La Esperanza: Beyond Automation[1]

Track: Management Education and Teaching Cases

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[1] This teaching case was prepared by professors XXX. Teaching cases are intended to support class discussions. They do not imply the endorsement of individuals or organizations, nor do they illustrate the effective or ineffective handling of a management situation or serve as primary information sources. This case has been adapted from real events. The names of people and organizations have been changed to ensure confidentiality. The authors wish to thank XXX for her expert advice and editorial suggestions.

La Esperanza: Beyond Automation

Abstract

The case offers students an opportunity to analyze aspects of organizational culture to be taken into account in a decision making process. It also provides them with the opportunity to consider various criteria that must be taken into account in a decision, such as the one of automation in the mining industry. Students will be able to examine a sustainable management perspective (in this case, examining the company's culture of security and wellbeing, as well as valuing human factors and intangibles).

Introduction

On November 19, 2015, Julio Soto, operations manager of La Esperanza, was getting ready to travel to the city of Lima, Peru to attend a board of directors meeting. La Esperanza was a mining unit property of POFCO, a company headquartered in China and with operations in the Peru, dedicated to the development of gold and copper projects. At that meeting, Soto would present an "autonomous transportation project," and upcoming investments in technology at La Esperanza would also be discussed. Soto was especially anxious about his meeting with John Brown, his corporate manager, who had drafted the project of autonomous trucks some years back, when holding the position of operations manager of La Esperanza. In the year 2012, John Brown had decided to shelve the proposal fearing that the project would damage relations with workers and the community, due to the replacement of local workforce with technology. Soto knew that the decision to automate could bring political and social costs to the company. This had to be evaluated.

Soto thought that the recent restructuring of POFCO opened an opportunity to take the project back "out of the drawer." With automation, La Esperanza would modernize and be brought up to par with other mines in the industry. In addition, given his experience in the reduction of operating costs through technological innovation in a Chilean mine, the autonomous transportation option was especially interesting to him. He considered it "an alternative that would boost efficiency, safety and productivity in the mine." Despite his enthusiasm, he had some concerns because the proposal would involve layoffs or relocations of personnel. He thus decided to schedule a meeting with Manuel Romero, manager of human resources and community relations, and Omar Zavaleta, superintendent of human resources. He worried and knew he had to weigh his concerns before the meeting: What would be the impact of the project be on the climate and culture of La Esperanza? How would it affect the perception of workers about their opportunities for growth? In addition, the decision implied dismissing the three workers with greatest seniority and legitimacy in the company. How would this affect the relationship of the company with the workers union? How would it affect the relationship with the communities that had given the company a social license to operate? Finally, Soto wondered whether automation would actually be profitable. Soto knew a tense conversation was awaiting him; but because the meeting with the management team was in two days, he needed to be well prepared with regards to his own doubts.

I. Mining in Peru

In 2015, Peru was the Latin American country with the largest number of gold, silver, lead and zinc reserves.[1] It was the sixth largest producer of gold in the world and the first in Latin America.[2] In addition, the export of mining products was important for Peru. It represented 59% of total exports between 2005 and 2014, which showed the significance of the contribution of mining to GDP. Mining was the main mechanism of economic growth for the country (see Appendix 1).

In regards to the evolution of the gross domestic product (GDP), in 2008 Peru achieved 9.1% growth. However, an ensuing crisis of gold and copper commodity prices led to a collapse of GDP. In 2009, growth reached only 1.1%.[3] According to the Central Bank of Reserve of Peru (BCRP – Banco Central de Reserva de Perú), [4] the mining GDP went from 7.1% in 2008, the highest in 3 years, to - 2.1% in 2009. This motivated the postponement of several investment projects in exploration and exploitation of copper and gold. The mining GDP suffered most in 2010, with a contraction of - 2.7%. This crisis in the sector continued through 2011. There were slight improvements in 2012 and 2013, with growths of 2.5% and 4.3%, respectively, followed by a new fall (-2,1%) in 2014, as a result of surpluses in the production of copper in China and Europe (see Appendix 2). Projected growth of the mining GDP in the 2015-2017 period was 15.5%, due to increased mining production and the execution of large infrastructure projects.[5]

Gold production in the Peru increased 3.5% between 2014 and 2015, and La Esperanza was the third producer of gold in the country (see Appendix 3). It was also the tenth company in terms of size of investments in Perú. Its production had increased fourfold between 2011 and 2014, and its gold production accounted for almost 5% of total national production. Country regions benefited differently from mining activity. Castile, Rioja and Laredo enjoyed the greatest income from it. In the context of economic projections for 2015, the impact of decisions made by La Esperanza would be great, not only for the company itself, but also for the district where it operated, the province of Sanchez Carrión, the region of Castilla, and the country's industry as a whole.

II. La Esperanza Mining Unit

La Esperanza initiated operations in 2011 with a single mining project carrying that same name, which consisted of a mine with doré-type gold reserves (alloy of gold, silver and smaller proportions of other metals). The mining concession covered an area of 331,500 hectares located in the district of Sanagorán, province of Sanchez Carrión. The location was 180 kilometers east of the capital of the region of Castilla, one of the two with the largest gold production in Peru. The area, located at an average altitude of 2,670 meters above sea level, had a dry and humid tropical climate, with maximum and minimum rainfall of 158 mm and 10 mm, respectively, and an average temperature above 12 °C.

The mineral deposit had been acquired on several occasions from the time of its discovery in 1994. POFCO had bought it at the beginning of 2015, shortly after the restructuring of the company. POFCO was a multinational company specializing in the production of precious metals. Its headquarters were in China, and it operated in Peru and other Latin American countries. At the beginning of 2015, year in which the company was restructured, leading to the appointment of new CEO, POFCO was worth US $3,500 million in the capital market and had a yearly production of 750,000 ounces of gold (see Appendix 3). Even though gold prices were not expected to rise in the near future, the company projected important increases in

low cost gold production at La Esperanza mine. The composition of the board changed and there were some movements in the management team.

After the retirement of the executive chairman of the board of POFCO in 2014, the up to then Vice President and CEO, Roger Andersen, took over that office. John Brown became corporate operations manager, and Esteban Rodríguez became the general manager of La Esperanza (see Appendix 4).

In 2015, the new board decided to follow an aggressive growth strategy. According to Andersen:

> We seek to create a stronger company with a better footing in the future, and with this in mind we are diversifying our asset base in one of the most attractive regions in the world for precious metals producers. As an organization with great management capabilities, we will continue to focus on sustained operational performance and constant innovation; as well as on delivering superior financial returns to our shareholders, both in the short and long terms.

Andersen wanted to align this growth strategy with the mission and vision of the company:

> To grow profitably by operating our mines in a sustainable manner, with the highest standards of safety, health, environmental protection and responsibility.
>
> To be an inspiring mining company, based on a transparent and innovative business model that creates value in a responsible manner.

Julio Soto was hired to take on the position of operations manager of the mine for two reasons: to help implement the new strategy, and to replace Brown who had been promoted to the position of corporative manager of operations in Peru. Soto had developed a solid career during his ten years as engineer in a similar mine in Chile, where he had performed positively in terms of costs management. He had recently left the company where he had worked for almost his entire professional career. He had made the decision to join La Esperanza because conducting a mine as operations manager, in a growing company, was powerfully appealing to him. It was also a job that would allow him to return to his country, after many years. During his career he had developed broad technical knowledge in the fields of exploration and mining production (methodologies, processes and technologies), as well as skills to lead and manage teams. Brown had come to the conclusion that Soto was the ideal candidate for the vacant position because, during his career, the latter had come up with cost reducing solutions without affecting quality or worker safety. Brown pointed out the following about Soto's competencies:

> Soto is highly motivated by technological innovation and teamwork. He has a broad business outlook, cares about increasing safety and assuring effective implementation of production plans, and is always in search of new opportunities.

