering the emergency character of the situation, Vale has agreed to provide monthly payments – as emergency indemnification – to the inhabitants of Brumadinho and the riverside from Brumadinho to Retiro Baixo Hydroelectric Power Plan Dam, in the

municipality of Pompéu. The monthly payment will be of 1 federal minimum wage²⁷ per each adult, 1/2 per each teen and 1/4 each child, from January 25th on, for one year. In a hearing held on April 4th, 2019 Vale agreed that the emergency payments will not be deducted from personal indemnifications and will be compensated from the collective socialeconomic damages to be defined at the end of the process. So far fore than 3000 persons have received the emergency payments and more than 12000 are programed to be executed by means of phone contacts and in in one of the 7 registry points set by Vale.

Furthermore, Vale has agreed in a Public Civil Lawsuit hearing on March 7th, 2019 to pay the equivalent of "Basic Goods Basket" to the members of the communities of Parque da Cachoeira e Córrego do Feijão for 12 months starting on January 25th, 2019.

Vale follows a robust agenda of respect and recognition of its direct employees and contractors and of complete respect for the right to unionization. Following these precepts vale agreed in a Public Civil Labor Lawsuit to the following commitments:

- Keep the payment of 2/3 of the salaries of its deceased direct employees and contractors until a definitive indemnification settlement is reached;
- Keep the full payment of the salaries of the missing employees and contractors;
- Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st, 2019;
- Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to widows/widowers – for life – and to dependents (i.e. children) until they are 22 years old;
- Psychological care for workers until clinical release;
- Day-care stipend of 920 Brazilian reais to employees' until they are 3 years old;
- Education stipend of 998 Brazilian reais to employees' until they are 18 years old

Regarding the damage control, Vale has taken emergency measures in order to restrict and reduce the impacts of the dam break. Following those first measures Vale has prepared and

presented to the applicable authorities the "Emergency Plan for Containment of Dam B1 Waste and Reparation of Impacted Areas". Among the many measures, for example, there is the setting up of filtrating membranes in Paraopebariver.

These membranes are physical barriers that reach the river bed contributing for the containment of waste and reducing the turbidity of the water. A comprehensive definitive plan is under construction by Vale in dialog with all relevant stakeholders.

Regarding the investigation on the event and the establishment of a body to follow such investigations and issue recommendations Vale clarifies that by determination³¹ of its Board of Directors on January 27th, 2019 two Extraordinary Independent Consulting Committees were created to report directly to the Board of Directors to be "external independent members, with unblemished reputation and with experience in the subjects of their respective occupations". The committees are:

- Extraordinary Independent Consulting Committee for Support and Recovery (CIAEAR) monitoring the measures of assistance to the impacted people and recovery of the impacted area.
- Extraordinary Independent Consulting Committee for Investigation (CIAEA) investigating the causes.

Days later the Board of Directors determined³² the creation of a third committee:

• Extraordinary Independent Consulting Committee for Dam Safety (CIAESB) - providing recommendations of actions to strengthen safety conditions of dams.

These three Committees have the objective to follow and advise in the actions taken by Vale as well in the investigation of the event and the present situation externally and independently. Hereunder the composition of the mentioned Committees:

Extraordinary Independent Consulting Committee for Support and Recovery (CIAEAR)

- Leonardo Pereira (external independent member Chairperson of the committee) President at Comissão de Valores Mobiliários (CVM) from 2012 to 2017. Independent
 Advisor of the Oversight Advisory Committee of the World Health Organization.
 Engineer and economist. Masters in Administration by Warwick University and
 specialization by AOTs, Japan. Visiting Fellow at Harvard Law School for negotiation
 and corporate governance. Global experience of more than 25 years in the capital
 markets.
- Ana Cristina Barros (external independent member) 30 years dedicated to the defense of the environment and sustainable development. Served as National Secretary of Biodiversity and Forests in the Ministry of Environment. Accomplishments: design and promotion of the Rural Environmental Registry, support for the creation of Conservation Units and national policies for management of indigenous lands, negotiations with the Global Environment Fund and representation of Brazil in the assessment of its Biodiversity Policy by the OECD.
- Márcio Gagliato (independent external member) Masters in Social Psychology (PUC) and PhD from the Faculty of Public Health (USP). Technical Consultant for United Nations agencies and international non-governmental organizations, more than 12 years of experience in humanitarian responses, including actions in Libya, Iran, Syria, Gaza, South Sudan, Somalia, Zimbabwe among others. Awarded with Fellowship Programme in Human Rights by the University of Columbia (NY). Specialist in emergencies by the Pan American Health Organization and participation in the "Reference Group of the Permanent Interagency Committee on Mental Health and Psychosocial Support in Humanitarian Emergencies".

Extraordinary Independent Consulting Committee for Dam Safety (CIAESB)

• Flávio Miguez de Mello (external independent member - Chairperson of the committee) - Civil engineer with specialization in hydraulics (1967) from the Federal University of Rio de Janeiro (UFRJ), with master's degree in Geology
Science (1975) from UFRJ. Miguez is a reference in engineering of dams. He has taken courses and trainings in the USA, Canada and Portugal, has been teaching courses at several universities since 1968, has published more than 100 technical papers in Brazil and abroad, and has managed consulting companies and technical institutions in Brazil and abroad, among which, the International Commission of Large Dams, the Brazilian Committee on Dams, the National Academy of Engineering in Brazil, the School of Engineering of UFRJ, and received several academic and professional awards. He has worked on several dam projects in Brazil and abroad.

Willy Lacerda (external independent member) - Graduated in Civil Engineering by Escola Nacional de Engenharia da Universidade do Brasil (1958), Masters' degree in Geotechnical Engineering from University of California - Berkeley (1969) and PhD in Geotechnical Engineering from University of California - Berkeley (1976). He participated in the creation of the Geotechnical Institute of the city of Rio de Janeiro in 1966. During his teaching as a professor at COPPE - Federal University of Rio de Janeiro (UFRJ), from 1967 to 2007, he supervised over 50 Masters' theses and 18 PhD dissertations. He has over 150 published papers in journals and academic congress publications. He is currently a collaborating professor at COPPE - Federal University of Rio de Janeiro (UFRJ). He has experience in Civil Engineering, with emphasis in slope stability, mainly acting on the following matters: embankments on soft clay, earth dams, landslides, slope stability, collapsible soils, soil mechanics and tropical soils. He was President at Brazilian Association of Soil Mechanics and Geotechnical Engineering (ABMS) from 1996 to 2000, where he currently is a partner and permanent member of the Board of Directors. Former president of JTC1 - Joint Technical Committee on Landslides and Engineered Slopes, of the following three international societies: ISSMGE, ISRM and IAEG - from 2006 to 2010, where he currently stands as one of its core members. He received the title of Emeritus professor of UFRJ in October 2010. He was nominated for the

National Academy of Engineering in Brazil (ANE) in 2012. He was nominated

as Eminent Professor by Escola Politécnica of UFRJ in 2015. He is the coordinator of INCT - Geotechnical Institute for Rehabilitation of Slopes and Plains - REAGEO since 2008.

Pedro Repetto (external independent member) – Mr. Repetto is a licensed civil- geotechnical engineer with over 50 years of experience in over 500 projects in 28 countries, including Brazil. Before becoming an independent consultant in 2008, he was Principal and Vice President of URS Corporation in Denver, where he served as Mining Business Line Manager, Office Manager, and Manager of the Engineering Division, the Civil/Geotechnical Group, and the Mining Group. His areas of expertise in the mining industry include tailings storage facilities, heap leach facilities, waste rock dumps, pit slope stability and foundations for mining structures. He has participated in the design and evaluation of dozens of tailings facilities comprising all types of tailings deposition technologies, including conventional slurry, highdensity thickened tailings and dry stacking (filtered tailings). Mr. Repetto was a Principal Professor of Geotechnical Engineering at Catholic University of Peru for over 20 years. He served as an expert to the Federal Institute for Geosciences and Natural Resources of Germany for the organization and teaching of continuing education courses on mining wastes, including tailings. He has served as a Principal Investigator or co-Principal Investigator for three National Science Foundation-sponsored earthquake engineering research projects.

Extraordinary Independent Consulting Committee for Investigation (CIAEA)

• Dra. Ellen Gracie (external independent member - Chairperson of the committee) - Former Minister of the Federal Supreme Court and of the Electoral Superior Court, President of the Special Committee for Investigation

at Petrobras, President of the Special Committee for Investigation at Eletrobras.

- Jose Francisco Compagno (Leadership Partner of the Forensic Department at EY from 2002 to 2018, and Leadership Partner for Transaction Support from 2001 to 2005. Auditing Partner at Arthur Andersen from 1998 to 2001. Director of Auditing at Coopers & Lybrand Auditores Independentes from 1987 to 1998. Graduated in Accounting Sciences at FMU - SP. Member of the Executive Committee at EY from 2016 to 2017.
- Manuel de Almeida Martins (external independent member) Civil Engineer graduated by the School of Engineering of the Federal University of Rio de Janeiro (UFRJ) in 1971, with specialization in geotechnical engineering and dam engineering. He carried out activities for thirty years in studies, project detailing, construction monitoring, supervision, quality control, monitoring and assessments on safety of dams and foundation works in large Brazilian companies as a geotechnical engineer and department manager specialized in geotechnics. In the last twenty years, he has worked as an Independent Consultant in geotechnical engineering for infrastructure projects, mainly dams.

Moreover, Vale has widely collaborated with all investigations voluntarily handing information, registries and files to the authorities as well as determining that all employees openly collaborate with the authorities.

Regarding the dam safety verification, risk assessment and efforts for non-repetition, Vale reiterates the independent actions of the CIAESB. Besides that, considering the more conservative risk assessments some operations were stopped and the persons in the respective Self-Saving Zones and/or Secondary Saving Zones of some dams were evacuates.

They are:

• Sul Superior dam, Gongo Soco Mine, Municipality of Barão de Cocais;

- B3/B4 dams, Mar Azul Mine, Municipality of Nova Lima, District of Macacos;
- Vargem Grande dam, in the Vargem Grande Complex, Municipality of Nova Lima; e
- □ Forquilha I, Forquilha II, Forquilha III and Grupo dams, Fábrica Complex,

Municipality of Ouro Preto.

For all persons evacuated Vale has provided temporary accommodation in hotels and rented houses. Currently there are 311 families, of which 42 are now houses of family members, as they so preferred and 222 families are in hotels while houses are being rented for them. To these families Vale has also provided emergency donation of 5,000.00 Brazilian reais, having already paid to 206 of such families and other 22 in process of payment and some others still in process of registration.

