

ESCOLA POLITÉCNICA DA USP
DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO

PRO3385 – Corporate Social Responsibility.

Class 1 – 2020 02 17

**THE VALLEY OF DEATH
VALE S/A CASE**

INTRODUCTION

Friday afternoon, January 25, 2019, lunch time. In the refectory of the mining company Vale, in Brumadinho-MG, dozens of workers were having lunch when the tailings dam of the Córrego do Feijão broke. The mud avalanche hit the administrative part of the company, including the refectory and the Vila Ferteco community. There were about 430 Vale workers at the site (RODRIGUES, 2019).

"First there was that loud noise, it looked like a helicopter falling. Then, the light ended and, when I got up to see what it was, I just felt things crushing me", says Paloma da Cunha, 22, a kitchen assistant who lived in front of the Nova Estância inn, in Brumadinho, also devastated by the tailings tsunami. Carried by the current, Paloma was thrown by the wave to the left side and clung to what she found on the way out of the flood. With great difficulty, she reached one of the pillars of a bridge on a train line broken by the force of the mud. At this point, she was able to hear the voice of Claudiney Coutinho, a Vale employee, who located her and launched a rope to rescue her. Sinking in the mud, Paloma could barely move. The rescue, filmed by a Coutinho's friend on his cell phone, was one of the most impressive images of the survivors' removal from the Brumadinho tragedy (MENDONÇA, 2019).

"I couldn't take it anymore, the mud is very heavy. I felt a lot of pain, I broke my sternum, my nose, I was bleeding a lot, but I just thought about my family. At that moment, I thought that everyone could be alive, as I was". The tailings flood from mining company Vale swallowed her house, taking away her husband, 18-month-old son, 13-year-old sister and the future as she had imagined. The kitchen assistant was the only one in the residence who survived (MENDONÇA, 2019).

This was not the first environmental disaster in the country or in the world. Table 1 presents some major global disasters that have occurred in the last four decades and summarizes their impacts.

Table 1: Environmental disasters and their impacts: examples.

| WHEN | WHERE | EVENT | IMPACTS |
|------------|-------------------|--|---|
| 28/03/1979 | Pennsylvania, USA | Three Mile Island nuclear power plant in poor condition had equipment failure and operational error. | Radioactive gases escaped into the atmosphere and 1.5 million liters of radioactive water released into the Susquehanna River. About 140 thousand people displaced to shelters. |
| 24/02/1984 | Cubatão, Brazil | Operational error by Petrobras operator when transferring gasoline to closed | 700 thousand liters of gasoline spilled through the mangrove bringing on a fire that decimated the village of Cubatão, causing more than 500 |

