

*The Chilean mining industry experience
related with the impact and learnings of
COVID-19, some ponderings.*

Jorge Pedrals

Partner

Pedrals & Cía.

Instituto de Ingenieros de Minas de Chile

Presenter's webcam image



Mining Engineer

Universidad de Chile
Master in History



With 35 years of experience, of which 30 have been holding key management positions in mining, energy and consultancy companies. He led as the C.E.O. the last 10 years two projects; a coal open pit mine – port facility in a remote island (Mina Invierno in Isla Riesco, with an investment of USD 600 million) in the south of Chile, and the expansion of "El Teniente" (Nuevo Nivel Mina, today Andes Norte, with an investment of USD 4 billion), the biggest underground mine in the world. Highly experienced in leading project work teams, strongly oriented to results in environments of high uncertainty.

Member of the Board of Instituto de Ingenieros de Chile (2020 - 2021).

President of the Mining Policy Commission of Instituto de Ingenieros de Minas de Chile.

He is currently dedicated to academia, consulting and business management.

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Opinions given in this lecture are the sole responsibility of Jorge Pedrals



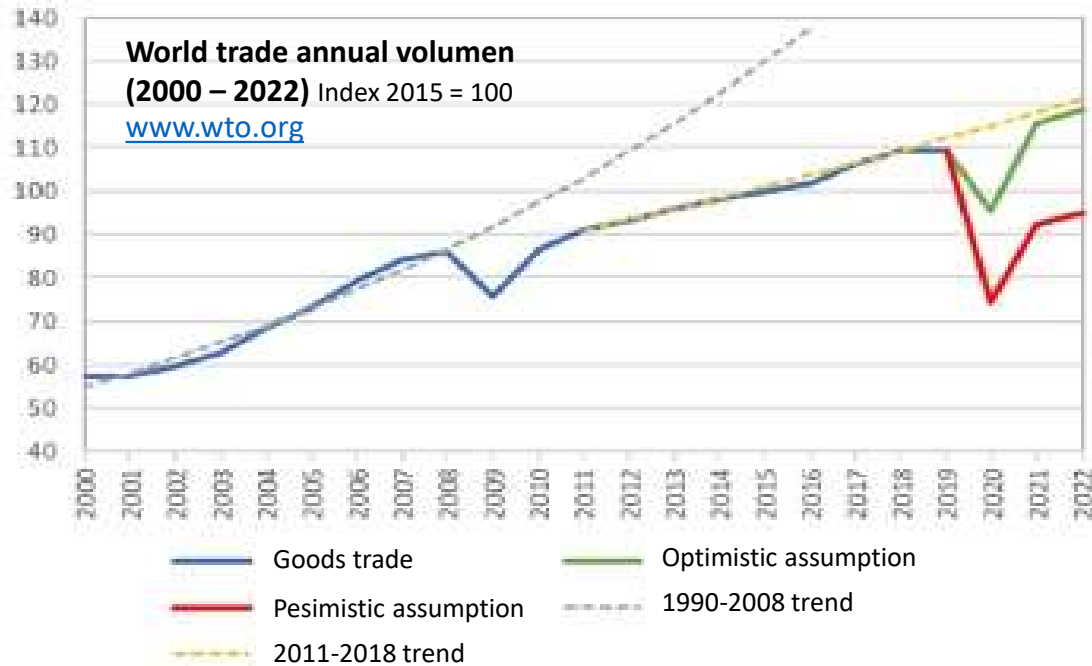
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Global



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World Bank Group Chief Economist Ms. Carmen Reinhart:

"As a consequence of COVID 19 there could be a trend towards deglobalization..."

<https://covid19.fen.uchile.cl/webinars/04-de-junio/>

Extreme' 17% Drop in Global Carbon Emissions Due to COVID-19 Shutdowns

www.earth.org

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....Overall, the International Energy Agency (IEA) predicts that global energy emissions will fall 8% this year due to a drop in demand for coal, oil and gas, reaching their lowest levels since 2010.

...

This drop is similar to the amount of annual emission reductions needed year-on-year to achieve the Paris targets; the UN says that carbon emissions must fall by 7.6% annually through to 2030 to limit global warming to 1.5 degrees Celsius by 2100.