Besides these, other mines have had the risk level of their dams raised to 1. This elevation of risk level does not point to the necessity of evacuation of Self-Saving Zones. In any case, these operations have also been stopped for further detailed assessment and eventual additional measures to be taken. The structures are:

- Sul Inferior dam, Gongo Soco Mine, Municipality of Barão de Cocais;
- Auxiliary tailing to dam 5, Águas Claras Mine, Municipality of NovaLima;
- Tailing B and Capitão do Mato dam, Capitão do Mato Mine, Municipality of Nova Lima;
- Maravilhas II dam, Vargem Grande Complex, Municipality of Nova Lima;
- Tailing Taquaras, Mar Azul Mine, Municipality of Nova Lima, Distrito de Macacos;
- Marés II dam, Fábrica Complex, Municipality of Belo Vale;
- Campo Grande dam, Alegria Mine, Municipality of Mariana;
- Doutor dam, Timbopeba Mine, Municipality of Ouro Preto;
- Tailing 2 in Pontal dams system, Itabira Complex, Municipality of Itabira;e
- Dam VI, Córrego de Feijão Mine, Municipality of Brumadinho.

Finally, regarding the leverage of Vale's shareholders, business partners and suppliers it is important to restate that Vale is in constant dialog and open to contributions and inquiries from any shareholders and stakeholders including NGOs and social movements.

Vale

invites all interested parties to follow the updates on the dedicated website. Vale also invites to follow the future publications of reports in the investigations conducted by the independent committees and, at any moment, present inquiries to Vale so that we may offer requested information as well as absorb claims.

Vale reiterates it remains committed to the safety of the operational structures, focused in the care and support to the affected families and open to investigations and requests of information.

Cordially,

Vale S.A.

Appendix F – Coding Sustainability Report regarding the Bento Rodrigues Dam Disaster

Meaning Unit	Condensed meaning unit	Code	Sub-Categories	Categories	Theme
"Vale clarifies that, according to the MPF complaint, the stated value is not based on the Samarco dam accident, but rather on an unjustified comparison with the Deepwater Horizon oil spill in the Gulf of	Stated value not based on the dam accident	Unjustified treatment		Attack the accuser	Deny
Mexico."	enjustited comparison				
"Mining, in general, is located in areas that have significant socio- economic deficits, where its activities generate potential impacts that can be both positive and negative. The installation and operation of the	Potential impacts that can be both positive and negative				
be both positive and negative. The mistation and operation of the various undertakings can interfere with the way of life in neighbouring communities, resulting in disturbance, but also creating jobs and	Can interfere with the way of life in neighbouring communities	Balance		Justification	Diminish
incomes."	Disturbance, but also creating jobs and incomes				
"In the state of Minas Gerais, Normative Deliberations COPAM No. 62, 02/17/2002, and No. 87, 06/17/2005, determine the implementation of	Vale executes external audit in frequency beyond the established				
periodic external audit, but Vale already executes it in frequency beyond the established by legislation, with renowned external auditors who are recognized for their skills in identifying risks associated with dams.	Renowned external auditors recognized for their skills in indentifying risks associated with dams	Preventive measures		Excuse	Diminish
Additionally, Vale has internal controls in accordance with the recommendations of the auditors."	Additional internal controls				
"Vale has never had a recommendation type 5 and currently has no recommendation type 4. That is, there are only recommendations classified as programmable or of corrective maintenance and/or preventive character."	Only recommendations classified as programmable or corrective or preventive	No warnings		Excuse	Diminish
"The dams security management is performed by dedicated and qualified staff whose mostly professionals hold master's, doctoral or specialization degree in Geotechnical Engineering and/or Dam Engineering."	Qualified staff	Professionals		Excuse	Diminish
"These structures experience visual inspections and are monitored by instruments that inform about the structural behavior. The visual	Inspections and monitoring				
inspections are performed every two weeks and include detailed checklist that covers different items for evaluating the conservation status of the structure and identifying potential problems with it."	Evaluation of conservation status and problem identification	Preventive measures		Excuse	Diminish
"At Vale, all dams, although they are no longer in operation, remain under the company's responsibility and are monitored, audited and maintained usually under the same criteria and safety standards adopted during its operation."	Dams are monitored, audited and maintained	Preventive measures		Excuse	Diminish
"Proactively, Vale's PAEBMs (Tailings Dam Emergency Action Plan) are being revisited in order to incorporate the learnings accrued from the failure of Fundão dam, as well as results obtained in several discussions that the company has been promoting with the communities located near	Vale's PAEBMs revisited	Learnings		Non-Repetition	Rebuild
agencies."	Incorporation of learnings accrued from the failure of the dam				
"After the accident in Mariana (MG), to bring greater comfort to society, Vale carried out a detailed extraordinary verification of the structural conditions of all its tailings dams"	Detailed verification of the structural conditions of Vale's tailing dams after the accident	Intensified actions		Non-Repetition	Bolstering
"In all cases, the company has contributed proactively with the inspection agents, promptly submitting the documents requested and	The company has contirbuted proactively			Transparent	Deleterie e
attending to any recommendation and/or demand set during inspections and surveys."	Document submission as requested	Contribution		Communication	Boistering
"At the end of 2015, as an immediate response to the accident and with the objective of increasing the good operational practices, Vale created a unified area dedicated to managing iron ore dams, performed before separately for each operation. In this first stage, the area will be responsible, among other activities, for Geotechnical management case (dams, piles, embankments, etc.) and plans and actions in case of any emergencies."	Creation of a unified area dedicated to managing iron ore dams	New practices		Non-Repetition	Rebuild
"The company has provided human and material resources, such as helicopter and emergency equipment, to support Samarco in the	Human and material resources				
rescues, water distribution and removal of the risky places for people displaced by the accident."	Support rescues, water distribution, and removal of people from risky places	Support	Immediate Support	Crisis Support	Rebuild
"99% of the families in Mariana and Barra Longa impacted by the accident ended 2015 in rented homes or at relative's homes, and all the houses rented by the company were equipped with furniture, home appliances, domestic utensils and bed linen and towels, preferably	Houses rented by the company	Support	Immediate Support	Crisis Support	Rebuild
acquired from region's suppliers. Before each family moved in, the company also supplied the homes with food, cleaning and personal hygiene products, and drinking water."	Equipped houses and other supplies	* K * *			
"In January 2016, each family with missing or deceased members due to the accident, received R\$100,000 (US\$31.6 thousand) in advance compensation payment from Samarco. The family groups who had to	Each family with missing or deceased members due to the accident, received R\$100,000				

move, i.e.those who lost their homes, Samarco released R\$20,000 (US\$6.3 thousand), with 50% of this amount not being considered as part of the advance compensation."	The family groups who had to move, i.e.those who lost their homes, Samarco released R\$20,000	Monetary indemnity		Compensation	Rebuild
"Periodic meetings were also held with communities, municipal authorities, state and federal governments, the environmental authorities, the Public Prosecutor Service, the Public Defender's Office and other responsible authorities, to provide clarifications and information about Samarco's action"	Provide clarifications and information	Process Transparency		Transparent Communication	Bolstering
"Also, service centres were set up in Colatina, Linhares, Marilandia and Baixo Guandu, in the state of Espírito Santo, and in Mariana and Barra Longa, Minas Gerais. The objective is to centralize demands, questions and claims from the community, facilitating the services and the tracking of solutions."	Service centers were set up	Support	Immediate Support	Crisis Support	Rebuild
	Emergency financial assistance				
"Samarco provided emergency financial assistance to those families that lost their monthly incomes as a result of the accident. This involves the	Payment of a monthly minimum salary to the family				
payment of a monthly minimum salary to the family, plus an additional 20% of a minimum salary to each dependent, as well as a basic foodstuff basket in monetised form, to the value of R\$338.61."	Additional 20% of a minimum salary to each dependent	Monetary indemnity		Compensation	Rebuild
	Basic foodstuff basket in monetised form				
"In both municipalities, Samarco and its partner companies hired local	Refurbishment of property	-			
inhabitants to take part in the returnishment of property, tencing and rehabilitation of agricultural properties, revegetation, organization of densities and easy of the second	Rehabilitation of agricultural properties and revegetation	Rehabilitation	Recovery	Crisis Support	Rebuild
uonations and care of the animals rescued.	Care of rescued animals				
"With regard to the residues, Samarco monitored the behaviour of the plume of turbidity in the sea and it stressed that there was no technical evidence that the material observed in the region of Abrolhos, in Bahia, originated from the failure of the Fundão dam"	No technical evidence that the material observed in the region of Abrolhos, in Bahia, originated from the failure of the Fundão dam	Lack of evidence		Justification	Deny
"The waste is mostly composed of silica (sand) arising from iron ore processing and it does not contain any chemical elements harmful to	Waste arising from iron ore processing (not from the dam failure)	No harm		Instification	Denv
health."	Does not contain any chemical elements harmful to health	110 14111		Justification	Dony
"The results of analyses Samarco commissioned from SGSGeosol Laboratorios, a company specializing in environmental and geochemical soil analysis, attests to the fact that the waste from the Fundão dams is characterized as not dangerous."	Waste from the Fundão dams is characterized as not dangerous	Impact minimization		Justification	Diminish
"The diagnosis carried out by a specialist consultancy (ACQUA Consultoria) confirms that shoals of fish continue to live along Rio Doce	The shoals of fish continue to live along Rio Doce river	No impact		Justification	Deny
" Less than 1% of the river basin was affected by the accident"	Less than 1% of the river basin was affected by	Impact minimization		Justification	Diminish
"The Rio Doce river's water quality was compatible with results found before the mud plume of turbidity passed down the river."	Water quality compatible with results found before the accident	Impact minimization		Justification	Diminish
"With respect to the presence of heavy metals dissolved in the water, the levels of arsenic, cadmium, mercury, lead, copper and zinc, among others, are in general similar to the results of studies carried out by the	Presence of heavy metals dissovled in the water	Impact minimization		Justification	Diminish
CPRM in 2010." "Vale Samarco and BHP Billiton signed on March 2, 2016, a full	Presence similar to results from 2010				
agreement [] for the environmental and socio-economic recovery in the regions impacted by bursting of the Fundão dam."	Environmental and socio-economic recovery in the impacted regions	Recovery	Recovery	Crisis Support	Rebuild
"All projects may be accompanied by the affected populations, there will be external audits and an ombudsman to serve the community."	External audits and an ombudsman	Process Transparency		Transparent Communication	Bolstering
"Additionally, it is decided that in the next 15 years, from 2016, will be invested R\$240 million per year for compensatory actions."	R\$240 million per year for compensatory actions	Monetary indemnity		Compensation	Rebuild
"Additional R\$500 million will be made available by the company, as a compensatory measure, for basic sanitation construction, which will be	R\$500 million as a compensatory measure	Monetary indemnity		Compensation	Rebuild
held by impacted municipalities by the end of 2018."	Compensation for basic sanitation contruction			_	
"It will also set up an Inter-Federative Committee, external and independent body of the foundation, constituted of 12 government	External and independent Inter-Federative Committee	Process Transparency		Transparent	
representatives, to monitor and validate the proposed plans, monitor and verify results."	Monitoring and validation of proposer planes	Observers		Communication	Bolstering
"Availability of resources, as compensation and with the amount of R\$500 million, for certain affected municipalities to use in the preparation and execution of plans for capture and sewage and landfills	The amount of R\$500 million for certain affected municipalities	Treatment	Recovery	Crisis Support	Rebuild
treatment."	For capture and sewage and landfills treatment				
"Conducting natural regeneration of 30,000 hectares over ten years as compensation and the amount of R\$1.1 billion."	Natural regeneration of 30,000 hectares	Regeneration	Recovery	Crisis Support	Rebuild
"Recovery, as compensation, of 5,000 springs to be defined by the Watershed Committee of Rio Doce."	Recovery of 5,00 springs	Recovery	Recovery	Crisis Support	Rebuild
"Reconstruction of the affected sites, as Bento Rodrigues, Paracatu de Baixo (Mariana) and Gesteira (Barra Longa), ensuring their participation in the dialogue process with the affected communities to define measures for the recovery or relocation."	Reconstruction of affected sites	Reconstruction	Recovery	Crisis Support	Rebuild
"Establishment of permanent communication and dialogue channels	Establishment of permanent communication and dialogue channels with the community	Transparency with		Transparent	Polet-rin-
with the community, as well as carrying out agendas to present the progress and results of the programs to be implemented."	Carrying agendas to present progress and results	the community		Communication	Doistering