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| | | piping. | deaths. |
| 03/12/1984 | Bhopal, India | A Union Carbide pesticide plant leaked 40 tons of toxic gases. | About 500 thousand people exposed to toxic gases, approximately 20 thousand died and 150 thousand became ill. |
| 19/07/1985 | Stava, Italy | Breakdown of two mining tailings dams in Val di Stava, owned by Prealpi Mining Company. | Dump of 180 thousand cubic meters of mud, sand and water at a speed of 90 km/h, killing 268 people, destroying 63 buildings and demolishing eight bridges. |
| 26/04/1986 | Chernobyl, USSR | Reactor 4 at the Chernobyl plant exploded and caught fire after a safety test. | Radioactivity cloud, 400 times larger than Hiroshima, covered the USSR, Western Europe, Scandinavia and the United Kingdom. 200 thousand people evacuated their homes, and between 30,000 and 60,000 died of cancer. |
| 24/03/1989 | Alaska, USA | Valdez, an Exxon oil tanker, hit the coast of Alaska. | 41 million liters of oil escaped with the collision, immersing in oil the fauna of the region. |
| 18/01/2000 | Rio de Janeiro, Brazil | A Petrobras pipeline carrying oil broke. | 1.3 million liters of oil spilled in the Guanabara Bay, affecting mangroves, a natural conservation unit and causing tons of fish death. |
| 16/07/2000 | Araucária, Brazil | Oil pipeline expansion joint break at the Presidente Getúlio Vargas Refinery (Repar), owned by Petrobras. | About 4 million liters of crude oil spilled into the Barigui and Iguçu Rivers, advancing for 30 km. The disaster affected the region's ecosystem, fish, mammals and the riverside population. |
| 29/03/2003 | Pomba River, Brazil | Cataguases de Papel and Cataguases Florestal tailings dam failure. | Dump of 1.2 billion liters of toxic waste from the Pomba River to the Paraíba do Sul River, reaching 40 municipalities in Minas Gerais, Rio de Janeiro and Espírito Santo. |
| 20/04/2010 | Gulf of Mexico, USA | British Petroleum offshore oil rig Deepwater Horizon explosion. | So far the greatest environmental tragedy in the USA. The explosion killed 11 workers and sunk the rig, causing the spill of 795 million liters of oil during 87 days. |
| 04/10/2010 | Ajka, Hungary | Dam failure at the Ajkai Timföldgyár aluminum plant. | Dump of a million cubic meters of toxic waste, causing 10 deaths and more than 150 injuries. 40 km ² of contaminated area, reaching the Danube and its tributary rivers. |
| 10/09/2014 | Itabirito, Brazil | Retiro do Sapecado mine dam failure, owned by Herculano Mining Company. | The spill left 3 dead, 5 injured and affected the basin of the Velhas River by ore tailings contamination. |
| 02/04/2015 | Port of Santos, Brazil | Fire in the fuel tanks of the Aratu Chemical Terminal, owned by Ultracargo. | The fire lasted nine days. More than eight billion liters of salt water used to put out the fire later returned to the sea, causing the death of seven tons of fish due to the decrease in the |

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| | | | oxygen rate in the water. |
| 05/11/2015 | Mariana, Brazil | Fundão tailings dam failure, owned by Samarco. | Dump of 43 million cubic meters of tailings. 600 families were displaced, 19 people died and 1469 hectares of vegetation were damaged. The mud contaminated 663 km of rivers, including the Doce River, the largest basin in the southeast of Brazil. |
| 25/01/2019 | Brumadinho, Brazil | Feijão mine tailings dam failure, owned by Vale | Dump of 12 million cubic meters of tailings along more than 46 km. 259 people died and 11 are missing. The ore tailings devastated 133.27 hectares of native Atlantic Forest vegetation and 70.65 hectares of Permanent Preservation Areas. The Paraopeba River, a tributary of the São Francisco, was seriously contaminated. |

Sources: adapted from EBC (2015); LEMOS (2013); LUINO, DE GRAFF (2012)

It is alarming to see that, even causing impacts of catastrophic magnitudes, environmental disasters such as the rupture of dams are recurrent in the country's history. These disasters shake the environment balance and the well-being of society for an indefinite period; compromise the image of the companies involved and devastate their financial health with huge amounts on fines, indemnities and repairs (LOPES, MORAIS, BARBIERI, 2016).

THE BRUMADINHO CASE

Dam I of Vale's Córrego do Feijão mine collapsed on January 25, 2019 and, in less than half an hour, killed 270 people, with company employees the majority of those affected by the dam breach. The tailings, very thick, moved quickly, reaching a speed of 80 km/h after the structure broke, according to the Fire Department of Minas Gerais (NASCIMENTO, 2019). Dam I, built in 1976, contained a volume of 12.7 million m³ of iron ore tailings. According to Vale, the dam had closed its activities about three years ago (ESTADÃO, 2019). The security sirens, which should have been triggered to alert employees and residents, did not sound due to the speed with which the event occurred (ISTO É, 2019). The National Water Agency (ANA) reported that the mud polluted 300 km of rivers (ANA, 2019).

To fulfill an ore supply agreement to the USA during World War II, in 1942 the then president Getúlio Vargas nationalized the mining sector, and founded a state-owned company focused on the production of iron ore: Companhia Vale do Rio Doce. In 1966, the port of Tubarão, in Vitória, began operating, paving the way for Vale's exports. In 1981, the mine in Carajás is opened; in addition to iron, Vale explores gold, manganese, copper and nickel reserves, among others. The company was privatized in 1997, and changed its name to Vale S/A in 2009 (UOL ECONOMIA, n.d.).