Global – Local



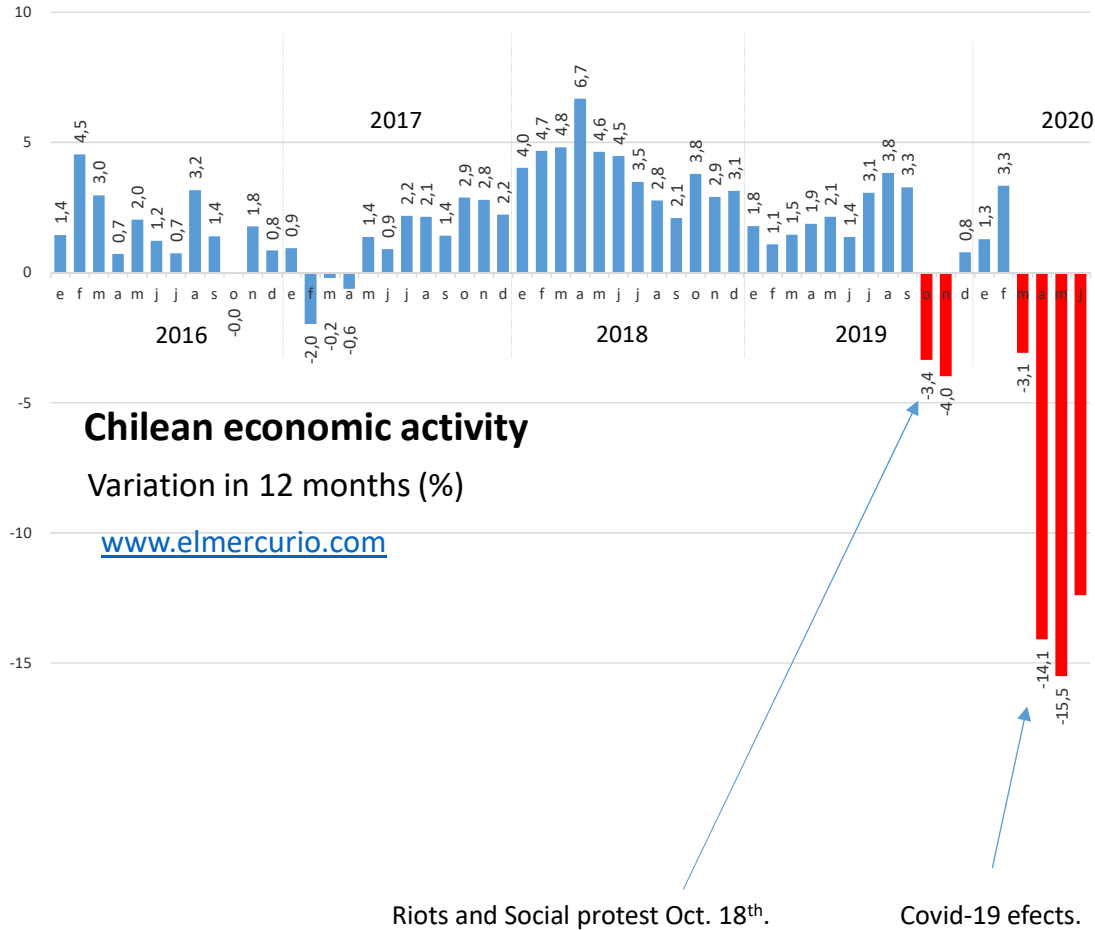
Puma walking in Las Condes, when Santiago is in silence.

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Animals reclaiming empty cities (Deutsche Welle)



Local



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Chile

19 million inhabitants.

January 2020

- ✓ 9.7 M Working force.
- ✓ 2.6 " Informal work.
- ✓ 0.8 " Unemployment.