"Implementation and maintenance of support measures for affected indigenous peoples."	Support measures for affected indigenous people	Support	Immediate Support	Crisis Support	Rebuild	
"Recovery of cultural goods of material nature and preservation of cultural property that was impacted"	Recovery of impacted cultural goods	Recovery	Recovery	Recovery	Crisis Support	Rebuild
cultural property that was impacted	Preservation of impacted cultural property					
"Implementation of actions that aim at recovery of impacted economic and productive activities, such as agriculture, fisheries, services and trade."	Recovery of impacted economic and productive activities	Recovery	Recovery	Crisis Support	Rebuild	
"Health programs, social protection and education for the restoration of impacted public services and monitoring of individuals and families	Restoration of impacted public services	Restoration	Recovery	Crisis Support	Rebuild	
affected are also planned."	Monitoring of affected individuals and families	Restoration	Recovery	Crisis Support	resultu	

Appendix G – Coding Sustainability Reports regarding the Brumadinho Dam Disaster

GRI Report	Meaning Unit	Condensed meaning unit	Code	Sub-Categories	Categories	Theme
2018	"We had complied with all procedures related to the safety of our operations, including conducting periodic onsite audits. But even so, due to causes that are being duly cleared, Dam 1 of the Córrego do Feijão Mine in Brumadinho failed."	Complied with all procedures related to safety Conducted periodic onsite audits Even so, Dam I failed	Preventive measures		Excuse	Diminish
2018	We know that our efforts will never be enough to bring back the lives that were lost, to compensate the people who have lost everything or almost everything, and to erase the impact on our employees and the communities neighbouring our dams, we are in mourning."	We are mourning	Mourning		Victimage	Bolstering
2018	"Immediately after the rupture of the dam, we began providing assistance in the form of shelter, psychological help, medical care, infrastructure repair, transport to move displaced people at risk to shelters and hotels, rescue of and veterinary care for animals."	Immediate assistance after the rupture of the dam	Assistance	Immediate Support	Crisis Support	Rebuild
2018	"At 12:28 p.m. on January 25, 2019, Dam I of the iron ore tailings of the Córrego do Feijão Mine collapsed. In just over three minutes, most of the 11.7 million cubic meters of tailings spread over approximately 295 hectares, reaching the operational and administrative areas of the mine, where about 600 of our own employees and those of third-party suppliers worked. Offices, maintenance workshops, locker rooms, refectory, mill, and loading terminal, among other structures, were impacted by the tailings."	Reaching the operational and administrative areas of the mine About 600 of our own employees and those of third-party suppliers Different structures were impacted by the tailings	Victims		Victimage	Bolstering
	"The dam was constantly monitored and received biweekly field inspections all reported to the National Mining Agency (ANM). It also	The dam was constantly monitored	Professionals			
2018	had a video monitoring system, siren alett system and downstream population registration. A total of 94 piezometers (46 of them automated) and 41 water level indicators were used to monitor the structure, with periodic information gathering and analysis by the geotechnicians responsible for the dam."	Biweekly field inspections It had video monitoring system, siren alert system, and downstream population registration Periodic information gathering and analysis by geotechnicians	Preventive measures		Excuse	Rebuild
2018	"External and internal emergency simulations were also carried out periodically – the last external simulation took place on June 16, 2018, under Civil Defense coordination. The last recorded inspection occurred on January 22, 2019."	External and internal emergency simulations	Preventive measures		Excuse	Rebuild
2018	"The dam had a Stability Condition Statement issued by TÜV SÜD do Brasil, a company specializing in Geotechnics, dated June 13 and September 26, 2018, related to the Periodic Safety Review of Dams and Regular Safety Inspection of Dams, respectively, as determined by DNPM decree 70.389/2017."	Stability Condition Statement	No warning signs		Excuse	Rebuild
2018	"The sound warning system, which is part of the PAEBM, was manually operated from a 24-hour Emergency and Communication Control Centre located outside the mine area. Before that, in October 2018, employees had participated in an internal simulation for emergency procedures."	Sound warning system Employees participation in an internal emergency simulation	Preventive measures		Excuse	Rebuild
	"To speed up actions, on the day of the dam's collapse, we created an	Immediate Response Groups for consolidating all				
	Immediate Response Group responsible for consolidating all emergency actions. Subsequently, a Humanitarian Aid Committee was set up, with a	Humanitarian Aid Commitee	Support			
2018 team of social workers and psychologists to provide assistance t and families. The top priority at that time was to receive the fan support the rescue, and assist all employees, both our own and t third- party suppliers, and the local population."	team of social workers and psychologists to provide assistance to victims and families. The top priority at that time was to receive the families, support the rescue, and assist all employees, both our own and those of third- party suppliers, and the local population."	Receive the families, support the rescues, and assist employees and local population	Assistance	Immediate Support	Crisis Support	Rebuild
2018	"We provided 40 ambulances, backhoes, a rescue helicopter, communication radios, 15 lighting towers, and balloons equipped with infrared technology and wi-fi for aerial monitoring."	Aerial monitors	Support	Immediate Support	Crisis Support	Rebuild
2018	"Partnerships with hospitals in the region made available 800 beds and medical and psychological care."	Medican and psychological care	Support	Immediate Support	Crisis Support	Rebuild
2018	"About R\$ 1.3 billion was spent to purchase medicines, water, equipment and other logistical resources."	Logistical resources	Support	Immediate Support	Crisis Support	Rebuild
2018	"We registered and referred homeless people and victims' family members to hotels and provided them with food, transportation, clothing and hygiene supplies, among other supports."	Provided food, transportation, clothing, hygiene supplies and other supports	Provision	Immediate Support	Crisis Support	Rebuild
2018	"Documents such as birth and marriage certificates and Identity Cards were issued by the Civil Police of Minas Gerais, with Vale's support."	Identity documents were issued with Vale's support	Assistance	Immediate Support	Crisis Support	Rebuild