Vale is "one of the largest metals and mining company in the world. Vale has a market capitalization of around US\$ 71 billion, with approximately 219,754 shareholders from all continents. Vale is the world's largest producer of iron ore and iron ore pellets and the world's largest producer of nickel." The company also produces

“manganese ore, ferroalloys, metallurgical and thermal coal, copper, platinum group metals (PGMs), gold, silver and cobalt.” (VALE, 2019, p. 1).

Vale shares are traded on the New York Stock Exchange – NYSE, the B3 – Brasil, Bolsa, Balcão and the Euronext Paris. Average daily trading value was approximately to US\$ 245 million in the second quarter of 2019. Vale’s credit rating are BBB- by Standard & Poor’s, Ba1 by Moody’s, BBB- by Fitch, and BBBL by Dominion Bond Rating Service (VALE, 2019).

Vale’s mission is “to transform natural resources into prosperity and sustainable development”, and its vision is “to be the number one global natural resources company in creating long term value, through excellence and passion for people and the planet”. The values listed by Vale are “life matters most; value our people; prize our planet; do what is right; improve together; make it happen.” (VALE, 2017, p. 19).

According to the 2017 Sustainability Report, “Vale maintains the management of its dams in permanent alignment and updating with the good and strictest international practices, standards of which exceed the legal requirements. In this sense, it bears emphasizing that the Brazilian dam safety legislation is quite stringent, also based on good international practices and very judicious, both in terms of safety management requirements and emergency management.” (VALE, 2017, p. 66).

The company informs that it has an “Integrated Risk Management System for geotechnical structures is based on three main pillars: People, Processes and Information Systems. In the People pillar, specialized teams are dedicated to controlling Vale’s dams, deploying qualified professionals at the operation sites to take care of the structures day-to-day, and at the offices to develop projects, studies and analyses to assure safety and reduce structural risks. In the Processes pillar, procedures are organized in Safety Management, Risk Management and Emergency Management throughout the life cycle of the structure, from design implementation, operation, maintenance and monitoring. In all these phases, the prognosis of the risks and the state of our readiness in case of an emergency.” (VALE, 2017, p. 66-67).

In the Information Systems pillar, the company has “two systems that support geotechnicians with information for fast and effective decision-making. One of them is Geotec, which stores structural maintenance and monitoring data. The other is Geotechnical Risk Management (CRG, acronym in Portuguese), which stores technical information on the structures, the Dam Safety Plan and information on risk analyses.” (VALE, 2017, p. 67).

“In addition to applying best practices pertaining to dam safety management, Vale submits its structures to audits conducted by specialized external consultants, and rigorously complies strictly with applicable legislation. Another highlight this year was implementing the International Panel of Experts on the Ferrous area, composed of international and national technicians who work in risk management, geotechnics and water resources. The panel’s purpose is to evaluate governance, processes, studies, projects and technical analyses of geotechnics and hydrology.” (VALE, 2017, p. 67).

In 2014, “Vale scored the second Gas Emission Inventory highest points for transparency in the evaluation of the CDP (Carbon Disclosure Project) questionnaire among companies in Latin America, and was included in the CDLI (Climate Disclosure Leadership Index) for the fifth time.” (VALE, 2015, p. 15). Vale was also recognized with the Época Green Company Award in 2014, 2011, 2010 and 2009. In 2015, Vale was listed for the fifth consecutive year in the Sustainability Index (ISE) of the São

Paulo Stock Exchange (BM&FBOVESPA) and, for the sixth consecutive time, the company received the Brazilian GHG Protocol Program's Gold Seal qualification for its Greenhouse Gas Emission Inventory (VALE, 2015).

Among the 2016 awards, Vale stood out in 15 categories of the Metals & Mining segment in the Latin America Executive Team ranking, prepared by the American Institutional Investor magazine (VALE, 2016). In the same year, Vale won "Best Practices in Health and Safety. The award, promoted by the Brazilian Mining Institute (Ibram), acknowledges efforts in adopting advances in the work environment. Vale excelled in the Management of Tailings Dam Emergencies" (VALE, 2016, p. 26). Besides that, "the Vale Foundation won the first place in the 2017 edition of the Human Being Award, organized by the Brazilian Association of Human Resources." (VALE, 2017, p. 106).