Esteban Rodríguez, general manager of La Esperanza, was concerned with aligning strategies, and in that sense, knew that organizational culture had to be properly articulated. The welfare coordinator, Rosa Espíritu, indicated that, "since its inception, La Esperanza had distinguished itself for its concern with safety and the community, and for a horizontal organizational structure, which was surprising in a recognizably unequal social environment." She explained, in addition: "What I liked was that workers highlighted the topic of equal treatment and equality in the dining hall." Manuel Romero, the manager of human resources and community relations, added:

> In other mines, there are up to five types of dining halls: for foreigners, officials, employees, workers and contractors, while here we all have lunch together. Each new person who joins the company must adapt to our culture, which motivates and generates trust.

With regards to relations with the community, Romero, pointed out:

> “One of the things that POFCO found attractive about La Esperanza, was the way the population living around the mine identified itself with the company and the enormous benefits it obtained. The company is conscious of its role and assumes the responsibility of the community's well-being in an area where there is not much governmental presence.”

Workers agreed with this appreciation of the work environment:

> I feel like in a family, which began small and grew by valuing people, and in hand with the community (Alberto Paiján, worker).

> I have been offered other jobs, but my son and I work here. I am doing well and I receive respect (Juan Chocope, truck operator).

Precisely, Brown had told Soto that one of the things he had learning with regards to mining in the country was that:

> In Peru, mining has to get along with the community. You have to get them involved as part of the project, listen to them, identify their needs, explain clearly what will happen, and show them that they can improve their income and their quality of life. You're optimizing processes, being efficient, but also providing others with opportunities for development. Thus, the community lets you work and is even

willing to help. There are difficulties, their common interests do not always prevail, but it is important to connect with them through their leaders.

The last audit of occupational safety and health conducted at La Esperanza confirmed that it complied with all laws, regulations and standards. Key to this was the training provided by the company, and the implementation of best practices and economically viable technologies to achieve the goals and objectives established by its Integrated Management System. In addition, the company had an Emergencies Response Plan, with brigade members from different areas of the company duly trained and trained to intervene as first respondents during an emergency. Brigade members were specifically trained in first aid, fire-fighting, mining rescue and spills of hazardous materials.

The Department of Occupational Safety and Health had developed a set of practices, values and policies related to the prevention of work-related risks. These served the process of advising and controlling workers, in positions of responsibility, in the different areas of the mine. In this way, daily tasks and activities were carried out with care for the physical integrity and the health of employees. Company culture placed the focus on following safety procedures, which reflected a commitment to the lives of the people.

Low worker rotation, below 5%, signaled stability in the company and the satisfaction of the workers, who in turn had assimilated good practices promoted by La Esperanza, including those having to do with safety.

In the words of Walter Guanilo, plant manager:

> A safety culture is built here and this also reaches the families of workers, because by caring for their integrity and their work, they also think about the safety of their families. Our *slogans* are regularly changing: your family is waiting for you at home, work carefully, if you take care for yourself and work well, your family will be well, among others. Security was tended to so well that the Ministry of Energy and Mines found nothing to report during scheduled inspections visits. As a result of this, the ministry began to make surprise inspections.

III. The community

The area of direct impact of the La Esperanza mining unit was composed of two villages (Los Pinos and Las Palmeras) belonging to the District of Sanagorán, and one village (El Eden) in the Huamachuco district. The rest of the Sanagorán and Huamachuco districts formed the area of indirect impact.

According to XI National Population Census (INEI, 2007), Los Pinos had 964 inhabitants, Las Palmas, 524, and El Edén, 512. On average, in the three villages, 97% of the homes were

made of adobe. In addition, 52% of the residents obtained their water for residential use from springs, wells, pipes or existing brooks in the area.

According to numbers provided by the INEI, in Sanagorán, access to the basic services was limited. Only 15% of the population had access to potable water, while almost 60% used water from rivers or canals. As for sanitary facilities, 48% of the population did not have this service and 42% had access to a cesspit (see Appendix 5).

According to the Ombudsman, in 2015, there were 214 social conflicts in Peru. None took place in the areas of influence of La Esperanza, but the area had other types of conflicts. The terrorist group Sendero Luminoso* had been present in the area in the 1980s. In addition, there existed disputes over land possessions between certain community members. They mentioned: "There is conflict over the possession of land and grasslands for agriculture, and there are also conflicts between families."

The local population associated mining activities with job opportunities and saw them as a means to increase family income. According to the Department of Human Resources and Community Relations, almost all workers, mostly aged between 20 and 40 years, came from the community, and had previously worked in agriculture. However, mining activity was also perceived as a source of risk because of its environmental impact. One of the residents of the area said:

> In part, it [mining] is a solution to our economic and work needs, but I am concerned because the risks can be very serious if not controlled as the law demands (...) It is bad because it pollutes and positive because it supports the community and our children (...) On the one hand it is not good due to environmental pollution that hurts the animals, the farms and ourselves, but at the same time we have jobs and the support of the company.

According to Romero, La Esperanza and the community had an easygoing, positive relationship, based on an effective social responsibility plan that successfully integrated local expectations with the needs of the company (see Appendix 6). La Esperanza was perceived by the community as a company that had brought opportunities for progress to the area in terms of jobs, income, training of young people, improved technical skills, and the development of the local infrastructure (access to electricity, improvements in school buildings and medical posts, among others). Community members were very interested in working for La Esperanza because it gave them status within community, especially if they

* The Communist Party of Peru-Shining Path (PCP-SL) was a terrorist and subversive organization that followed Marxist, Leninist and Maoist ideologies. They carried out hostile operations in the 1980s, until the capture of their leader, Abimael Guzman, in 1992.

were drivers of the giant trucks that were used in the mine. These trucks were symbols of power and prestige. On this Juan Chocope expressed:

> "I entered the mine many years ago, worked hard in several areas and now I drive my truck. Important companies have come to train me, I make more than other co-workers, and my son has also started to work here (…) I want him to go to school and have a better future.

Workers from all areas of the mine aspired to reach the position of truck driver. For the majority of community members, this was the maximum aspiration because it implied higher incomes, commensurate with associated risk. In this sense, Romero said:

> Local people like to operate these machines. It is cultural... truck operators hang on their walls framed photos of themselves with the machines, and their sons look at them with pride (...) This group of operators is an elite in the mine and is a relatively closed group (...) Operators feel proud in front of their families, not just because of improved quality of life, but also because of the job position that they hold, since their skills and competencies are recognized. The son of a worker commented a few days ago... Dad, when I grow up I will also drive that super machine.

One of the prerequisites to hold the position of truck drivers was to have a truck operator certification issued by the manufacturers. For this reason, the training plan of La Esperanza included yearly trainings and certificate courses for truck drivers. Community residents and mine workers had to apply for these courses, for getting a job a driver was in very high demand. Those who were not selected had to invest their own resources to get the training that made them eligible to apply for the truck driver position.

IV. The Automation of the Transport System Project

The production process in La Esperanza included stripping or rupture of the rock, mining, which consisted of the recovery of ore through leaching; and finally, smelting and casting (melting the ore and inserting it into a mold to obtain marketable gold bars).

The stripping process started out with drillings in the rock. Drilling machines made holes in which explosives were placed for blasting the rock from which the ore would be extracted. Rock waste was also produced in the process. The broken rocks were transported by means of excavators (CAT 345) and giant hydraulic shovels (with capacity of 23 cubic yards) towards awaiting high tonnage tipper trucks, in a continuous operation. The trucks then carried the rocks to where the leaching process took place, as well as to the waste rock deposits. The truck round was two kilometers long on average. In 2014, the company had 43 tipper-trucks with a capacity of 90 metric tons each, to meet an operation of 35,000 metric tons of ore per day.