2018	"We hired a team of professionals from the Albert Einstein Hospital based in São Paulo, which included specialists in trauma, mourning and catastropheresponse, to provide psychosocial care at the service stations and telephone channels."	Vale hired a team of health professionals	Support	Immediate Support	Crisis Support	Rebuild
2018	"In Pas (service stations), we also provided 407,000 liters of mineral water to the community, up to 9,000 meals/snacks per day, animal feed, as well as personal hygiene kits, medicines, fuel and construction material."	Provision of mineral water, meals, animal feed, personal hygiene kits, medicines, fuel, and construction material	Provision	Immediate Support	Crisis Support	Rebuild
2018	"Since the dam failure, we have made available toll-free numbers to enable the population to request assistance"	Toll-free numbers to request assitance	Assistance	Immediate Support	Crisis Support	Rebuild
2018	"Rural producers with activities in fifteen municipalities received water supplies for human and animal consumption and irrigation – we have so far provided about 145 million liters of water."	Water supplies for human and animal consumption and irrigation	Support	Immediate Support	Crisis Support	Rebuild
2018	"We also provided transportation for community relocations between the Córrego do Feijão Community Centre, Casa Branca Community and the Brumadinho Bus Station to respond to demands arising from access interruptions caused by the rupture."	Provision of transporation for comunity relocation	Provision	Immediate Support	Crisis Support	Rebuild
2018	"On January 31, 2019, we began registering the people eligible to receive funds from the emergency donation of R\$ 100,000 offered by Vale to support families who have had deceased or disappeared due to the collapse"	Emergency donation of R\$ 100,000 offered by Vale	Donation		Compensation	Rebuild
2018	"The official list of beneficiary families has been validated by the Civil Defense and is available on Vale's website."	List of beneficiaries validated by the Civil Defense Availability of information	Information availability		Transparent Communication	Bolstering
		Finencially suggested meanly living the the Salf				
2018	"We also hnancially supported people living in the Self-Kescue Zones (ZAS in Portuguese) of Dam I: RS 50,000 per property located in the ZAS; 101 payments have been made. In addition, we have given R\$ 15,000 per family household of rural producers or merchants who have productive activity in the area"	Rescue Zones R\$50,000 per property R\$15,000 per family household of rural producers or merchants who have productivity activity in the area.	Monetary indemnity		Compensation	Rebuild
2018	"Funeral assistance to the victims' families, in the amount of R\$ 3,928.34, in addition to payments to cover notary fees, body transfers, urns, ornaments, graves, burial services and other expenses."	Funeral assistance to the victims' families R\$3,928.34	Assistance	Immediate Support	Crisis Support	Rebuild
		Payments to cover other funeral-related expenses				
2018	"Vale entered into an agreement with the city of Brumadinho to donate to the city approximately R\$ 80 million over the next two years. We have also signed an agreement to donate R\$ 100 million to the Association of Mining Cities of Minas Gerais (AMIG in Portuguese) and agreements to	Donation to the city of Brumadihno	Donation		Compensation	Rebuild
	donate to other institutions a total of R\$ 114 million."	Donation to the AMIG	-			
2018	"Payment of a monthly minimum wage for each adult, half (1/2) the monthly minimum wage for each teenager and one quarter (1/4) the minimum wage for each child of families living in regions located up to one kilometer from the Paraopeba River, from Brumadinho to the city of Pompéu, at the reservoir of Retiro Baixo, beginning on January 25, 2019,	Payment of a monthly minimum wage per adult Half of it for each teenager	Payment		Compensation	Rebuild
	for a term of one year"	One quarter for each child				
2018	"Provision of a basic food basket for each household in the communities of Córrego do Feijão and Parque da Cachoeira for 12 months. The value of the basic basket will be determined."	Provision of a food basket	Provision	Immediate Support	Crisis Support	Rebuild
2018	"Provision of independent technical advice so that those affected can	Technical advice for negotiation of individual	Assistance	Immediate Support	Crisis Support	Rebuild
	negorate tien individual indeninities.	incentities				
2018	"Reimbursement for or direct funding of the extraordinary expenses of the State of Minas Gerais, its direct agencies and its indirect administration, including the cost of transport, accommodation and food for the employees involved in rescue work and other emergency actions."	Reimbursement for or direct funding of extraordinary expenses of the State of Minas Gerais	Payment		Compensation	Rebuild
2018	"Maintenance of 2/3 of the salaries of all employees, both our own and those of third- party suppliers, who died, until a definitive indemnification agreement is formalized."	Maintenance of salaries	Monetary indemnity		Compensation	Rebuild
2018	"Maintenance of the salaries of employees who are missing."	Maintenance of salaries	Monetary indemnity		Compensation	Rebuild
2018	"The guarantee of employment or salary for Vale employees in Brumadinho, including those of our third-party suppliers, until December 31, 2019."	Guarentee of employment or salary	Support	Immediate Support	Crisis Support	Rebuild
2018	"Maintenance of the medical plan for family members of the victims, both our own and those of third-party employees, under the accreditation regime, covering the entire state of Minas Gerais. Widows or companions are covered for life and dependents are covered up to 22 years of age."	Maitenance of the medical plan for family members of victims	Monetary coverage		Compensation	Rebuild
2018	"Psychological assistance to workers until they are medically discharged."	Psychlogical Assistance	Assistance	Immediate Support	Crisis Support	Rebuild
2018	riovision of independent technical advice so that those affected can negotiate their individual indemnities."	Provision of independent technical advice	Provision	Immediate Support	Crisis Support	Rebuild
2018	"Day-care centre allowance of R\$ 920.00, to care for children up to three years old of deceased workers."	Day-care centre allowance of R\$920.00	Allowance		Compensation	Rebuild
2018	"An educational allowance of R\$ 998 .00 for children of deceased	Educational allowance of P\$998 .00	Allowance		Compensation	Rebuild
2018	workers until the date they become." "Vale paid the costs of hiring 142 professionals to integrate the health and social assistance teams of the city of Brumadinho for the initial term of six months"	Bearing the cost of hiring professionals	Provision	Immediate Support	Crisis Support	Rebuild
2018	"With the failure of Dam I of the Córrego do Feijão Mine, procedures for monitoring the structural conditions of all dams were intensified, causing emergency actions to be taken for Dam VI, which was impacted by the tailings flow from Dam 1"	Intensified monitoring of the structural conditions of dams	Intensified actions		Non-repetition	Rebuild
2018	"In parallel preventive efforts, the alert level of structures located in other municipalities was raised to three according to the Emergency Action Plan for Mining Dams (PAEBM in Portuguese"	Raise of the alert level of other structures	Intensified actions		Non-repetition	Rebuild
2018	"In addition, simulations were performed, reinforcing siren-activated evacuations to the residents of the Secondary Security Zones (regions not defined as ZAS) "	Reinforced siren-activated evacuations	Intensified actions		Non-repetition	Rebuild
	dormou ao Lawj.	Simulations performance				l

2018	"In all Vale structures, the frequency of monitoring safety variables and stability inspections were intensified to strengthen preventive and corrective actions in a timely manner"	Intensified monitoring of safety variables and stability inspections	Intensified actions		Non-repetition	Rebuild
2018	"We anticipated the implementation of the Geotechnical Monitoring Centre (CMG) at the Águas Claras Mine in Nova Lima, Minas Gerais, responsible for monitoring 24 hours, seven days a week all upstream and some conventional dam structures by means of big screens."	Implementation of the Geotechnical Monitoring Centre	New practices		Non-repetition	Rebuild
2018	"In the search for disposal alternatives to replace tailings dams, the Company had already been developing conceptual waste disposal projects using new technologies aim to reduce dependence on dams for our operations in the future."	Company had already been developing conceptual waste disposal projects	Past actions		Reminder	Bolstering
2018	"Vale invested nearly R\$ 66 billion (US\$ 17.5 billion) over the last 10 years to install and expand the use of the dry process – or natural moisture – of the iron ore produced in its operations in Brazil."	Vale invested nearly R\$ 66 billion (US\$ 17 .5 billion) over the last 10 years to expand the use of the dry process of the iron ore	Past actions		Reminder	Bolstering
2018	"Vale signed an agreement with the Government of the State of Minas Gerais, through which R\$ 5 million was donated to be invested in Civil Defense equipment, R\$ 4 million of which is designated for the Military Police."	Donations to the State of Minas Gerais	Donation		Compensation	Rebuild
2018	"Over the last few years, several investments were made in other community safety initiatives. One of the examples began in August 2018 – the construction of a new tailings pipeline connecting the pumping station CB3 to Arm 5 of the Pontal Dam. This new layout will keep the Itabira community out of the impact zone in the event of an incident."	Over the last few yeas several investment were made in other community safety initiatives	Past actions		Reminder	Bolstering
2018	"After the failure of Dam I of the Córrego do Feijão Mine, we implemented a global structure of Asset Integrity and Geotechnical Risks (dams, dikes and waste rock dumps) and Operational Risks."	Implementation of new global structures	New practices		Non-repetition	Rebuild
2019	"Vale apologizes to society and deeply regrets the 270 fatalities, of whom two were young pregnant women and 11 victims have not yet been located."	Vale apologizes to society	Apology		Apology	Rebuild
2019	"One of the first steps in our efforts to fully repair of the affected territory, after the dam rupture, was to create of the Special Office for Reparation and Development."	Speacial Office for Reparation and Development	Reparation	Immediate Support	Crisis Support	Rebuild
2019	"Its priority is to coordinate the socio-economic and environmental restoration actions of the impacted municipalities, with social engagement and transparent performance []"	Transparent performance	Transparency		Transparent Communication	Bolstering
2019	"Vale has made a commitment to its stakeholders and society in general to implement Integral Reparation since the first drafts of its reparation plan for Brumadinho and the affected areas. The decision is consistent with the company's recognition of the United Nations' Guiding Principles	Company's recognition of the UN's Guiding Principles on Business and Human Rights	Past actions		Reminder	Bolstering
	on Business and Human Rights."	Decision consistent with it				
2019	"Focused on rebuilding people's lives and the territory, the company has been developing assistance programs, aiming to contribute so that communities can deal with the new reality, resume their routines and plan for the future."	Rebuilding people's lives and the territory	Rebuild	Recovery	Crisis Support	Rebuild
2019	"The company's challenge, since then, consists of implementing actions where community participation has been essential to mitigate the impacts of the disruption and evacuations. The open, transparent and clear	Open, transparent and clear dialogue with the	Transparency		Transparent	
	dialogue was and continues to be a guide for performance within a continuous learning cycle."	communities	,		Communication	Bolstering
2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte."	communities Investment to guarantee water supply	Recovery	Recovery	Communication Crisis Support	Bolstering Rebuild
2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)"	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People	Recovery	Recovery Recovery	Communication Crisis Support Crisis Support	Bolstering Rebuild Rebuild
2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what hanoneed."	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget	Recovery Recovery No repetition	Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition	Bolstering Rebuild Rebuild Rebuild
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2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened." "Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief."	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget Never repeat what happened Overcome grief	Recovery Recovery No repetition Recovery	Recovery Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition Crisis Support	Bolstering Rebuild Rebuild Rebuild Rebuild
2019 2019 2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened." "Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief." "The Território Parque Project, in Córrego do Feijão, presented by Vale in December 2019, aims to requalify the region through infrastructure improvement. It involves renovating, paving and urbanizing streets, houses and structures, economic reactivation and development of local tourism"	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget Never repeat what happened Overcome grief Requalify the region	Recovery Recovery No repetition Recovery Restoration	Recovery Recovery Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition Crisis Support Crisis Support	Bolstering Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild
2019 2019 2019 2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Para' de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened." "Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief." "The Território Parque Project, in Córrego do Feijão, presented by Vale in December 2019, aims to requalify the region through infrastructure improvement. It involves renovating, payning and urbanizing streets, houses and structures, economic reactivation and development of local tourism" "Parents, spouses or partners and children will receive, individually, BRL 500,000 for moral damages and also the payment of an additional instrance for work accidents in the amount of BRL 200,000. Siblings will receive BRL 150,000. There will also be the payment of material damage to the nucleus of dependents, the minimum amount of which is BRL 800,00."	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget Never repeat what happened Overcome grief Requalify the region BRL 500,000 for moral damages Additional insurance for work accidents of BRL 200,000 Siblings will receive BRL 150,000 Payment of material damage to the nucleus of dependents: BRL 800,000	Recovery Recovery No repetition Recovery Restoration Monetary indemnity	Recovery Recovery Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition Crisis Support Crisis Support Crisis Support	Bolstering Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild
2019 2019 2019 2019 2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened." "Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief." "The Território Parque Project, in Córrego do Feijão, presented by Vale in December 2019, aims to requalify the region through infrastructure improvement. It involves renovating, paving and urbanizing streets, hoouses and structures, economic reactivation and development of local tourism" "Parents, spouses or partners and children will receive, individually, BRL 500,000 for moral damages and also the payment of material damage to the nucleus of dependents, the minimum amount of which is BRL 800,000." 'In August 2019, Vale deposited in court the amount of BRL 400 million as payment of collective moral damages, due to the signing of the agreement."	communities Communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget Never repeat what happened Overcome grief Requalify the region BRL 500,000 for moral damages Additional insurance for work accidents of BRL 200,000 Siblings will receive BRL 150,000 Payment of material damage to the nucleus of dependents: BRL 800,000 BRL 400 million as payment of collective moral damages	Recovery Recovery No repetition Recovery Restoration Monetary indemnity Monetary indemnity	Recovery Recovery Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition Crisis Support Crisis Support Crisis Support Crisis Support Compensation	Bolstering Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild
2019 2019 2019 2019 2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened." "Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief." "The Território Parque Project, in Córrego do Feijão, presented by Vale in December 2019, aims to requalify the region through infrastructure improvement. It involves renovating, paving and urbanizing streets, houses and structures, economic reactivation and development of local tourism" "Parents, spouses or partners and children will receive, individually, BRL 500,000 for moral damages and also the payment of an additional insurance for work accidents in the amount of BRL 200,000. Siblings will receive BRL 150,000. There will also be the payment of material damage to the nucleus of dependents, the minimum amount of which is BRL 800,000." In August 2019, Vale deposited in court the amount of BRL 400 million as payment of collective moral damages, due to the signing of the agreement." "BRL 80 million in financial compensation for the city of Brumadinho, due to the interruption of productive activities, to be transferred within two years after the agreement"	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget Never repeat what happened Overcome grief Requalify the region BRL 500,000 for moral damages Additional insurance for work accidents of BRL 200,000 Siblings will receive BRL 150,000 Payment of material damage to the nucleus of dependents: BRL 800,000 BRL 400 million as payment of collective moral damages BRL 80 million in financial compensation for the city of Brumadinho	Recovery Recovery No repetition Recovery Restoration Monetary indemnity Monetary indemnity	Recovery Recovery Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition Crisis Support Crisis Support Crisis Support Compensation Compensation Compensation	Bolstering Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild Rebuild
2019 2019 2019 2019 2019 2019 2019 2019	dialogue was and continues to be a guide for performance within a continuous learning cycle." "Regarding water supply in the affected regions, Vale signed two Terms of Commitment. With an investment of approximately BRL 577 million, the goal of these works [] is to guarantee the water supply for the municipality of Pará de Minas and the metropolitan region of Belo Horizonte." "For the recovery, the families also need support in planning their future. This is made possible through the Comprehensive Assistance to the Affected Program (PAIA from the acronym in Portuguese)" "The memorial will be a way of affirming the company's commitment to "never forget Brumadinho" and never to repeat what happened." "Another project that has been developed with the community is the construction of a community center in which residents can practice activities that help them overcome their grief." "The Território Parque Project, in Córrego do Feijão, presented by Vale in December 2019, aims to requalify the region through infrastructure improvement. It involves renovating, payment of an additional insurance for work accidents in the amount of BRL 200,000. Siblings will receive BL 150,000. There will also be the payment of material damage to the nucleus of dependents, the minimum amount of Which is BRL 800,000." "In August 2019, Vale deposited in court the amount of BRL 400 million as payment." "BL 14.5 million transferred to the Brumadinho Tourism Association to support the advertising campaign to encourse."	communities Investment to guarantee water supply Support in planning the future Comprehensive Assistance to the Affected People Nerver forget Never repeat what happened Overcome grief Requalify the region BRL 500,000 for moral damages Additional insurance for work accidents of BRL 200,000 Siblings will receive BRL 150,000 Payment of material damage to the nucleus of dependents: BRL 800,000 BRL 400 million as payment of collective moral damages BRL 80 million in financial compensation for the city of Brumadinho Transfer to Brumadinho Tourism Association Encouraging tourism	Recovery Recovery No repetition Recovery Restoration Monetary indemnity Monetary indemnity Regeneration	Recovery Recovery Recovery Recovery Recovery Recovery	Communication Crisis Support Crisis Support Non-repetition Crisis Support Crisis Support Crisis Support Compensation Compensation Compensation Crisis Support	Bolstering Rebuild