June 2020

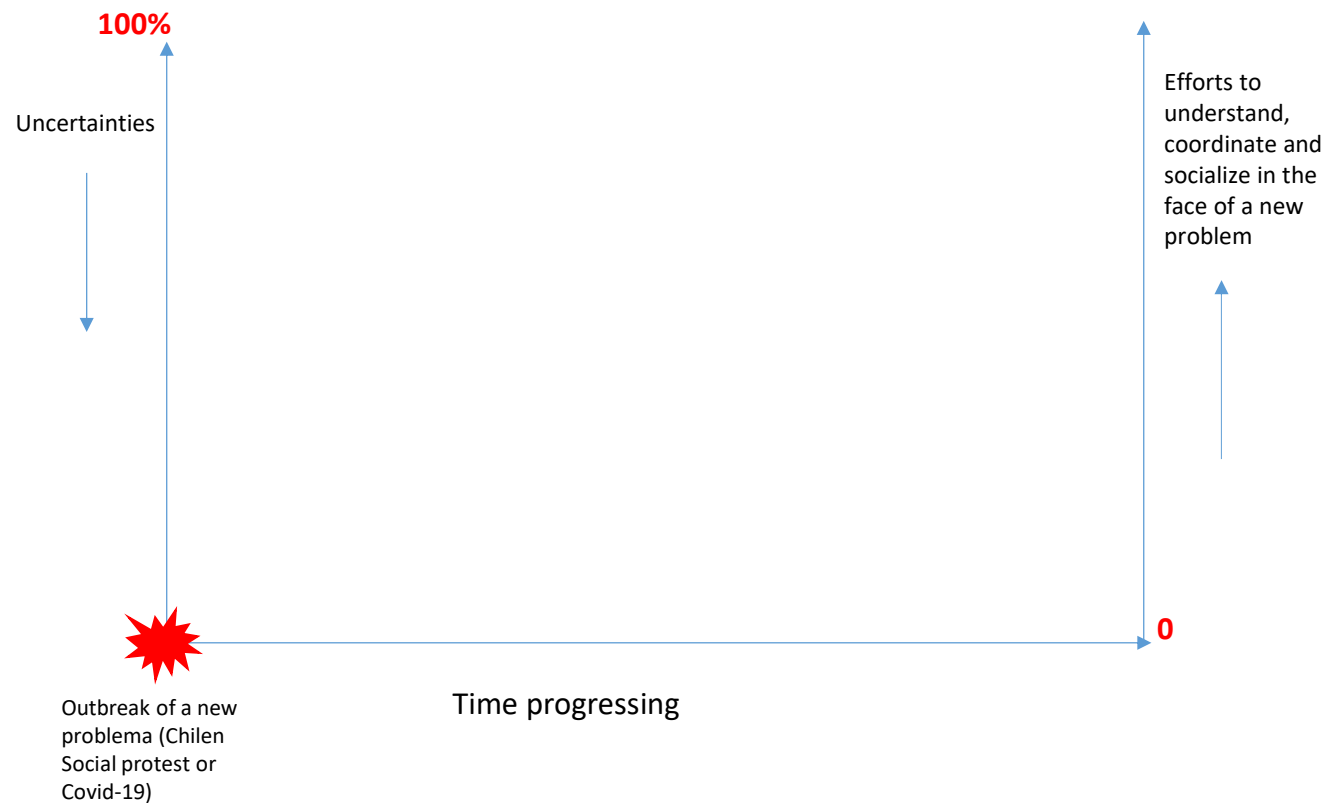
- ✓ 8.1 M Working force. 1.6 M
- ✓ 1.6 " Informal work. 1.0 M
- ✓ 0.9 " Unemployment. 0.1 M
- ✓ 0.7 " Employment special law. 0.7 M

Source Instituto Nacional de Estadística Chile www.ine.cl

More than 3 million people pressing for employment.