The National Mining Agency (ANM) report on the Brumadinho tragedy concluded that Vale had information about the dam's problems months before the breach and that it omitted this data from the sector's regulatory authorities. A photo, for example, shows sediment at the outlet of one of the dam's drains, which according to ANM may indicate a serious problem. It is on Vale's records, but it was never sent to the agency. The version handed over to the inspectors had a single photo, showing only a problem in a channel to drain rainwater, which according to the agency does not affect the safety. According to the report, there was also an omission in the dam's piezometers (water pressure measuring devices). Charts show that they entered an emergency level 15 days before the breach (JORNAL NACIONAL, 2019).

The Agency states that Vale carried out a dam inspection three days before the tragedy. Only almost a month later, with the mud already spilled, the company informed the agency's system that the minimum safety factors had not been reached. According to the ANM, the missing information could have helped reduce the damage. "Activate the evacuation; activate the dam safety plan depending on the level of reporting. For example, the drain, which is carrying sediment, is very serious. That's right, our team would have the other day doing an inspection, helping, trying to find out what's going on and would already trigger the alert level one and due to the proximity of the cafeteria, for example, we could have already blocked the plant, with that movement", highlights Eduardo Leão, ANM director (JORNAL NACIONAL, 2019).

While the disruption in Brumadinho is the world's deadliest ore dam disaster in recent decades, the Samarco (a joint venture between Vale and the Anglo-Australian BHP Billiton) dam in Mariana in 2015 is the most serious environmental disaster in history caused by an ore spill (PASSARINHO, 2019).

THE MARIANA CASE

In November 2015, the Fundão dam broke, in Mariana-MG. The dam is controlled by Samarco Mineradora S/A, which has as shareholders Vale and BHP Billiton, and contained approximately 50 million m³ of iron ore tailings. The dam's rupture immediately launched 34 million m³ into the environment, while the remaining 16 million m³ continued to spread, gradually, towards the sea (LOPES, MORAIS, BARBIERI, 2016).

Samarco and Vale generated the tailings contained in the dam. These tailings initially hit the Santarém dam, forcing the mud wave passage for 55km, from the

Gualaxo do Norte River into the Carmo River. The water and mud wave hit Bento Rodrigues district, causing death and destruction, and the Doce River, where it traveled about 680 km to its mouth in Linhares-ES (LOPES, MORAIS, BARBIERI, 2016).

During its course, the mud wave destroyed communities and altered the water quality; leading to the death of aquatic biodiversity, including the entire regional set of fish. The levels of water turbidity led to the interruption of economic activities and the water supply of municipalities that depended on the affected rivers. In addition to the fatal victims and the injured, there were direct environmental and social damage, such as the destruction of housing and urban structures; destruction of permanent preservation areas; communities' isolation; wild and farm animals' death; impact in rural plantations; fishing restrictions; and health damages. The disaster also scathed the electricity generation by the hydroelectric plants affected (LOPES, MORAIS, BARBIERI, 2016).

Samarco Mineração S/A is a privately held company founded in 1977, which operates in the mining segment, controlled through a joint venture between Vale and the Anglo-Australian BHP Billiton. Samarco's activities are primarily located in the states of Minas Gerais and Espírito Santo, and its main product is iron ore pellets sold to the steel industry in 19 countries in the Americas, the Middle East, Asia and Europe. Corporate governance is based on four central pillars: Corporate Responsibility, Transparency, Equity and Accountability. Management consists of an Administrative Council with four members and four alternates, appointed by the shareholders of the parent companies. The Administrative Council is divided into four committees: Finance and Strategy; Operations; Audit; and Remuneration. These committees define strategies, approve business plans, investments, and budgets and monitor the company's results (RUFINO, SILVA, LUCENA, 2019).