	among others"	Hiring professionals	Support			
2019	"BRL 30 million for Social Assistance and Health to those affected by the rupture of the dam, via agreement with the City Hall"	Investment in social assistance and health	Support	Immediate Support	Crisis Support	Rebuild
2019	"A BRL 20 million contribution to the Military Fire Brigade of Minas Gerais, to acquire of more than 7,000 pieces of equipment, make structural improvements and provide professional training, in recognition of corporation's work and heroism"	Contribution to the Military Fire Brigade of Minas Gerais	Contribution		Compensation	Rebuild
2019	"An investment of BRL 70 million to acquire 77 operational vehicles delivered to the public security agencies of Minas Gerais: 50 vehicles for the Military Police; 13 vehicles for the Fire Department (buses, trucks and vans); two vehicles for the Civil Police and 12 vehicles for the Civil Defense (automobiles, vans and trucks)"	Investment in operational vehicles for the public security agencies of Minas Gerais	Contribution		Compensation	Rebuild
2019	"BRL 258.7 million, only in 2019, in financial contributions to support the cities covered by the agreement with AMIG, where operations were halted, covering 10 municipalities in addition to Brumadinbo (Barão de Cocais, Belo Vale, Congonhas, Itabirito, Mariana, Nova Lima, Ouro Preto, Rio Acima, São Gonçalo do Rio Below and Sarzedo)"	BRL 258.7 million in financial contributions to support 10 municipalities	Monetary indemnity		Compensation	Rebuild
2019	"The company imported and donated DNA recognition equipment (Illumina) to the Belo Horizonte Forensic Medicine Institute (IML), which contributes to the work and speeds up the process of identifying the victims of the runture"	Donation of DNA recognition equipment	Donation		Compensation	Rebuild
2019	"In addition the company purchased BRL 6.5 million worth of equipment to donated to the Institute "	Equipment donation to the IML	Donation		Compensation	Rebuild
2019	"An additional BRL 107 million per year, transferred to the State Government, in ICMS taxes on the sale of Vale's ore to steel companies in another state."	BRL 107 million per year transferred to the State Government	Payment		Compensation	Rebuild
2019	"After almost a year of studies focusing on recovering the water quality of the Paraopeba River, more than 31,000 samples were collected at approximately 90 points along the Paraopeba and São Francisco Basin [], Such monitoring was carried out in consonance with the Instituto Mineiro de Gestão das Águas (IGAM in Portuguese) and showed that the sediment plume did not reach the São Francisco River"	The sediment plume did not reach the São Francisco River	Impact minimization		Justification	Diminish
2019	"Studies were also carried out to evaluate the potential toxic effects of the tailings present in the water and sediments of the Paraopeba River, by means of analyses of labouratory organisms. Such analyses have not indicated toxic effects on the river water to date."	Analyses have not indicated toxic effect on the Paraopeba River water to date	No harm		Justification	Diminish
2019	"The company also collected more than 100 tailings samples along the basin of the Ferro-Carvão stream (including within Dam I). The samples collected supported the characterization of the tailings to be "Non- Dangerous - Inert and Not Inert" waste according to ABNT Standard NBR10.004."	Tailing along the basin of the Ferro-Carvão stream (including within Dam I) characterized as "non- dangerous - inert and non inert"	Impact minimization		Justification	Diminish
2019	"At the end of May 2019, Vale invested in the construction of the River Water Treatment Station (ETAF acronym in Portuguese), located in the Alberto Flores region. Three months later, ETAF had already managed to return more than 1 billion litres of clean water to the Paraopeba River [] Still in 2019, Vale installed the second River Water Treatment Station in Brumadinho to work in integration with the dredging process of the Paraopeba River."	River Water Treatment Stations	Treatment	Recovery	Crisis Support	Rebuild
	"Through dredging, the accumulated waste is removed in the silted	Dredging	Treatment			
2019	region of the Paraopeba. The removed material is stored and dehydrated in large bags, and then transported to an appropriate area in the Córrego do Feijão Mine. The water drained from these bags is pumped to a treatment plant and returns cleanly to the Paraopeba River"	Waste removal	Recovery	Recovery	Crisis Support	Rebuild
		Water treatment				
2019	"Rescue and care for animals after the dam rupture involved a multifunctional team of veterinarians, biologists, zootechnicians, among other environmental experts. These professionals who worked to track, rescue, monitoring and care for the local fauna throughout the affected area, covering both domestic and wild species"	Rescue of the local fauna	Assistance	Immediate Support	Crisis Support	Rebuild
2019	"Vale also plans to replenish the local flora, through reforestation and environmental reintegration in the impacted area"	Replenish local flora	Regeneration	Recovery	Crisis Support	Rebuild
2019	"To rescue seedlings, seeds and epiphytes from the target areas of suppression, we developed the Flora Conservation Program."	Flora Conservation Program	Regeneration	Recovery	Crisis Support	Rebuild
2019	"In addition, actions to conserve DNA from endangered species were part of our Recovery of Degraded Areas activities."	DNA conservation from endangered species	Recovery	Recovery	Crisis Support	Rebuild
2019	"The Ground Zero Project consists of reconstructing of the original conditions of the Ferro-Carvão Stream and the revegetation with native plants from the riparian forest region, in addition to recovering of the Paraopeba River."	Resconstructin the original conditions Revegetation with native plats	Reconstruction	Recovery	Crisis Support	Rebuild
2019	"After the Dam I rupture at the Córrego do Feijão Mine, Vale has accelerated its plan to de-characterize its upstream dams. The goal is to reintegrate these structures into the environment and, therefore, mitigate the risks they pose to people in surrounding communities."	Reintegration of upstream dams in the environment	Transformation		Non-repetition	Rebuild
2019	"Vale [] launched a set of integrated actions for the communities of Macacos (Nova Lima), Barão de Cocais and Itabirito, which are part of the Impacted Territories Development Plan"	Impacted Territories Development Plan	Development	Recovery	Crisis Support	Rebuild
2019	"The Dam I rupture changed the company's management - not only in terms of reviewing its governance, standards of operational excellence and safety, but also in its engagement with its stakeholders and commitments to local communities and society as a whole."	Change in management	Transformation		Transparent Communication	Bolstering
2019	"The company also strives to implement actions to prevent events such as the rupture of Dam I from happening again."	Actions to prevent event repetition	No repetition		Non-repetition	Rebuild