It is noteworthy that Codelco and its division Gabriela Mistral in Chile (see Appendix 7), was the first mining operation, worldwide, in which 100% of the trucks operated autonomously, i.e. without a driver. In that mine, the transport of the rock was made by means of teleoperators, which worked 24 hours a day.

Commenting on the Chilean experience, a specialist on the subject mentioned:

> Although Codelco has been a pioneer in remotely-operated mining with the Gaby mine transport system, in practice, this system has had some inconsistencies in GPS reliability;[6] also, it should be presenting low benefit-cost ratios, because the cost of labor in Chile is still low. Additionally, problems have occurred because operators have failed to follow rules and incurred in programming errors.

In the case of Australia, the Green River mining complex implemented, in 2008, the system of autonomous transport as a key component to increase efficiency, reduce costs and improve health, safety and the environment. At the beginning of 2014 the Australian mine projected to have 40 autonomous trucks. According to Joel Méndez, specialist in independent transport systems, "in this case the economic benefit was evident in the short term because the labor costs amounted to around US $200,000 dollars per year per driver, while the cost of maintaining an autonomous truck was approximately one third of that."

In the case of Peru, only plant operations had been automated; i.e. the control of processes to obtain the final product. But transport, including the one corresponding to waste rock disposal, had not. This meant that companies lacked integrated processes with common standards (languages, data transmissions and homogenous platforms) to reach their goals. The transport process depended on the skills of the operators and the meticulousness of the supervisors in charge monitoring and control, “but levels of performance in terms of time, quality and productivity could not be standardized in accordance with quality requirements” (Julio Soto, manager of operations of La Esperanza).

La Esperanza could be classified as a mine with midlevel automation. For this reason, leaching and processing still produced pollution and risks, including carbon sequestration. But advances in automation had produced improvements, which were recognized by all workers: people were less exposed and the risks of contamination and lack of safety had been reduced.

La Esperanza did not have any automated processes in the sphere of transportation. The project that Julio Soto had in hand was meant to do away with drivers for the transport of material and substitute them with an automated system, in which an operator, from a control base, would handle remote autonomous trucks. The transport system automation project envisaged starting with a pilot of two trucks and to gradually expand to a fleet of 31 trucks.

Soto was convinced that this change was the tendency in the industry. In his opinion, La Esperanza could not stay behind if the company wanted to keep abreast with the processes of modernization. In a report to his supervisors, Soto indicated that the automation project would bring the following benefits:

- Greater efficiency and productivity. With an autonomous system, it was estimated that production would increase between 15 and 20% at an early stage, with increased precision and accuracy as a result of the systematization and standardization of repetitive tasks. This efficiency was aligned with the company's growth strategy and with sustained improvements in its the operational performance.

- Process efficiencies. Replacing the current trucks with unmanned ones would reduce shift-change times.

- Cost reductions. Fuel consumption would be reduced somewhere between 10 and 15%, and the costs of maintenance would decrease by about of 8% (just the cost of tires was expected to decrease from approximately US $70,000 to US $30,000). In addition, costs of overtime and temporary replacements would decrease, because the automated trucks would operate 24 hours a day, seven days a week throughout the year.

- Lower risk of accidents, human and material losses, and health problems. Worldwide, it was estimated that the industry was experiencing two to three truck operator deaths a year in the critical task of transporting the mineral from the areas of extraction to the plant. Worker dissatisfaction associated with high-risk work was also expected to decrease.

- Increase in training opportunities. The operators of automated systems would be trained in the new technology.

Despite these benefits, Brown had filed away the automation of transport project in 2012. On that year, a report that has been prepared for the management of the company, provided the following reasons:

- Probability of layoffs. The economically active population (EAP) living in the vicinity of the plant was of about 1000 people. La Esperanza employed about 500, and of these, half worked in the transport of ore. In the event of automation, about 100 (out of 250) operators could be relocated in other areas (such as control and monitoring) where support would be required after the implementation of automation; but, the other 150 operators would be laid off, which would affect the climate inside and outside the mine.

- Dissatisfaction of workers seeing their career aspirations truncated. The opportunity to develop into a truck driver had become part of the culture of the mine, and was the dream that many workers had sought to reach for years.

- Safety increases were not guaranteed. The document pointed out that the behavior of people in automated environments sometimes led to increased failures and errors, especially in the initial troubleshooting phase. Thus, there would not necessarily be improvements in worker safety.

- Political and social costs. This cost had to be assessed because the community was expecting more jobs, and some of the community leaders members of the Union. Mining conflicts, resulting from the breakdown of company relationships, raised the risk of cessation of operations at the mine.

- Automation did not necessarily bring savings. It was possible that automation was not attractive from a cost-benefit perspective because labor in Peru was inexpensive. The average annual salary of a mining worker in Peru was US $ 12,000, in contrast to the US $ 200,000 a year that an operator in Australia would make. In the latter case, the economic benefit of automation was clear.

V. Preparatory meeting with HR

While discussing the benefits of the proposal, both in terms of reducing safety risks and expanding opportunities in workers' careers, Romero, manager of human resources and community relations, recalled an incident that had cost the job of two workers:

> Because of his yearning to become operator of a mining truck, a young worker went to the extreme of risking his position in the company in order have the opportunity to handle one of these trucks. The young man worked as controller in the geology area, and upon spotting a truck that was inactive, he begged the operator insistently, to lend it to him. The latter acceded. Because of this risky behavior the young man was dismissed. The controller apologized publicly to the company and the security committee, accepting responsibility. It became known that the young man possessed a license to operate the truck, and that he had been waiting for the opportunity to put it into use, but he had not been authorized by the mine.

With respect to adverse effects, Omar Zavaleta, superintendent of human resources felt that if the mine was fully automated, it would offer fewer jobs and this would bring problems:

> La Esperanza, is one of the companies in the mining sector that values local labor the most. The proportion of local labor is higher than in other mines (...). The project should be evaluated very carefully because I currently think we cannot cut down the number of available jobs by automating. But in the case that we could, this would have

> to be evaluated not only from a technical point of view, but also politically and socially, because there would be a great social impact (...) social conflicts have paralyzed whole mines for days, for weeks, for months. I know that social costs can reach 20 million dollars per week for projects in operation; the Harvard Kennedy School has confirmed this information. That is why we should evaluate whether automating really brings any gain.

The dynamics of the discussion made it clear that the challenge for La Esperanza was great. Automation would bring the benefit of increased productivity, process efficiencies and cost reduction. But it was important to also assess and weigh out the risks stemming from layoffs and the perception of shortened professional development, as well as the political and social factor, given the company's responsibility with the community. This seemed like a dilemma with no quick solution.

Few days later, while on his flight to the mine, Soto reflected on the arguments for and against the automation, and while doing so, thought of how valuing people was a part of the identity of La Esperanza. This is why analysis had to be well rounded: What would contribute most to the sustainability of La Esperanza? Was it possible to find a balance? How could respect towards the people be demonstrated in a situation such as this one?

APPENDIX 1

Importance of Mining for Peru - Exports 2006 to 2015 *

By group of products - percentage structure

Item	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
Fishing	5.6	5.2	5.8	6.2	5.3	4.6	4.9	4.0	4.4	4.2
Agricultural	2.4	1.6	2.2	2.3	2.7	3.6	2.3	1.8	2.1	2.1
Mining	61.8	62.1	58.4	60.9	61.2	59.4	57.9	55.5	52.0	55.0
Oil and natural gas	7.6	8.2	8.6	7.1	8.6	9.8	10.5	12.3	11.5	6.7

* Data from November 2015

Source: Banco Central de Reserva del Perú. *Memoria* 2015 (Central Reserve Bank of Peru, Annual Report, 2015).