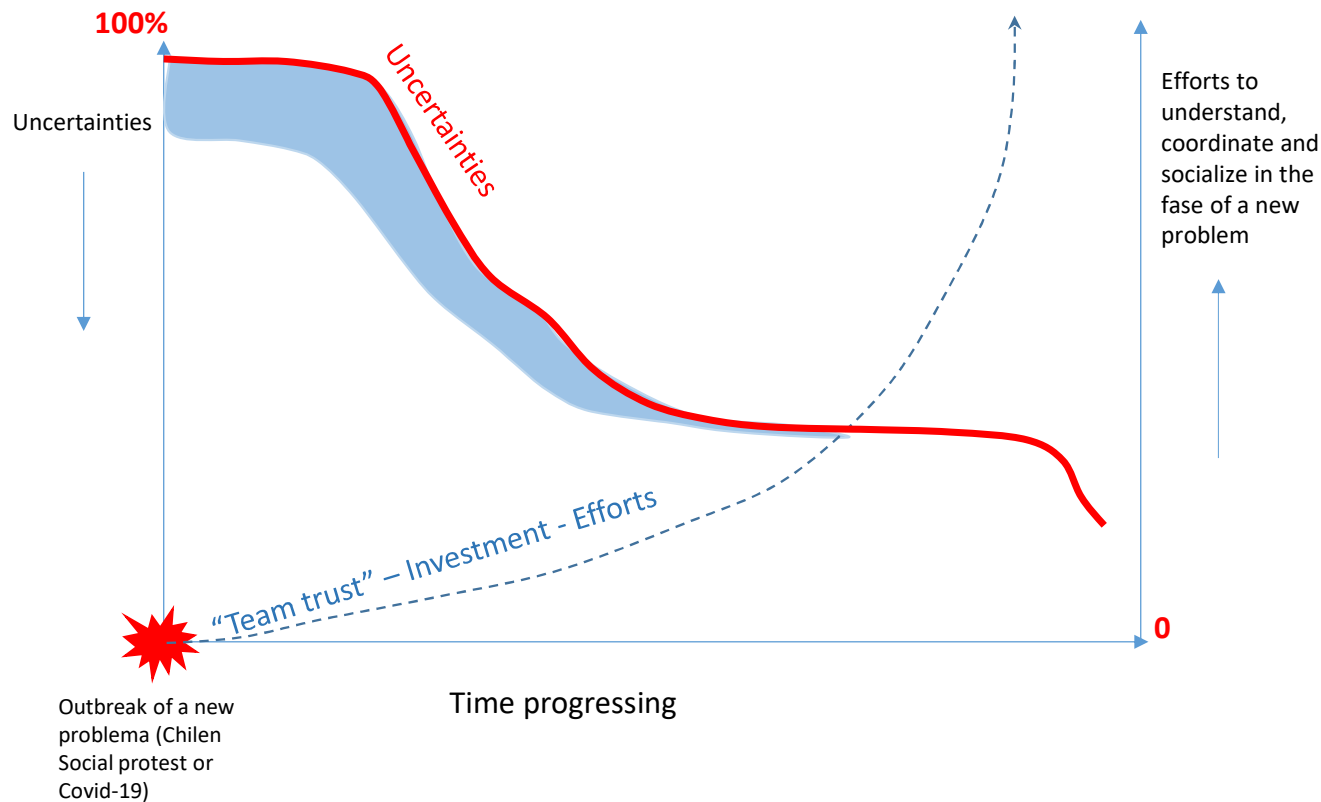
Dynamic Complexity – Mental models

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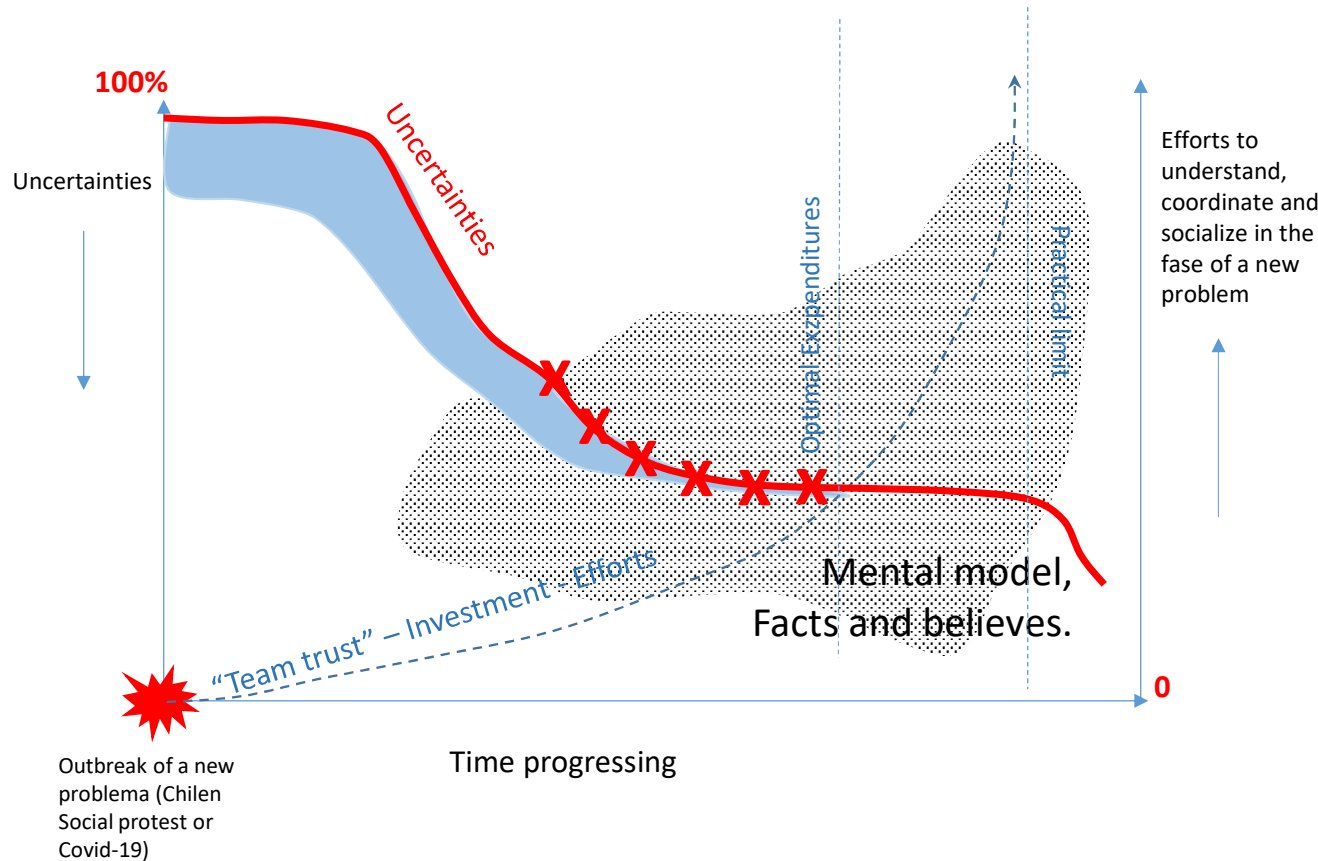
Dynamic Complexity – Mental models

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Dynamic Complexity – Mental models

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New challenges,
uncertainties...

So, how to think out
of the box... **More
diversity, more
perspectives, less
ideology and less
pure knowledge**

One example, the quarantines

(it could also be the rock bursts of NNM in El Teniente 2015)



Covid-19: economía y salud

28 de Mayo 2020 - Noticias



Alexander Galetovic, Senior Fellow UAI, expuso en el ciclo de charlas de la Escuela de Gobierno sobre el riesgo del coronavirus a nivel país.

En el marco del Ciclo de Charlas: Las Réplicas del covid-19, Visiones desde la Escuela de Gobierno, es que se invitó al economista y Senior Fellow UAI, Alexander Galetovic, quien conversó sobre el panorama actual que vive el país debido a la pandemia del covid-19 y sobre la importancia de que las empresas, y sus trabajadores puedan volver a trabajar, para así evitar que las empresas quiebren masivamente. En este punto hizo énfasis ya que "las cuarentenas crean una recesión, la recesión crea pobreza y la pobreza crea un deterioro de la salud". Por lo que, a su juicio, las cuarentenas ayudan a no colapsar el sistema de salud. "Las cuarentenas aplanan la curva, lo que hacen es controlar el contagio en un determinado momento, pero no significa que habrá menos contagios en el tiempo", aseguró Galetovic.



El centro de estudios ante la cantidad de personas contagiadas en la región Metropolitana hizo un llamado a tomar medidas más estrictas, como la ampliación del toque de queda o restricción en el transporte público.

15 de junio 2020



Covid-19 en Chile: Situación y líneas de acción

Por
Ricardo Bitrán
Jorge Claro
Rodrigo Muñoz
Paula Arpón

7 de julio y 12 agosto 2020

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La OMS pidió ahora evitar las cuarentenas como método principal para controlar el avance del coronavirus

David Nabarro, encargado de la Organización Mundial de la Salud para el coronavirus en Europa, explicó que los bloqueos solo hacen "que la gente pobre sea mucho más pobre".