2019	"The company has also assumed a commitment to implement actions to guarantee the non-repetition of events such as Brumadinho."	Guarantee non-repetition	No repetition		Non-repetition	Rebuild
2019	"The rupture of Dam I at Córrego do Feijão Mine, in Brumadinho, like every catastrophic event of this magnitude, produced a revision of the risk management model practiced by Vale so far, leading it to reformulate the	Revision of risk management model	Transformation	Non-repetition	Rebuild	
	safety management model of production processes, while maintaining advances achieved."	Reformulation of safety management model				
2019	"We deeply regret the 270 lives lost due to the rupture of Dam I of the Córrego do Feijão Mine in 2019."	Deeply regret the 270 lives lost due to the rupture of Dam I	Apology		Apology	Rebuild
2019	"Vale has developed and uses, in all areas where it operates, an environmental management system that maps environmental risks and attempts to prevent and mitigate those risks, and minimize, compensate and remediate environmental impacts caused."	Has developed and uses an environmental management system	Past actions		Reminder	Bolstering
2019	The company has redoubled its efforts to increase the rigor of the process Risk Management following the rupture of Dam I at the Córrego do Feijão mine, in Brumadinho (MG)."	Efforts to increase rigor of risk management	Intensified actions		Non-repetition	Rebuild
2019	"One of the initial steps was to create a corporate area called the Tailings Department within the new Executive Office of Safety and Operational Excellence, which reports directly to the company's CEO."	Creation of Tailing Department	New practices		Non-repetition	Rebuild
2019	"Technical analysis of all dams' history and current conditions, with preparation of studies "As-Is", paying special attention to structures whose original projects do not have the required data completion and precision."	Technical analysis of all dams' history and current conditions	New practices		Non-repetition	Rebuild
2019	"Additional reinforcement to increase the safety factor of the dam when necessary"	Dam reinforcement to increase safety	Intensified actions		Non-repetition	Rebuild
2019	"Creation of the Independent Committee for Extraordinary Dam Safety Advisory (CIAESB in Portuguese), reporting directly to the Board of Directors"	New commitee - Independent Commitee for Extraordinary Dam Safety Advisory	New practices		Non-repetition	Rebuild
2019	"Formation of a specific Executive Committee for geotechnical risks"	New commitee - Executive Commitee for geotechnical risks	New practices		Non-repetition	Rebuild
2019	"Implementing of the Basic Geotechnical Guidelines (DBG acronym in Portuguese), a tool that aims to improve the routine safety management of geotechnical structures and give their owners greater visibility on their performance"	New Basic Geotechnical Guidelines	New practices		Non-repetition	Rebuild

Appendix H – Coding Company Responses regarding the Bento Rodrigues Dam Disaster

Company Response	Meaning Unit	Condensed meaning unit	Code	Sub-categories	Categories	Theme
2016	"Samarco opened a channel for the public aiming to clarify, in a	Clarify details about the case	Transparency		Transparent	Bolstering
2010	transparent manner, all the details about the case."	Transparent	mansparency		Communication	Boistering
	"Vale has been participating actively in measures to guarantee the safety	Active participation				
2016	and the fundamental rights of the people affected by the accident. Since the first day, we have been providing human and material resources to aid	Guarantee safety and fundamental rights	Provision	Immediate Support	Crisis Support	Rebuild
	Samarco."	Provision of human and material resources				
2016	"Samarco, Vale and BHPB will create a foundation to develop and implement remediation and compensation programs in substantial amounts	Remediation and compensation programs	Monetary indemnity	Compensation	Crisis Support	Rebuild
	over many years"	Substantial amounts				
	ⁿ On March 2nd, 2016, Samarco Mineração S.A (Samarco) and its two shareholders, Vale S.A (Vale) and BHP Billiton Brasil LTDA (BHPB Brasil), have entered into an agreement with the Federal Government,	Agreement with public authorities				
2016	represented by the Attorney General of Brazil, the States of Espírito Santo and Minas Gerais and certain other public authorities (Brazilian Authorities) for the restoration of the environment and communities	Restoration of the environment	Restoration	Recovery	Crisis Support	Rebuild
	affected by the Samarco dam failure on November 5th, 2015 ("Agreement"). "	Restoration of affected communities				
2016	"Since 1997, Vale has established a relationship and support actions with the Indigenous People Krenak"	Relationship and support since 1997	Past actions		Reminder	Bolstering
2016	"In November 2015, Vale started emergency additional support to the Indigenous People Krenak focused on water supply among other inputs in order to minimize the immediate effects resulting from the Fundão Dam accident."	Emergency support Minimization of the immidiate effects from the dam disaster	Support	Immediate Support	Crisis Support	Rebuild
2019	"Vale adopted a set of measures after the Fundão dam break in Mariana, in 2015, aiming to prevent the occurrence of a similar event in its direct operations."	Measure to prevent occurance of a similar event	No repetition		Non-repetition	Rebuild
2019	"Since then Vale has revised its structured dam management system which encompasses technical and governance measures."	Revision of dam management system	Revision		Non-repetition	Bolstering
2019	"It is also worth mentioning that from 2015 to 2019 Vale has applied around 5 billion Brazilian reais in dam maintenance and health and safety"	Investments in dam maintenance, and health and safety	Past actions		Reminder	Bolstering
	"After the event the Fundação Renova was created under the observance of	Fundaçao Renova				
2019	different federative levels. The foundation has already spent 745 million Brazilian reais in the Mediated Indemnifications Program and other 845 mi	Mediated Indeminifications Program	Monetary indemnity	Compensation	Crisis Support	Rebuild
	on Emergency Financial Support."	Emergency Financial Support				
	"Important investments were made for the improvement of processes	Investments for improvement of processes				
2019	seeking always the best operational techniques and technologies in order to ensure the stability of the structures "	Seeking best operational techniques and technology	New practices		Non-repetition	Bolstering
	in the state of th	Ensuring stability as a goal				