Samarco's mission and values are based on three criteria: (i) producing and supplying iron ore pellets, intensively applying technology to optimize the use of natural resources and to generate economic and social development while respecting the environment; (ii) respect people, valuing life above any results and material goods, as well as respect the right to individuality, without discrimination of any nature, aiming at the individual and society well-being; and (iii) preserve the environment, through the correct use of the necessary resources for the company's activities. In order to meet the third criterion, the company specifically carried out periodic monitoring and sought to mitigate the environmental impacts related to the operations and business strategy risks (RUFINO, SILVA, LUCENA, 2019).

In mid-2014, Samarco released a plan addressing its strategy for the next eight years. The priorities were high productivity, with maximum use of the available assets in all areas and activities; low production costs in order to ensure competitiveness; high quality standards, according to market requirements; and a strong reputation that reflects good relationships with customers, employees, business partners and society in general (RUFINO, SILVA, LUCENA, 2019).

The company received several awards and recognitions. In 2014, it was elected for the second consecutive year as the Best Mining Company and the second Largest Mining Company in the country (Exame Magazine). Samarco was twice champion in the Mining and Steel Sector (Anuário Época Negócios 360º). It was ranked for the fourth time among the 150 best companies to work for in Brazil (Guia Você S/A) and received the Inca Excellence Awards Digital (Ideas, 2014). The company was 12th in the Benchmarking Ranking (Edition of the Benchmarking Brasil Program, 2013).

Samarco received the Green Mine Award; was the 14th in the Espírito Santo Business Leader Award; received the Findes/Senai Environment Award; and it was considered the company that best communicates with journalists (RUFINO, SILVA, LUCENA, 2019).

Four years after Mariana's tragedy, its causes are still under investigation. Some evidence points out that Samarco knew that the Fundão dam could be unstable. In the previous year, a company's technical team identified cracks in the top of one of the dam's walls, corrected with simple embankments at its base. At the time, the cracks were not considered as a static liquefaction result (solid material that starts to behave as fluid), which happens when there is too much water in the dam's foundation. According to the Public Prosecutor's Office of Minas Gerais, the successive increments in the height of the dam made by Samarco due to the iron ore pellets production increase at that unit could have caused the liquefaction. The Public Prosecutor's Office also investigates changes made to the original project, such as the increase in the wall elevation by 25 meters in the twelve months prior to the dam breaking (RUFINO, SILVA, LUCENA, 2019).

Samarco's operations in more than three decades of activity have contributed to Mariana's economic growth. In 2010, Mariana's per capita GDP was R\$ 114.347.90, much higher than the national equivalent of R\$ 26.445. Samarco's presence in the region also contributed to the financial support of the Municipality of Mariana. Between 2011 and 2015, the resources collected with mining royalties and with ICMS (tax on goods and services) represented more than 70% of the municipal revenue of the Municipality (SALINAS, 2016).

On the other hand, economic data indicates that the population of Mariana does not enjoy the same benefits as the Municipal Administration with the presence of Samarco. The contribution of the mineral industry in the number of active jobs in Mariana is not very significant (about 12%). The 2010 Demographic Census pointed out that the average income of the employed person in Mariana was lower than the national average. In addition, despite the high budget revenue, Mariana is still a municipality that does not offer sewage treatment services to its population (SALINAS, 2016).

QUESTIONS

"Social responsibility (at least in its pure form) means giving away the shareholders' money. It weakens the firm's competitive position, and it dilutes the effort of its managers, who are supposed to focus on economic productivity" (Davis quoted by Mintzberg, 1983, p.6)

1. Do you agree with this statement? Please, detail your argument?
2. Considering the Carroll's CSR Pyramid, what are the responsibilities that you identify from Vale's case? Detail the evidences. (see paper Carroll *edisciplinas* usp)



3. **Decoupling** of means and ends is the disconnection between the actions and the goals of an organization. Decoupling can also refer to promises or policies that are not supported by corresponding actions (LYON, MONTGOMERY, 2015). In the light of those definitions, analyze the Brumadinho tragedy. (see paper Lyon and Montgomery, 2015)

4. Likewise, according to the values of its shareholders, Samarco demonstrated a prevention behavior, seeking to avoid environmental and social damage. Analyze Mariana's tragedy.

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