12 de Octubre de 2020

Compartir en Facebook

Compartir en Twitter



Las declaraciones de David Nabarro sobre la cuarentena.

Un asesor especial de la Organización Mundial de la Salud (OMS) instó a los Gobiernos a no utilizar la cuarentena como principal estrategia para controlar la propagación de la COVID-19, y alertó sobre el aumento de la pobreza como consecuencia de las restricciones.

"En la Organización Mundial de la Salud no abogamos por las cuarentenas como el principal medio de control de este virus", dijo el doctor David Nabarro, uno de los seis enviados especiales de la OMS para la COVID-19, en una entrevista con el medio británico *Spectator*. "El único momento en que creemos que una cuarentena está justificada es cuando el virus se está propagando rápidamente en una comunidad", dijo.

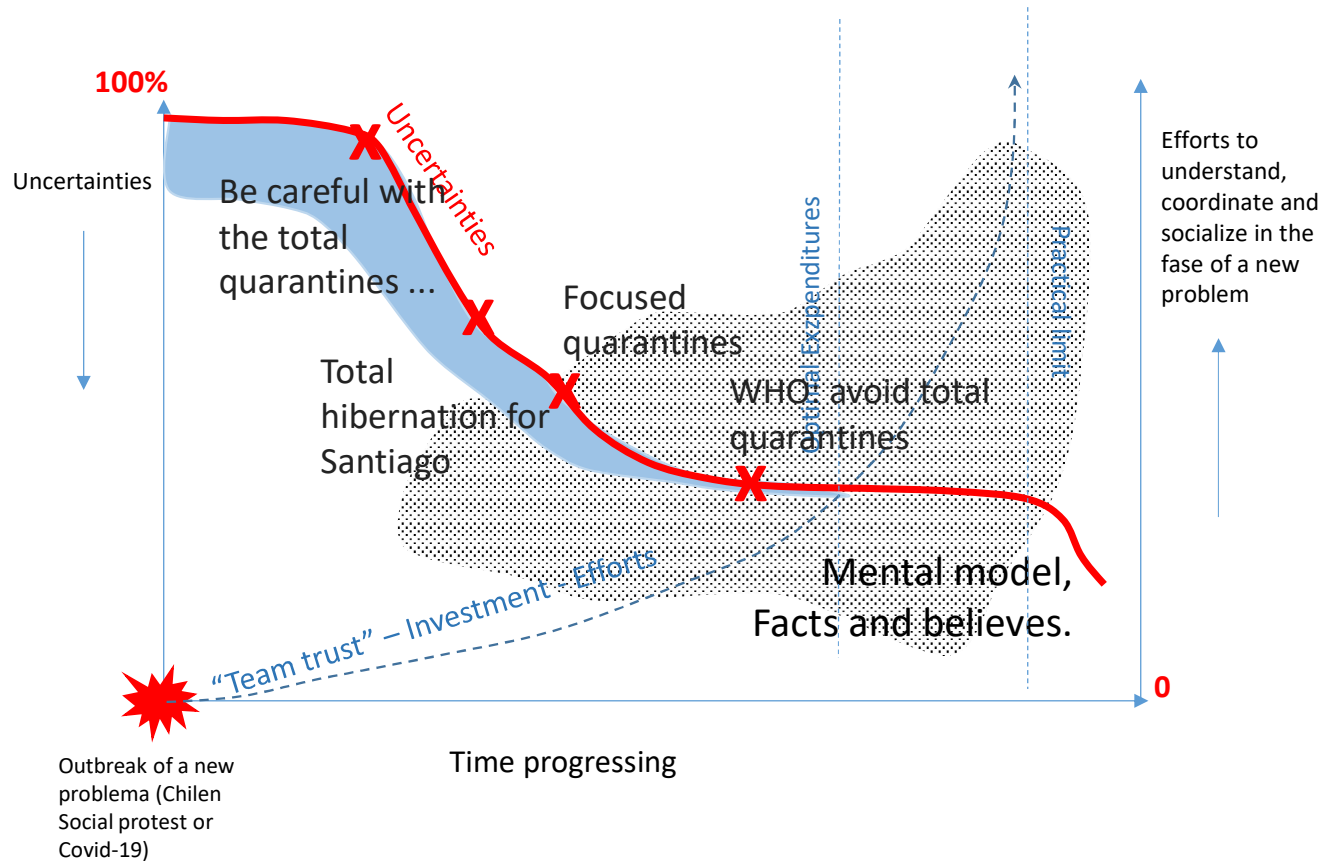
MÁS LEIDAS EN infobae América

- 1 En una respuesta: "No movilizó" del invento una falsa idea perfecta: Sanear el agua y cuando sea posible, la desinfectación con cloro, para matar los virus.