Appendix I – Coding Company Responses regarding the Brumadinho Dam Disaster

The balant of value releging sampt in ways if the source of the balant in source and half half in the source of the balant in the source of the sou	Meaning Unit	Condensed meaning unit	Code	Sub-categories	Categories	Theme
Tu is a low maching fur from 2016 0.2014 Value large filter Periodic filter <td>"On behalf of Vale we deeply regret the event"</td> <td>Regret the event</td> <td>Regret</td> <td>5</td> <td>Apology</td> <td>Rebuild</td>	"On behalf of Vale we deeply regret the event"	Regret the event	Regret	5	Apology	Rebuild
Sack data barrary Value loss on transportanting souths event remarkants. Otif prodube water Privinin Immediate Support Chick Support Behalid Tampergree communication works werk werk the community value and endoation works. Assistance Immediate Support Chick Support Behalid Allos for data provide an advantant works. Assistance Immediate Support Chick Support Behalid Allos for data provide an advantant streng south should the one of its private conditional for an advantant streng south should of the one of its private conditional for a advantant streng south should the one of the private conditional for a advantant streng south should for advantant streng south streng south should for advantant streng south streng south streng south should for advantant streng south streng sou	"It is also worth mentioning that from 2015 to 2019 Vale has applied around 5 billion Brazilian reais in dam maintenance and health and safety"	Investments in dam maintenance, and health and safety	Past actions		Reminder	Bolstering
Tenergeory commution works were node stated is took or de- commuting Thurggory contruction works Axisture Immodule Support Robust Chills *Abits and the human- tion of the transmitty product of a flecturg to the commuting protocomment product an alternative probability of the commuting protocomment product and	"Since the dam break Vale has been offering potable water for irrigation, animal and human consumption to the ones affected."	Offer potable water	Privision	Immediate Support	Crisis Support	Rebuild
"Asia moders provide an advantive pathway for the community Vale has presenting with order a interactive pathway for the community of the company is the strength of the community of management is interactive pathway for the community of management is interactive of the company. Is the superior of the company is possible of the company is the strength of the community of management is interactive of the company. The strength of the community is possible of the company is the strength of the company is possible of the company. The strength of the company is possible of the company is a strength of the company is possible of the company. The strength of the company is possible of the company is possible of the company is possible of the company. The strength of the company is possible of the company is possible of the company is possible of the company. The strength of the company is possible in the company is possible of the company is possible of the company is possible of the company is possible of the company is possible of the company is possible of the company is possible of difficult is a company is possible of the company is possible of difficult is a company is possible of the company is possible of difficult is a company is possible of the company is possible of difficult is a company is possible of the company is possible of difficult is a company is possible of the company is possible of difficult is a company is possible of the company is possible of difficult is a company is possible of difficult is a company is possible of difficult is a company is possible of difficult is a company is possible of difficult is a company is difficult is possible of difficult is a company is possi	"Emergency construction works were ready stated in order to de- obstruct and rehabilitate the roads."	Emergency construction works	Assistance	Immediate Support	Crisis Support	Rebuild
Tasisate interactive palwaps, Value has provided cloudly regardly in park in production. The structure (Value park during), variant of the productive park of park in park in the structure (Value park during), variant of the summer (Value park during), variant	"Also in order to provide an alternative pathway for the community Vale has permanently authorized on February 14th, 2019 the use of its private road that goes through the Córrego do Feijão Mine."	Provision of an alterantive pathwat for the community	Provision	Immediate Support	Crisis Support	Rebuild
To under oprovide mergency support to the affected provide and state of the information of the fundies of insigned or decision formic indemfification on the fundies of insigned or decision formic indemfification of the fundies of insigned or decision formic indemfification of the fundies of insigned or decision formic indemfification of the fundies of insigned or decision of the fundies of the fundies of insigned or decision of the fundies of the fundies of insigned or decision of the fundies of the fundies of insigned or decision of the fundies	"Besides the alternative pathways, Vale has provided school transportations, ambulances (29/day at peak demand), ears/taxis (3786 trips so far), vans and busses (1856 seats available per daily at peak demand, 1445 currently) to assist the needs of the persons affected, including fixed routs of transportation."	Provision of transportations	Provision	Immediate Support	Crisis Support	Rebuild
The domation in the amount of 100,000.00 Brazilian reais is intended for prependitions of Vai's direct employees and contractors and member of the community that mainting decenters? Domations Compensation Crisis Support Rebuild T	"In order to provide emergency support to the affected persons and families Vale has provided – apart from any future indemnification – donations to the families of missing or deceased persons, as well as for persons with residence and/or commercial/productive activities in the "Self-Saving Zone"."	Vale has provided donations	Donations	Compensation	Crisis Support	Rebuild
T	"The donation in the amount of 100,000.00 Brazilian reais is intended for representatives of Vale's direct employees and contractors and members of the community that are missing or deceased"	Donation of 100,000 reais	Donations	Compensation	Crisis Support	Rebuild
Term the persons whose homes were completely or partially in the "self- king Zone". Vale has made vaniable the domation of 50,000 0000 Domations Compensation Crisis Support Rebuild Tor the persons with their productive and or commercial activities completely or partially in the "self. Saving Zone" Vale has made available the domation of 15,000 0 reais Domations Domations Compensation Crisis Support Rebuild The registry for receiving these domations began on February 11th, 2017 doserving the widely publicized criteria also available in Vale's website Domations is available on the company's website Inno evailability Transport Rebuild Predise these actions. Vale has seen of foreing transportation and accommodation for the persons affected that were forced out of their maines accommodation for the dow beak. Assistance Innmediate Support Rebuild Vale has been providing transportation and accommodation and accommodation for their stransportation and accommodation for various reasons Provision Immediate Support Crisis Support Rebuild Vale has providing transportation and accommodation for their stransportation and provision Provision Immediate Support Immediate Support Rebuild Vale has providing transportation and accommodation for their stransportation and persons how induce temporary homes and commodation for various reasons Provision Immediate Support Crisis Support Rebuil	"[] the official list validated by the Civil Defense State Coordination and made available on the vale.com/Brumadinho"	Official list of affected people was validated Official list is available on the company's website	Info availability		Transparent Communication	Bolstering
Prof. the persons with their productive and/or commercial activities: Donation of 15,000 reais Compension Crisis Support Rebuild complexity or receiving the donations begin on February 111, 2019 Registry for receiving donations is available on the commary's website Info availability Transparent Bolatering descripting the view of the persons affected that were forced out of their accommodation for the persons affected that were forced out of their accommodation and accommodation for the persons affected that were forced out of their accommodation and accommodation and accommodation for the persons affected that were forced out of their accommodation and accommodation and accommodation for the persons accommodated in Provision of transportation and accommodation for various reasons Provision Immediate Support Crisis Support Rebuild Vale has been providing transportation and accommodation in the institute of Legal Medicine of Minas Gerain, providing transportation and accommodation in the statute of the persons accommodated in Provision of transportation and provision Provision Immediate Support Crisis Support Rebuild Vale has provided temporary housing for the persons accommodated in provision of remporary housing for the persons accommodated in Provision of transportation and provision Provision Immediate Support Crisis Support Rebuild The temporary house include the payment of reat and fixed expenses: Payment of reat and fixed expenses in temporary house in themonitipation of temporary house in the one ph	"For the persons whose homes were completely or partially in the "Self- Saving Zone" Vale has made available the donation of 50,000.00 Brazilian reais."	Donation of 50,000 reais	Donations	Compensation	Crisis Support	Rebuild
"The registry for receiving these donations began on February 11th, 2019 discripting the videly publicated criteria also available in Vale's website" Registry for receiving donations is available on the company's vebate Info availability Transparent Communication Bolstering Beside these actions. What has teen offortig transportation and accommodation for the persons affected that were forced out of their homes because of the dam break." Offering transportation and accommodation for affected people Info availability Crisis Support Rebuild "Vale has been providing transportation and accommodation of familes accompanying persons in hospitals, search for survivors/corpuse for all for body identification in the fassification of thansa Gerais." Provision Immediate Support Crisis Support Rebuild "Vale has been provided remporary housing for the persons accommodated in the date transport term home" Provision of temporary housing Provision Immediate Support Crisis Support Rebuild "To the cases when it was possible to transport the furniture was it was that to the temporary homes include the pupment of reat and fixed express: freal estate tax, water, ower and gas bills) until the conclusions of the inhabitants of Brommadine and the reveale Crose base to provide momitly pupments - as emergency indemtification - to the inhabitants of Brommadine to and the reveale from Bromaduho to terior Base of the done crease when it was another and fixed express: homes Payment of an emergency indemnification and accommodation of "Bassis Goods Basket" to 12 Provision	"For the persons with their productive and/or commercial activities completely or partially in the "Self- Saving Zone" Vale has made available the donation of 15,000.00 Brazilian reais."	Donation of 15,000 reais	Donations	Compensation	Crisis Support	Rebuild
"Beside these actions. Vale has been offering transportation and accompodation for the persons affected hat were forced out of their affected people Assistance Immediate Support Crisis Support Rebuild "Vale has been providing transportation and accommodation also for families accompanying persons in hospitals, search for survivors/corpset and for body identification in the Institute of Legal Medicine of Minas Provision of transportation and accommodation for various reasons Provision Immediate Support Crisis Support Rebuild "Vale has been provided temporary housing for the persons accommodated in host that cannot four there that an object that cannot four there and fixed expenses of the damb provision of temporary housing for the sense accommodation of reat and fixed expenses. Provision of temporary housing Provision Immediate Support Crisis Support Rebuild The temporary homes include the payment of rent and fixed expenses the emergency character of the situation, Vale has agreed to provise monthly payments are supported." Payment of rent and fixed expenses in temporary houses include the payment of rent and fixed expenses in temporary houses include the agreed in a Phylic Ciril assuth hearing on any expersor of maintication - to the familiants and provision of temporary indemnification in the emergency character of the situation, Vale has agreed to provise model manification and accomodation of maintimum wage per ach each and 1/4 ach chield, from January 25th on, for any experiment of maintimum wage per ach each and 1/4 ach chield from January 25th on, for any experint and fixed expense in the maintipation of Theoread Payment of th	"The registry for receiving these donations began on February 11th, 2019 observing the widely publicized criteria also available in Vale's website"	Registry for receiving donations is available on the company's website	Info availability		Transparent Communication	Bolstering
"Vale has been providing transportation and accommodation also for families accompanying persons in hospitals, search for survivors corpues and for body identification in the Institute OL Legal Medicine of Minas Gerais." Provision of transportation and accommodation for various reasons Provision Immediate Support Crisis Support Rebuild 'Vale has provided temporary housing for the persons accommodated in hotes that cannot return home" Provision of temporary housing Provision Immediate Support Crisis Support Rebuild "'Vale has provided temporary housing to the persons accommodated in hotes that cannot return home" Provision of temporary housing Provision Immediate Support Crisis Support Rebuild "Tor the cases when it was possible to transport the furniture was it was that to the temporary homes and could the payment of rent and fixed expenses in temporary homes Support Immediate Support Crisis Support Rebuild "The temporary homes and gas bills until the conclusions of the indemnification process" Payment of rent and fixed expenses in temporary homes Support Immediate Support Crisis Support Rebuild "Considering the emergency character of the situation. Vale has agreed to provide monification on the riverside from Brumadinho to Retion Baixo Hydroelectric Power Plan Dam, in the municipality of Pompdu." Payment of an emergency indemnification Rebuild "The m	"Besides these actions, Vale has been offering transportation and accommodation for the persons affected that were forced out of their homes because of the dam break."	Offering transportation and accomodation for affected people	Assistance	Immediate Support	Crisis Support	Rebuild
Vale has provided temporary housing for the persons accommodated in hotes that cannot return home" Provision of temporary housing Provision Immediate Support Crisis Support Rebuild "For the cases when it was possible to transport the furniture was it was taken to the temporary homes and complemented as needed. On the other cases, complete new furniture was provided." Furniture transportation and provision Provision Immediate Support Crisis Support Rebuild "The temporary homes and gas bills) until the conclusions of the indemification process" Payment of rent and fixed expenses in temporary homes Support Immediate Support Crisis Support Rebuild "Considering the emergency character of the situation, Vale has agreed to provide monthly payments - as emergency indemnification - to the inhabitants of Brunadihho to Retrice Payment of an emergency indemnification Monetary indemnity Compensation Crisis Support Rebuild "The nonthly payment will be of 1 federal minimum wage per each adult, 1/2 per each teen and 1/4 each child, from January 25th, on, for aneary 25th, 2019" Monthy payment of a basic goods basket for 12 months Provision Immediate Support Crisis Support Rebuild "Euclidering on March 7th, 2019 to pay the equivalent of the salaries of the minimum wage per adult for a basic goods basket for 12 months starting on January 25th, 2019" Pay the equivalent of a basic goods basket for 12 months Provision Immed	"Vale has been providing transportation and accommodation also for families accompanying persons in hospitals, search for survivors/corpses and for body identification in the Institute of Legal Medicine of Minas Gerais."	Provision of transportation and accomodation for various reasons	Provision	Immediate Support	Crisis Support	Rebuild
"For the cases when it was possible to transport the furniture was it was taken to the temporary homes and complemented as needed. On the other cases, complete new furniture was provided." Furniture transportation and provision Provision Immediate Support Crisis Support Rebuild "The temporary homes include the payment of rent and fixed expenses (real estate tax, water, power and gas bills) until the conclusions of the indemnification process." Payment of rent and fixed expenses in temporary homes Support Immediate Support Crisis Support Rebuild "Considering the emergency character of the situation, Vale has agreed to provide monthly payments – as emergency indemnification – to the inhabitants of Brumadinho and the riverside from Brumadinho to Retiro Baixo Hydroeletric Power Plan Dam, in the manicipality of Pompéu." Monthy payment of an emergency indemnification of minimum wage per achadult, 1/2 per each teen and 1/4 each child, from January 25th on, for one year." Monthy payment of minimum wage per adult Payment Compensation Crisis Support Rebuild "Furthermore, Vale has agreed in a Public Civil Lawsuit hearing on members of the communities of Parque da Cachoeira e Córrego do Feijã of 12 months starting on January 25th, 2019" Pay the equivalent of a baisc goods basket for 12 months Provision Immediate Support Crisis Support Rebuild "Guarantee of employees and contractors until a definitive indemnification settlement is reached" Maintenance of salaries Monetary indemnity Compensation <	"Vale has provided temporary housing for the persons accommodated in hotels that cannot return home"	Provision of temporary housing	Provision	Immediate Support	Crisis Support	Rebuild
taken to the temporary homes and complemented as needed. On the other cases, complete new furniture wasprovided." Immediate Support Immediate Support Crisis Support Rebuild "The temporary homes include the payment of rent and fixed expenses (real estate tax, water, power and gas bills) until the conclusions of the indemification process" Payment of rent and fixed expenses in temporary homes include the payment of rom Brundatinho as deriver the form Brundatinho and the riverside from Brundatinho to Retiro Baixo Hydroelectric Power Plan Dam, in the manicipality of Pompéu." Payment of an emergency indemification - to the inhabitants of from Brundatinho to Retiro Baixo Hydroelectric Power Plan Dam, in the manicipality of Pompéu." Payment of an emergency indemification - to the inhabitants of the combust hearing on for one year." Monthy payment and 1/4 each child, from January 25th on, for one year." Monthy payment of minimum wage per ach dation 1/4 each child, from January 25th on, for one year." Monthy payment of a baisic goods basket for 12 months starting on January 25th, 2019" Pay the equivalent of a baisic goods basket for 12 months Provision Immediate Support Crisis Support Rebuild "Keep the full payment of the salaries of the missing employees and contractors until a definitive indemification settlement is reached" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Keep the full payment of the salaries of the missing employees and contractors until a definitive indemification settlement is reached" Maintenance of salaries Mon	"For the cases when it was possible to transport the furniture was it was	Europius terrestation and envision	Provision	International Comment	Crisis Summert	D-huild
The temporary homes include the payment of rent and fixed expenses (real estate tax, water, power and gas bills) until the conclusions of the indemnification process."Payment of rent and fixed expenses in temporary homesSupportImmediate SupportCrisis SupportRebuild"Considering the emergency character of the situation, Vale has agreed to provide monthly payments – as emergency indemnification – to the linabitants of Brumadinho and the riverside from Brumadinho at the from Brumadinho at the from Brumadinho at the from Brumadinho at the riverside from Brumadinho at the from Brumadinho at the riverside from Brumadinho at the from Brumadinho at the riverside from Brumadinho, Including on Manater Attender at the reached attender attender attender athere atten	taken to the temporary homes and complemented as needed. On the other cases, complete new furniture was provided "	Furniture transportation and provision	Assistance	Immediate Support	Crisis Support	Rebuild
"Considering the emergency character of the situation, Vale has agreed to provide monthly payments – as emergency indemnification – to the inhabitants of Brumadinho and the riverside from Brumadinho to Retiro Baixo Hydroelectric Power Plan Dam, in the municipality of Pompéu."Payment of an emergency indemnificationMonetary indemnityCompensationCrisis SupportRebuild"The monthly payment will be of 1 federal minimum wage per each adult, 1/2 per each teen and 1/4 each child, from January 25th on, for on cyear."Monthy payment of minimum wage per adultPaymentCampensationCrisis SupportRebuild"Furthermore, Vale has agreed in a Public Civil Lawsuit hearing on March 7th, 2019 to pay the equivalent of "Basic Goods Basket" to the members of the communities of Parque da Cachocira e Córrego do Feijão for 12 months starting on January 25th, 2019"Pay the equivalent of a basic goods basket for 12 monthsProvisionImmediate SupportCrisis SupportRebuild"Keep the full payment of the salaries of the missing employees and contractors."Maintenance of salariesMonetary indemnityCompensationCrisis SupportRebuild"Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st, 2019"Guarentee of employment or salarySupportImmediate SupportCrisis SupportRebuild"Guarantee of employment or salary to the employees and contractor, until December 31st, 2019"Guarentee of employment or salarySupportImmediate SupportCrisis SupportRebuild"Guarantee of employment or salary to the employees and contractor, until December 31st, 2019"Guarentee of employment or salar	"The temporary homes include the payment of rent and fixed expenses (real estate tax, water, power and gas bills) until the conclusions of the indemnification process"	Payment of rent and fixed expenses in temporary homes	Support	Immediate Support	Crisis Support	Rebuild
"The monthly payment will be of 1 federal minimum wage per each adult, 1/2 per each teen and 1/4 each child, from January 25th on, for one year." Monthy payment of minimum wage per adult Payment Compensation Crisis Support Rebuild "Furthermore, Vale has agreed in a Public Civil Lawsuit hearing on March 7th, 2019 to pay the equivalent of "Basic Goods Basket" to the members of the communities of Parque da Cachoeira e Córrego do Feijão for 12 months starting on January 25th, 2019" Pay the equivalent of a basic goods basket for 12 months Provision Immediate Support Crisis Support Rebuild "Keep the full payment of the salaries of the missing employees and contractors" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Guarantee of employment or salary to the employees of Brumadinho, including contractor, will December 31st, 2019" Guarentee of employment or salary Support Immediate Support Crisis Support Rebuild "Afford medical insurance for the families of direct employees and contractor, will be comber 31st, 2019" Afford medical insurance for the families Monetary coverage Compensation Crisis Support Rebuild	"Considering the emergency character of the situation, Vale has agreed to provide monthly payments – as emergency indemnification – to the inhabitants of Brumadinho and the riverside from Brumadinho to Retiro Baixo Hydroelectric Power Plan Dam, in the municipality of Pompéu."	Payment of an emergency indemnification	Monetary indemnity	Compensation	Crisis Support	Rebuild
"Furthermore, Vale has agreed in a Public Civil Lawsuit hearing on March 7th, 2019 to pay the equivalent of "Basic Goods Basket" to the members of the communities of Parque da Cachoeira e Córrego do Feijão for 12 months starting on January 25th, 2019" Pay the equivalent of a basic goods basket for 12 months Provision Immediate Support Crisis Support Rebuild reijão for 12 months starting on January 25th, 2019" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Keep the full payment of the salaries of the missing employees and contractors" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st, 2019" Guarentee of employment or salary Support Immediate Support Crisis Support Rebuild "Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to midmum (informere, for the families of direct of Minas Gerais to midmum (informere) Afford medical insurance for the families Monetary coverage Compensation Crisis Support Rebuild	"The monthly payment will be of 1 federal minimum wage per each adult, 1/2 per each teen and 1/4 each child, from January 25th on, for one year."	Monthy payment of minimum wage per adult	Payment	Compensation	Crisis Support	Rebuild
employees and contractors until a definitive indemnification settlement is reached" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Keep the full payment of the salaries of the missing employees and contractors" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st, 2019" Guarentee of employment or salary Support Immediate Support Rebuild "Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to middum(informer, for high engle and engle and to be induced insurance for the families Afford medical insurance for the families Monetary coverage Compensation Crisis Support Rebuild	"Furthermore, Vale has agreed in a Public Civil Lawsuit hearing on March 7th, 2019 to pay the equivalent of "Basic Goods Basket" to the members of the communities of Parque da Cachoeira e Córrego do Feijão for 12 months starting on January 25th, 2019"	Pay the equivalent of a basic goods basket for 12 months	Provision	Immediate Support	Crisis Support	Rebuild
"Keep the full payment of the salaries of the missing employees and contractors" Maintenance of salaries Monetary indemnity Compensation Crisis Support Rebuild "Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st, 2019" Guarentee of employment or salary Support Immediate Support Crisis Support Rebuild "Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to windown(informer, for the families, ond to develope the product of the salaries) until the Afford medical insurance for the families Monetary coverage Compensation Crisis Support Rebuild	employees and contractors until a definitive indemnification settlement is reached"	Maintenance of salaries	Monetary indemnity	Compensation	Crisis Support	Rebuild
"Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st, 2019" Guarentee of employment or salary Support Immediate Support Crisis Support Rebuild "Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to indem with for any to decorder in (in contractor sublempondum) Afford medical insurance for the families Monetary coverage Compensation Crisis Support Rebuild	"Keep the full payment of the salaries of the missing employees and contractors"	Maintenance of salaries	Monetary indemnity	Compensation	Crisis Support	Rebuild
*Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to midour for life, and to dependents (i.e. abilders) until that Afford medical insurance for the families Monetary coverage Compensation Crisis Support Rebuild	"Guarantee of employment or salary to the employees of Brumadinho, including contractor, until December 31st. 2019"	Guarentee of employment or salary	Support	Immediate Support	Crisis Support	Rebuild
widows/widowcis – ioi inc – and to dependents (i.e. cnildren) until they	"Afford medical insurance for the families of direct employees and contractors in the territory of the State of Minas Gerais to widows/widowers – for life – and to dependents (i.e. children) until they	Afford medical insurance for the families	Monetary coverage	Compensation	Crisis Support	Rebuild
are 22 years old" "Psychological care for workers until clinical release" Psychological care Assistance Immediate Support Crisis Support Rebuild	are 22 years old" "Psychological care for workers until clinical release"	Psychological care	Assistance	Immediate Support	Crisis Support	Rebuild
"Day-care stipend of 920 Brazilian reais to employees' until they are 3 Day-care centre allowance of R\$920.00 Allowance Compensation Crisis Support Rebuild	"Day-care stipend of 920 Brazilian reais to employees' until they are 3 years old"	Day-care centre allowance of R\$920.00	Allowance	Compensation	Crisis Support	Rebuild