APPENDIX 2
Importance of Mining for Peru - Gold and Copper Prices & Mining GDP - 2008 to 2015 *

Year	Copper	Gold	Mining GDP
	Cents. US$/lb.	US$/ozt	Real % change
2008	315.32	872.27	7.1%
2009	234.22	972.37	-2.1%
2010	341.98	1224.48	-2.7%
2011	399.66	1571.05	-2.1%
2012	360.59	1668.00	2.5%
2013	332.12	1409.69	4.3%
2014	311.26	1265.60	-2.1%
2015*	218.10	1085.83	15.5%

* Data from November 2015

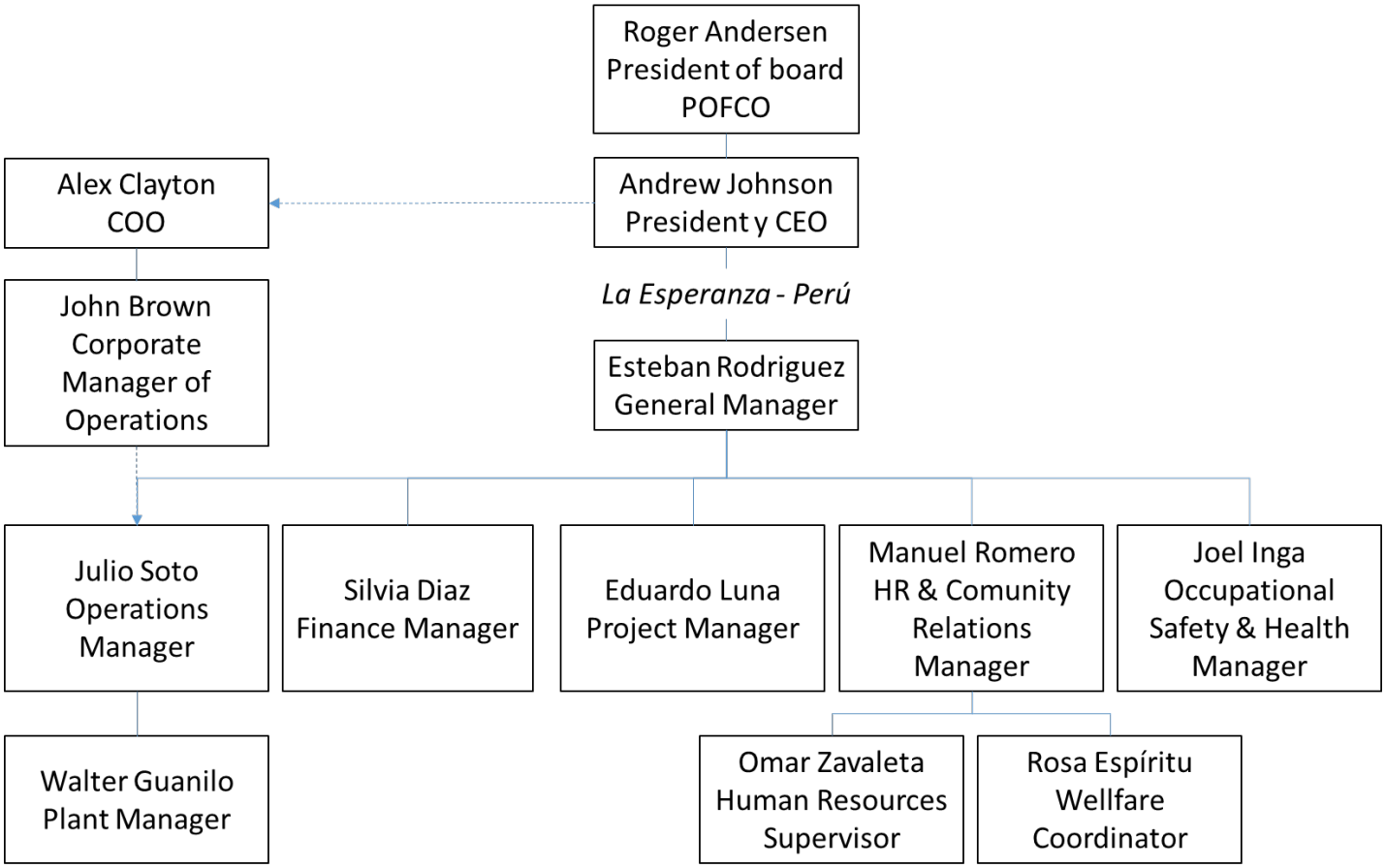
Source: Ministerio de Energía y Minas del Perú. *Anuario Minero* 2015 (Ministry of Energy and Mines of Peru, Mining, Yearbook, 2015)

APPENDIX 3
Production of Gold at La Esperanza - 2011 to 2014

	Mineral extracted			Waste	Total metric tons
Year	Metric tons	Au (g/t)	Ounces	Metric tons	Metric tons
2011	2,667,598	0.865	81,394	4,182,371	6,849,969
2012	6,345,654	0.84	188,023	12,953,447	21,220,411
2013	11,543,221	0.58	236,162	20,997,357	36,808,494
2014	12,876,212	0.507	230,277	15,332,132	32,606,798
Total	**33,432,685**	**0.698**	**735,855**	**53,465,307**	**97,485,672**

Source: Annual Report, 2015 - POFCO

APPENDIX 4
Organizational Chart of POFCO



Source: Company document

APPENDIX 5
Living Conditions in Areas of Influence

Health center at the village of Los Pinos

Living conditions at Los Pinos

Educational Institution at the village of Palmeras

House in the village of El Edén

Source: Company document

The villages of Los Pinos, Palmeras and El Edén:

The villages had access to sanitary services through latrines; however, much of the population defecated outdoors.

In the village of Los Pinos only two families had access to electric power. The remaining members of the community had no service. In the case of Palmeras, no house had electricity, and in El Edén, 26% of homes did.

For health services, the residents of Los Pinos and Palmeras resorted to the Micro Network of Choquehuanca, whereas the settlers of El Edén went to the Center of Health of Burgos. When patients needed a diagnosis or a more complex treatment they went to the Leoncio Prado Hospital in the District of Santiago, which was approximately four hours away from the villages.

Los Pinos had an educational institution covering the three levels of basic education (initial, primary and secondary). In Palmeras and El Edén, only initial and primary levels were offered.

30% of the residents of Los Pinos fell in the category of economically active population (EAP). 60% worked in agriculture. The EAP in Palmeras was 28%, and 72% of these worked in agriculture and cattle ranching. At El Edén, EAP was 27%, with 81% working in agriculture and ranching.

Potato crops covered the greater part of cultivated lands in Los Pinos and Palmeras. Grains such as barley, wheat, lupin and bean crops were harvested in smaller surfaces, though they remained significant. The fate of crops was mostly domestic consumption. However, lupin and potatoes were commercialized.

The residents of these communities were mostly of indigenous origin. However, with the arrival of the Spanish conquest, they had taken up traditions of Western origin, especially those of a religious nature. The celebration in honor of the Virgin of Grace (Virgen de Gracia) was the most important in the area.

Source: Tecnología XXI S.A, Op cit., Chapters IV & VI

APPENDIX 6
Community Relations Plan During Project Operations

Population/village	Program	Subprogram	Activity	Beneficiary population	Goals	Indicator
Los Pinos, Palmeras y El Edén	Health	Immunization campaigns	Home by home vaccination of children under 12	1296	In one year 50% of children fully vaccinated	20 children vaccinated monthly
		Hygiene campaigns	Education in health and hygiene	1296	Diminish stomach infections	Gradual decrease of cases in the first aid post compared to cases during project construction (baseline)
	Education	Total care education	Centralization of students in the new school	569	In 3 years, centralize all students in the new school	Improvement of the educational levels in each school year
		Training for youth and adults in the EAP	Training in different trades to be needed in the project	500	Provide greater opportunity to residents of Peña Colorada	Higher percentage qualified workers-force with respect to the beginning of the project
	Housing	Promote the centralization of citizens and support the formal constitution of a Centro Poblado Menor (CPM) (Small Township)	Support and cooperate with the new CPM in public services and other	600	Raise the standard of living of the population	Residents have access to more services with respect to the 2007 Census
	Productive chains	Communal enterprise	Organization of the first multiple services communal enterprise	500	At the end of the first year, should be properly created	Certificate of incorporation
		Promotion and development of new productive community enterprises	Farms, fish farms, and other activities generating goods and services	1200	Create new job opportunities	Creation of new community enterprises in different economic activities
	Local employment	Employment in the villages	During the three stages of the project	140	Increase % of local workforce	Number of local jobs

Source: Company document

APPENDIX 7

Gabriela Mistral Division - Chile

Mining Gabriela Mistral - Gaby - strengthens the operation of the largest fleet of autonomous trucks in the world[7]

Thursday, 19 April 2012

PampaElvira, Chile April 2012. - The Gaby mine continues to mark milestones in technological innovation. After becoming in 2008 the first mining project in the world to operate with autonomous trucks, today the company strengthens this place by increasing its fleet to 17, becoming the largest in the globe.