"Education stipend of 998 Brazilian reais to employees' until they are 18 years old"	Educational allowance of R\$998.00	Allowance	Compensation	Crisis Support	Rebuild
"Vale clarifies that by determination of its Board of Directors on January 27th, 2019 two Extraordinary Independent Consulting Committees were created to report directly to the Board of Directors to be "external independent members, with unblemished reputation and with experience in the subjects of their respective occupations"	Two Extraordinary Independent Consulting Committees	Independence		Transparent	Bolstering
	External independent members with experience and unblemished reputation			Communication	-
"Moreover, Vale has widely collaborated with all investigations voluntarily handing information, registries and files to the authorities as well as determining that all employees openly collaborate with the authorities."	Voluntary collaboration with all investigations	Collaboration		Transparent Communication	Bolstering
"Besides that, considering the more conservative risk assessments some operations were stopped and the persons in the respective Self-Saving	Conservative risk assessement in some operations	Intensified actions		Non-repetition	Rebuild
Zones and/or Secondary Saving Zones of some dams were evacuates"	Operations were stooped and dams evacuated	intensified decions		Tion repetition	Rebuild
"To these families Vale has also provided emergency donation of 5,000.00 Brazilian reais"	Emergency donation	Donations	Compensation	Crisis Support	Rebuild
"Besides these, other mines have had the risk level of their dams raised to 1"	Risk level of some dams has increased	Revision		Non-repetition	Rebuild
"Finally, regarding the leverage of Vale's shareholders, business partners and suppliers it is important to restate that Vale is in constant dialog and	Constant dialog	Contribution		Transparent	Bolstering
open to contributions and inquiries from any shareholders and stakeholders including NGOs and social movements. "	Open to contributions and inquires			Communication	

Appendix J - Diagram of SCCT's crisis response strategies





Appendix K – Updated Diagram of SCCT's crisis response strategies