Six new Komatsu 930E4 trucks, operating on autonomous technology were added to the 11 already existing. A total of 17 teams will be in charge of all tasks having to do with transport of material from the pit.

This increase in the size of the fleet is in addition to other technological advances, such as improvements in software that will enable better performance, productivity and safety. Among the features of this new version is that it allows trucks to reach better speed standards. In addition, the system is strengthened with a greater number of safety layers and allows for more flexible information management.

Mariano Olguín, general manager of Gaby Mining, asserts that this innovation places the mine at the technological vanguard of the industry. "We are pioneers and that fills us with pride. We were the first in the world to bet so strongly on automation, and we have demonstrated that it is a successful option."

In addition, he commented that the decision to use autonomous trucks brings a series of benefits that go beyond production. "We are innovating not only in technology, but also in the safety of our workers and in cost reduction; and looking towards the future from a sustainability perspective," he concludes.

Presently, the system has been installed on all equipment in the mine, which allows operators to converse with the Komatsu trucks 930E4. This is how 30 trucks can work simultaneous in the pit, while interacting with total safety with the autonomous ones.

Komatsu Truck 930E4

This equipment, the latest model of AC electrical trucks of the 930 series, uses GPS (Global Positioning System) during production, in addition to other support signals on earth, like positioning and navigation systems. This allows them to move and transport loads in an autonomous way, that is to say, without requiring an operator or remote control (it is the only one in the market that can also be operated through a manual system). It has a capacity of 290 metric tons, with a capacity of 2,700 HP. Its ECOT3 engine, with a hydraulic and electrical system, was designed specifically to meet the new regulations of the EU Stage IIIA, contributing lower NOx emissions and enabling low fuel consumption.

The autonomous truck is designed to operate continuously, 24 hours a day, navigate through predefined routes at a predetermined speed, wait and be positioned in areas of loading, and report location status, among others. All of these characteristics grant the autonomous system greater safety and matchless operational continuity, whose final results are lower maintenance and operations costs. Presently, and after the successful experience of Gaby, another important mining company works with autonomous Komatsu trucks in Australia.

End notes

[1] Ministerio de Energía y Minas de Perú, *Anuario Minero 2015.* Available at http://www.minem.gob.pe/minem/archivos/file/Mineria/PUBLICACIONES/ANUARIOS/2015/

[2] Ibid., 27.

[3] Ibid., 10.

[4] Ibid., 12.

[5] Banco Central de Reserva del Perú, *Panorama actual y proyecciones macroeconómicas 2016-2017.* Available in http://www.bcrp.gob.pe/docs/Publicaciones/Reporte-Inflacion/2016/marzo/reporte-de-inflacion-marzo-2016.pdf

[6] Minería Chilena, Automatización en Minería: Se avanza, pero falta más. Available at http://www.mch.cl/informes-tecnicos/automatizacion-en-mineria-se-avanza-pero-falta-mas/

[7] https://www.codelco.com/minera-gaby-consolida-la-operacion-de-la-mayor-flota-de-camiones/prontus_codelco/2012-04-18/192119.html

La Esperanza: Beyond Automation[1]

Teaching note

I. Summary

The case shows a decision-making situation in La Esperanza, a mining unit dedicated to the development of gold and copper extraction projects in the Peru. The venture is owned by POFCO, a company headquartered in China. Specifically, management faces the dilemma of whether or not to proceed with a process of automation involving the replacement of manned trucks with autonomous trucks. To make the decision, management must consider variables related to sustainability and the company's values.

After restructuring and changing its chief executive officer in April 2015, POFCO was in a privileged position to compete in the global market. The ROE of POFCO (11%) exceeded the industry average (5%), and the company was well positioned to profit if the price of gold and silver recovered. For POFCO, one of the attractions of La Esperanza was the way the villagers around the mine identified themselves with the company, due to the benefits they received.

On November 19, 2015, Julio Soto, operations manager of La Esperanza, was getting ready to travel to the city of Lima, Peru, to attend a board of directors meeting. At that meeting he would present the "autonomous transportation project," and upcoming investments in technology at La Esperanza would also be discussed. He was especially anxious about his meeting with John Brown, his corporate manager, who had drafted the project of autonomous trucks some years back, when holding the position of operations manager of La Esperanza. In the year 2012, John Brown had decided to shelve the proposal for two reasons. There was fear that the project would damage relations with workers and the community, due to the replacement of local workforce with technology. Moreover, the project at the time had lost economic appeal as a result of a drop in gold prices.

Given POFCO's new growth strategy, as well as its current position as one of the leading mining companies in the world, Soto judged that the time was ripe to pull the automation project back out of the shelf for reconsideration and evaluation. It would be the opportunity to modernize La Esperanza and bring it up to par with other mines in the industry. In

[1] These teaching notes were prepared by professors XXX. Teaching cases are intended to support class discussions. They do not imply the endorsement of individuals or organizations, nor do they illustrate the effective or ineffective handling of a management situation or serve as primary information sources. This case has been adapted from actual events. The names of people and organizations have been changed to ensure confidentiality. The authors wish to thank XXX for her expert advice and editorial suggestions.

addition, given his experience in the reduction of operating costs through technological innovation in a Chilean mine, the autonomous transportation option was especially interesting to him. He considered it "an alternative that would boost efficiency, safety and productivity in the mine." Despite his enthusiasm, he had some concerns because the proposal would involve layoffs or relocations of personnel. He thus decided to schedule a meeting with Manuel Romero, manager of human resources and community relations, and Omar Zavaleta, superintendent of human resources. What he worried about the most was that the decision was likely to bring political and social costs to the company. This had to be evaluated.

The automated trucking system project (*autonomous haulage*) had two phases: it started with a pilot of two trucks, and then extended to the entire fleet composed of 31 trucks. The operations manager thought that the project was beneficial for the company and for the workers. Replacing the manned trucks with unmanned ones would reduce the amount of time consumed during changes of shift; it would also reduce overtime payments and replacements, as well as potential accidents and health problems caused by dust and stress. Despite the expected benefits, the decision to automate could bring tension among workers due to a decrease in the number of available jobs, and also because it would spoil the existing aspiration among many incumbent workers to become operators of big trucks. In La Esperanza, all employees and operators agreed that the company had a culture of safety and wellbeing, as well as of equal treatment. An icon to the latter was a dining hall shared by all company employees, irrespective of their position in the company.

The implementation of this project involved the relocation of more than 100 operators to other areas where support was required: control rooms and monitoring, among others. It was also likely that the project would result in layoffs, mostly of foreign workers, given that protecting jobs for the local population was a priority.

II. Approach and uses of the case

The case offers students an opportunity to analyze aspects of organizational culture to be taken into account in a decision making process. It also provides them with the opportunity to consider various criteria that must be taken into account in a decision, such as the one of automation in the mining industry. Students will be able to examine a sustainable management perspective (in this case, examining the company's culture of security and wellbeing, as well as valuing human factors and intangibles).

This case was designed for MBA and EMBA students, as well as students of other management programs. It is especially useful in a course or session on decision making, in which the influence of contextual and behavioral factors is taken into account. By discussing this case, students will have the opportunity to develop a key managerial skill: critical thinking.

The case may be used in more than one way, depending on the interests of the instructor. It could be used in a strategy course, where the relationship between strategy and culture is discussed. It could also be used in a course on strategic management of human resources, always from the perspective of strategic decision-making in a specific context.

These teaching notes, and the teaching plan we propose were designed for a session on decision making in a management course.

III. Learning Objectives

After discussing this case, students will be enabled to:

Knowledge:

1. Recognize the concepts of organizational culture and moral culture, and appreciate their usefulness as frameworks for decision-making.

2. Recognize the criteria of sustainability and organizational values, and appreciate their utility in decision-making processes.

3. Identify the trade-offs between economic criteria and organizational values in decision-making processes.

Skills:

4. Identify the interests of stakeholders.

5. Analyze how organizational values affect decision-making processes.

6. Identify common biases in decision-making processes.

7. Select and recommend a decision, taking into account organizational values and variables associated with sustainability.

8. Examine their own experiences to draw lessons from the case.

IV. Suggested Readings

Readings about the context:

The readings provided below provide background information. It is at the discretion of the professor to assign them as mandatory.

Construction mining (2014). http://www.construccionminera.cl/automatizacion-en-mineria-el-futuro-es-ahora/

Lynas, D. & Horberry, T. (2011). Human Factors Issues with Automated Mining Equipment. *The Ergonomics Open Journal*, (4), 74-80.

Mandatory readings for class discussion:

The articles by Feldman (2007) and by Bartels, Southport & Papania (2010) are critical for case discussion as here suggested. The instructor may decide to also assign the articles by Pfeffer (2013) and Lovallo & Kahneman, Sibony (2011). The decision will depend on what students have been exposed to in previous courses, their previous experience, other specific characteristics of students, and the way the instructor decides to organize the discussion. Other suggested readings, to be used at the instructor's discretion, have been included at the end of these teaching notes.

Bertels, S., Papania, l., & Papania, D. (2010). *Embedding sustainability in organizational culture. A systematic review of the body of knowledge*. London: Network for Business Sustainability

Feldman, S. P. (2007). Moral business cultures: The keys to creating and maintaining them. *Organizational Dynamics*, *36*(2), 157-170.

Kahneman, D., Lovallo, D., & Sibony, or (2011). Before making a big decision... Harvard Business Review América Latina, 89 (5), 20-31.

Pfeffer, j. (2013). You´re still the same: Why theories of power hold over time and across contexts? *Academy of Management Perspectives*, 27 (4), 269-280.

V. Suggested assignment questions

1. Why is the automated trucks project being considered and reviewed, once again?

2. From the point of view of the operations manager, what are the main arguments in favor of automation?

3. How do the values of La Esperanza manifest themselves in the practices, actions and behaviors of its executives and workers?

VI. Questions for class discussion:

1. If you were Julio Soto would proceed with automation? Why?

2. How would you characterize the organizational culture of La Esperanza? How about its moral culture?

3. What factors or criteria would you consider to make the decision to automatize trucking in La Esperanza? Why?

4. How do the various decisions affect stakeholders?

5. What decision would you advise the operations manager to take, and why?

Table 1. Questions for analysis in class discussion, pedagogical objectives and time estimates

Questions	Pedagogical objectives	Time
BLOCK 1 If you were Julio Soto would you proceed with automation? Why?	Connect students with the case. First approximation to the analysis of economic and cultural factors in the process of decision-making.	10 min.
BLOCK 2 How would you characterize the organizational culture of La Esperanza? How about its moral culture? What does Soto value? What are his priorities? What does the human resources manager value? What are his priorities? What do workers value? What are their priorities?	Recognize the concepts of organizational culture and moral culture, and appreciate their usefulness as frameworks for decision-making.	15 min.
BLOCK 3 What is the position of the workers and the community?	Identify stakeholder interests, which may directly affect the decision to automate.	5 min.
BLOCK 4 What factors or criteria would you consider to make the decision to	Identify and analyze what criteria of sustainability and culture (values, beliefs, habits/customs) should be taken into consideration in this decision-making process.	20 min.

automate trucking in La Esperanza? Why?		
BLOCK 5 How do the various decisions affect stakeholders?	Identify the trade-offs between economic criteria and organizational values in decision-making processes. Identify the positive or negative effects of different decisions on key stakeholders.	15 min.
BLOCK 6 What decision would you advise the operations manager to take, and why?	Skills: Analyze how organizational values and moral culture affect decision-making processes. Select and recommend a decision, taking into account the values of the organization, the variables associated with sustainability (triple bottom line*)* and moral culture. Identify biases that might intervene in Soto's decision-making. Identify student biases by comparing their initial vote with their final vote (pre and post discussion).	25 min.
BLOCK 7 Conclusion: Lessons learned.	Examine the students' own experiences to draw lessons from the case. Connect the case with student experiences; identify practical challenges in their own organizations.	10 min.

VII. Conceptual Framework

<u>The automation process</u>

Automation corresponds to the transformation of a process or equipment to an operation that is performed without the intervention of the human being. There are different applications of automation at different levels in the mining sector. These go from the automatic coordination of the operation of various equipment, or the analysis of information in real time, allowing for improvements decision-making, to the introduction of artificial intelligence and robotics. Automation could mean the destruction existing jobs. However, it may result in the creation of new jobs, which will tend to be more specialized and require higher-level skills. Given the latter, automation could be seen as an opportunity, as it would imply worker training and the development of new skills (Construcción Minera, 2014).

Reasons to automate

The common motives for the automation of a transport system have been fundamentally three: 1) security; it is estimated that worldwide, in the industry, two to three truck operators die annually while on duty; 2) economy; automation reduces the number of operators, the number of shifts and the number of errors (Lynas & Horberry, 2011); 3) work satisfaction; risky jobs are associated with the problem of job dissatisfaction (Walker, 2014). Despite initial investments in systems and adjustments that must be made in order to achieve automation, in the industry, referential numbers indicate that automated trucks lead to operational savings: increases in production reach between 15 and 20%, fuel reductions between 10 and 15%, and reductions in the costs of maintenance, around 8%.

According to Lynas & Horberry (2011), although automation in mining occurred mainly for reasons of security and efficiency, the motives to automate can be grouped in the following categories: to isolate the operators from dangerous situations, to reduce production costs, to improve precision, to reduce environmental impact, to operate in inaccessible areas, to increase the availability of data and information, and to reduce manual operation of equipment. Also improvements in the attitudes of workers, such as increased job satisfaction, have been identified (Walker, 2014)

This case takes students to a relevant discussion and necessary debate, still scant in the classrooms, on the impact of automation on individuals, their attitudes and their behaviors. The case was selected because of increasing automation in the mining industry, and also due to concerns with the impact of automation on people, especially, the displacement of workers and the loss of rank and privileges (McKinsey & Co., 2017).

Values, culture and sustainability

To identify the values of different stakeholders, Feldman (2006) provides a framework for cultural analysis that is useful to identify the moral cultures of organizations. The framework directs us to the analysis of the mission, that is, the creed of the companies, and to the identification of company priorities as they relate to values. For example, it could happen that an organization valuing health may hold this value below profitability or worker welfare, and that these hierarchies of values are not negotiable. The framework also facilitates the analysis of the discourse of executives, who through their words reveal the values underlying their decisions and practices. We recommend the use of Feldman's method to analyze the mission and the vision of La Esperanza, and to analyze quotes from several actors and the case narrative in general. The aim is to identify the values that stakeholders may or may not share, those that are shared by all, and those that are only shared by a subset of employees.

The case shows that the health and safety of workers and their families, both inside and outside of the mine, are a priority for the company. It also shows that the workers are tuned into that. According to Bertels, Papania & Papania (2010), a culture of sustainability is one in which the members of an organization share assumptions and beliefs about the

importance of balancing economic efficiency, social equity and environmental responsibility. Here the focus will be on economic and social sustainability, as the case does not provide information about environmental issues.

The reasons to automate (strategy) are safety and productivity. Therefore, automating is not necessarily in conflict with the declared values of the various collaborators of La Esperanza. Throughout, the case highlights the value attributed to the community, as well as a culture of safety, both of which lead to the care of workers and their families. The strategy nevertheless clashes with a subculture, one of privileges for a group of truck operators, as will be shown below. The students, upon finalizing the discussion and analysis of the case, will be able to determine whether La Esperanza had a moral culture and whether this moral culture guided the company's decisions.

Fairness and power

In La Esperanza all the employees and operators recognize there is a culture of security and welfare. They emphasize the symbolic importance of the common dining hall, where no distinctions are made with regards to job position. For workers, this dining hall is an expression of equality and empowerment. However, the analysis of values and culture described above sheds an inconsistency: truck-operators value and defend the special privileges, status and power associated with their particular positions. Pfeffer (2013) provides arguments relevant to the case: hierarchies, the pursuit of personal self-enhancement, and the "us versus them," that supports relations of power and influence, do not necessarily counter good progress in an organization that values equity and the empowerment.

Attitudes towards work

Studies usually report the dissatisfaction of operators of heavy equipment in remote sites (Walker, 2014). Consequently, the decision of automation could favor truck operators because it eliminates a risky activity. However, in the specific case of La Esperanza, for operators, automation means the disappearance of an activity that has traditionally given them power/status and sense of wellbeing. The ***loss of acquired power/status*** and attained welfare probably would lead to negative attitudes towards work. It would also affect ***identification with the work place***, and the meanings that work confers to life (Avent, 2016): "Work is not just a means to obtain the resources needed to bring food to the table. It is a source of identity. It helps give structure to our days and our lives. It provides the possibility of personal fulfillment that derives from being useful to others and is a critical part of the glue that holds society together and facilitates its operation."

Decision-making and biases

To discuss the decision that would be taken by the students, when assuming the role of Soto, we suggest using as a tool the matrix of consequences proposed by Hammond, Keeney & Raiffa (1999).

The article by Kahneman, Lovallo & Sibony (2011) will serve as a basis for the identification of biases in decision-making. Each actor or group has different interests that may lead to biases. These are self-interest, falling in love (in this case, with a project), self-confidence and anchoring, among others.

VIII. Analysis and discussion

Block 1: If you were Julio Soto would you proceed with automation? Why?

Open the discussion by asking students: What would your decision be if you were in the place of Soto? Would you automate or not? Why? The instructor will register the answers on the board, to return to them toward the end of the discussion. Surely those favoring automation will provide arguments such as improved productivity and security, modernization, better positioning of the company, and other related answers. One would expect that those arguing against automation would justify their answers by mentioning loss of jobs, or by expressing doubts about the returns on investment (to see ***Blackboard 1***).

If the issue of values or culture appears among the arguments, this would make for a natural transition to the next discussion block. Otherwise, the instructor would have to "force" the appearance of the issue of culture or value, by way of a question such as the following: What is the organizational environment that we observe in the case?

Block 2: How would you characterize the organizational culture of La Esperanza? How about its moral culture?

The Feldman (2007) article provides a framework of analysis for the narrative of the managers, applicable also to the mission of mine, to understand their priorities. This is how the corporate culture would be determined.

Students will observe the mission of the mine: "To grow profitably by operating our mines in a sustainable manner, with the highest standards of safety, health, environmental protection and responsibility."

Upon analyzing the narrative of the mission they will conclude the following about company values:

1. To grow profitably is the main objective;

2. Efficiency and innovation are the mechanisms to achieve this;

3. Safety, health, protection, and responsibility, also emerge in the text but more as a means than an end.

They will also observe the following about the narrative contained in the vision of La Esperanza: "To be an inspiring mining company, based on a transparent and innovative business model that creates value in a responsible manner."

This narrative values innovation and the creation of "value in a responsible manner."

The mission and vision are important to understand the complexity of the decision of automation. By analyzing them, students will observe that the root of this complexity lies in the need to reconcile efficiency and profitable growth with responsible value creation.

What does Soto value? What are his priorities?

From the case narrative, students will identify Soto's priorities: "...he developed a solid career for the last 15 years as an engineer in a similar mine, achieving success in cost management..."; Soto gave priority to "... the permanent search of new opportunities that maximize returns for the company and its shareholders." The corporate manager, John Brown says, "Soto is highly motivated by technological innovation and team work...."

Students could conclude that Soto values primarily obtaining economic returns through innovation, and that he worries about the welfare of human resources and the long term.

What does the human resources manager value? What are his priorities?

From the words of Manuel Romero, manager of human resources and community relations, students will recognize that his concerns are loss of employment and factors that could affect relations with the community, and, as a result, the legitimacy of the mine. He also fears the possible dehumanization of the work environment as a result of growing automation. Students could conclude that the people and the community are a central priority for the human resources and community-relations manager.

What do the workers value?

These values would be those that workers experience day in and day out at La Esperanza. To identify these values, students will analyze (as assigned in a previous activity) the quotes of several employees of the mine.

The welfare coordinator, Rosa Espíritu, indicated that since its inception, La Esperanza distinguished itself for its concern with safety and the community, and for a horizontal organizational structure, which was surprising in a recognizably unequal social

environment. She explained: "What I liked was that workers highlighted the topic of equal treatment and equality in the dining hall."

The manager of human resources and community relations coincided in saying that, "in other mines, there are up to five types of dining halls: for foreigners, officials, employees, workers and contractors; while here, we all have lunch together...."

In the words of Walter Guanilo, plant manager, "A safety culture is built here and this also reaches the families of workers, because, by caring for their integrity and their work, they also think about the safety of their families. Our slogans are regularly changing: your family is waiting for you at home, work carefully; if you take care of yourself and work well, your family will be well; among others."

Students will recognize that all the members of La Esperanza praise the equality that is perceived; the symbol is the common dining hall without areas differentiated by positions. They will highlight that throughout the case, members of the company perceive each other as members of a family, and that security is a priority.

Students may conclude that in the company there is a culture of equity and security.

At this point in the discussion, the instructor will make a summary of the values previously identified, and will then ask students to determine whether there is or not a moral culture in La Esperanza (see ***Blackboard 2***).

Block 3: What are the interests of the truck operators and the community?

For this analysis, students will observe in the text quotes citing operators of trucks, as shown below.

Manuel Romero, human resources manager, said the following:

> "What is most valued by workers at La Esperanza are opportunities and growth; to be a truck operator is the highest aspiration. Also these workers are highly valued by the company; they constitute something like an elite in the mine; in addition, they make up an almost closed group."

Julio Soto remembered:

> "…there occurred a dangerous incident recently; because of his yearning to become operator of a mining truck, a young worker went to the extreme of risking his position in the company in order to have the opportunity to handle one of these trucks. The young man worked as controller in the geology area, and upon spotting a truck that was inactive, he begged the operator insistently, to lend it to him. The latter acceded. Because of this risky behavior, the young man was dismissed. He apologized to everyone, and to the company publicly; that is, to all members of the committee and

> told them that he accepted his responsibility. It became known that he possessed a license to operate the truck, and that he had been waiting for the opportunity to put it into use; but he had not been authorized by the mine."

For most of the people living around the mine, operating a truck was the highest occupational aspiration. In addition to prestige, being an operator implied higher levels of income, commensurate with the associated risk. With regards to this, Romero mentioned verbatim:

> "Local people like to operate these machines. It's cultural... operators hang on their walls framed photos of themselves with the machines, and their sons look at them with pride (...) This group of operators is an elite in the mine and is a relatively closed group (...) Operators feel proud within their families, not just because of improved quality of life, but also because of the job position that they hold, since their skills and competencies are recognized. The son of a worker commented a few days ago... 'Dad, when I grow up I will also drive that super machine'."

Juan Chocope, truck operator, said:

> "I entered the mine many years ago, worked hard in several areas and now I drive my truck. Important companies have come to train me, I make more than other co-workers, and my son has also started to work here (…), I want him to go to school and have a better future."

In regards to relations with the community, Romero, pointed out:

> "One of the things that POFCO found attractive about La Esperanza, was the way the people living around the mine identified themselves with the company and the enormous benefits they obtained. The company is conscious of its role and assumes the responsibility of the community's wellbeing, in an area where there is not much governmental presence."

Students could conclude: a) that being a mining truck operator was the maximum career aspiration for company workers, something that workers from the different areas in the mine aspired to be, and b) that the post of operator was more valued than other job positions the company; they had privileges that made them feel superior to others; they stood out among workers, and were perceived as different from others. In sum, the operators valued their status, their pay, and the recognition of company and their families.

At this time, the instructor will add to the values found previously, the interests of this group of operators. He or she will steer students into identifying the inconsistency between the previous analysis, which showed that La Esperanza had a culture of equity and security, and the current analysis, which shows that truck operators enjoy a special and differentiated position (see ***Blackboard 3***).

The Pfeffer (2013) reading suggested in the conceptual framework, provides the arguments to clarify these inconsistencies. The search for personal improvement (self-enhancement) and the benefits of status and power, enjoyed by some, is not always at odds with the efforts that companies make to achieve the wellbeing of employees in general. The students may observe that subcultures, whose values are not always are consistent with those of their mother culture, can exist.

Block 4: Identify all the possible goals of the decision

Having read the case and discussed the previous blocks, students will identify criteria such as: modernization and technological innovation, productivity, efficiency, security, saving, and wellbeing of the workers, among others. These criteria should be taken into account for the decision regarding automation (see ***Blackboard 4***).

Block 5: How does each goal affect the various stakeholders: business, community, and truck operators?

Based on expressed values, one might think that the automation decision may favor the truck operators because it does away with a hazardous activity. However the removal of this job position, and its associated status and wellbeing, would probably lead to dissatisfaction and negative attitudes toward work. Automation would also affect worker identification with work; the meaning that work gives to life. That is, even if jobs were retained during automation, through the relocation of operator, there could be negative consequences for the organization.

Having analyzed and discussed issues pertaining to the previous blocks, students will estimate, for each goal, the positive or negative effects for the three main stakeholders: the mine operation, the community and the truck operators (see ***Blackboard 5***).

The results from this block prepare students to build, in Block 6, the *consequences matrix* developed by Hammond, Keeney & Raiffa (1999).

Block 6: What should Soto do? What decision would you advise the operations manager to take, and why?

At this moment, students will analyze how the two alternative decisions (to automate or not) would affect the criteria identified in Block 5. Do the goals/criteria increase, diminish or remain stable? For example, "productivity" would increase with automation and would remain stable if the company does not automate. Moral culture has been included in this matrix. Towards the end of this block, students will be asked to discuss how moral culture would be affected by each alternative decision (see ***Blackboard 6***).

Students have already identified criteria; they have estimated the effects on stakeholders, and have also assessed the consequences of each alternative decision. Now, making use of

the reading by Kahneman, Lovallo & Sibony (2011), students will discuss the biases that could affect Soto's decision-making. For example, given his trajectory and values, it is plausible that one source of bias would be that he has "fallen in love" with the project. It is also possible that he suffers from an excess of self-confidence, due to his previous successes, and to the recognitions he has received, which also explain his present position as operations manager in La Esperanza. An anchoring bias could also be influencing Soto's decision, as it may center his concerns almost exclusively on the issue of preserving jobs.

Next, the instructor will resume the initial case question: Would you proceed with automation or not? He or she will then lead a discussion about differences or similarities between the students' initial responses and the opinions they have formed, having reached this point in the discussion. The instructor will ask students to provided their respective justifications. He or she will also ask students analyze, with the analytical framework provided by Kahneman, Lovallo, & Sibony (2011), the biases to which they themselves were subject when declaring their preferred decision.

Block 7: Lessons learned

This last section could focus on the experience of students as decision-makers. What type of decisions do they usually have to make?

Have they faced conflicts similar to those confronted by Julio Soto, when making decisions? Have they recognized biases in their own decisions?

What is important in this section of the discussion is that students realize that decision-making processes are complex and require: a) the identification of multiple economic variables and organizational values; b) balancing between the economic value and social value that are at stake; and, c) considering the impact that decisions have on people and the company. Likewise, it is key that students realize that all managers –including themselves– are exposed to biases in decision-making processes and that it is fundamental to be aware and vigilant of those biases.

IX. Blackboard plan

Blackboard 1: Justification for the initial decision

To automate	**Not to automate**
To modernize the mine To improve security	Reduces personnel Unemployment

To increase productivity To reduce accidents To reduce risks To save money	Cost of manual labor does not justify Mine is the only source of work in the community Discontent with work and working conditions

Blackboard 2: The values of the organization

Company	**Soto**	**Human Resources**	**Workers**
Yield/profitability Efficiency Innovation Security Health Transparency Responsibility	Yield/profitability Shareholders Technological Innovation Teamwork	Employment Community Equity	Equity Security Opportunities to grow

Blackboard 3: What do stakeholders value?

Company	**Soto**	**Human Resources**	**Workers**	**Truck operators**
Yield/profitability Efficiency Innovation Security Health Transparency	Yield/profitability Shareholders Technological Innovation Teamwork	Employment Community Equity	Equity Security Opportunities to grow	Job position Pay/wage Status Recognition

Responsibility				

Blackboard 4: Goals of the decision to automate

- Innovation in technology (modernization of the mine)
- Productivity
- Efficiency
- Security
- Employment
- Responsibility
- Savings
- Fairness/equity
- Satisfaction of operators
- Identification with work
- Well-being of operators
- Legitimacy in community
- Social license to operate

Blackboard 5: Key affected stakeholders

Object of decision	**The Mine**	**The community**	**The truck operators**
Innovation in technology (modernization of the mine)	+		
Productivity	**+**	**+**	**+**
Efficiency	**+**	**+**	**+**
Security	**+**	**—**	**—**
Employment	**+**	**—**	**—**
Responsibility	**+**	**+**	**+**
Savings	**+**	**—**	

Equity	+	—	—
Satisfaction of operators	—	—	—
Identification with work	—		—
Wellbeing of operators			—
Legitimacy in community	—	—	
Social license to operate	—		

Blackboard 6: Consequences matrix

Goal/criterion	**To automate**	**Not to automate**
Innovation	Stands out	Does not stand out
Productivity	Grows	Stable
Employment	Downsizes/relocation of employees	Stable
Efficiency	Grows	Stable
Security	Improves	Stable
Responsibility	Considering previous improvements, it would be perceived as more responsible	
Savings	Increases	There wouldn't be any
Equity	It increases with the removal of the position of truck operators, as the latter constituted an elite	The perception of equity remains, even though it is not evenly spread (subculture of privilege among truck operators)
Worker satisfaction	It could grow due to greater security but it would be diminished by the layoffs	Stable
Satisfaction of operators	Will diminish due to layoffs or relocation	Stable
Identification of operators with work	Will diminish	Stable
Wellbeing of operators	Objectively you would grow if they keep their jobs; from the perspective of the operator, it does not	Stable
Legitimacy in community	Will diminish removal of job positions and layoffs	Stable
Social license to operate	It would be negatively affected	Stable

Moral culture	Weakened or strengthened?	Weakened or strengthened?

X. Other suggested readings

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