- 2 La OMS pidió ahora evitar las cuarentenas como método principal para controlar el avance del coronavirus.
- 3 Emma Corwell, esposa de El Chapo Guzmán, se presenta en público con sus hijos.
- 4 Una ex vedeta del Arsenal explicó por qué las futbolistas obligan tener relaciones con prostitutas y cuando su costo.
- 5 "Siempre que tengo demencia", la meditación es una excelente herramienta para combatir la COVID-19.

12 de Octubre 2020

Dynamic Complexity – Mental models

Presenter's webcam image



Sweden or New Zealand?

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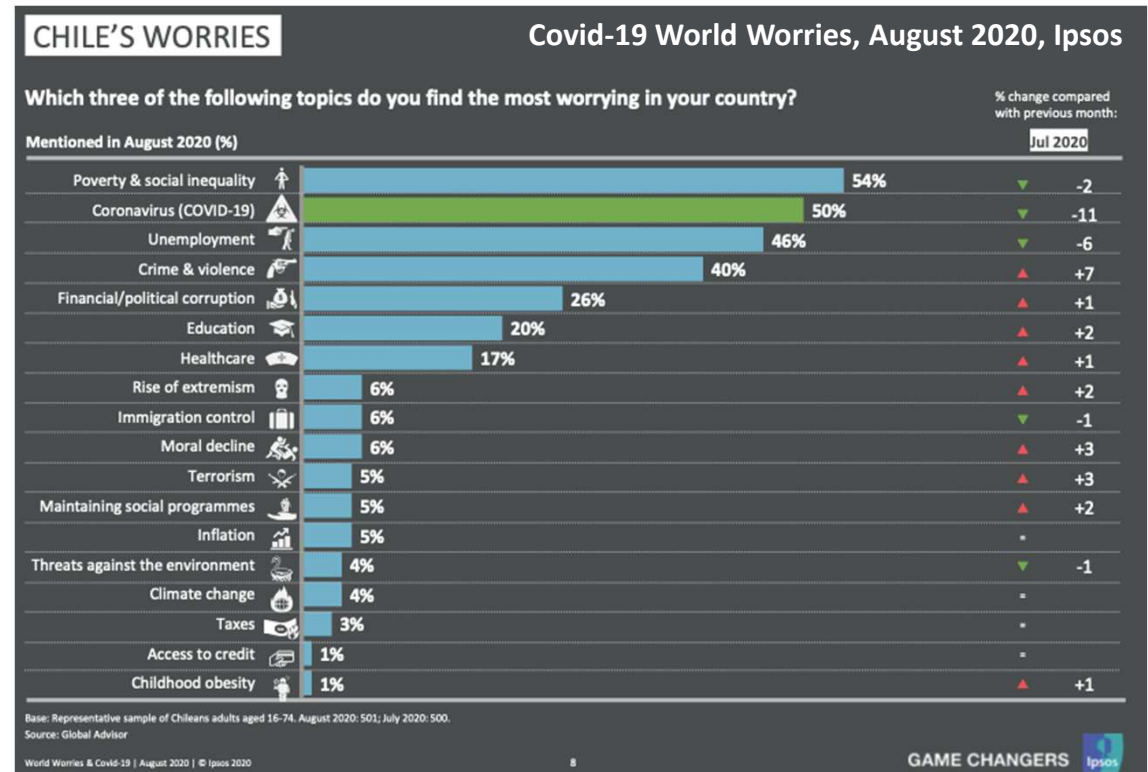
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Condorito by Pepo.

... but finally we are getting some agreements regarding a constitutional process and releasing the pandemic lockdowns.

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In one word... fear

Public policy must be oriented to health in a broader sense...

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Health about Covid-19.

Health in general.

Mental health.

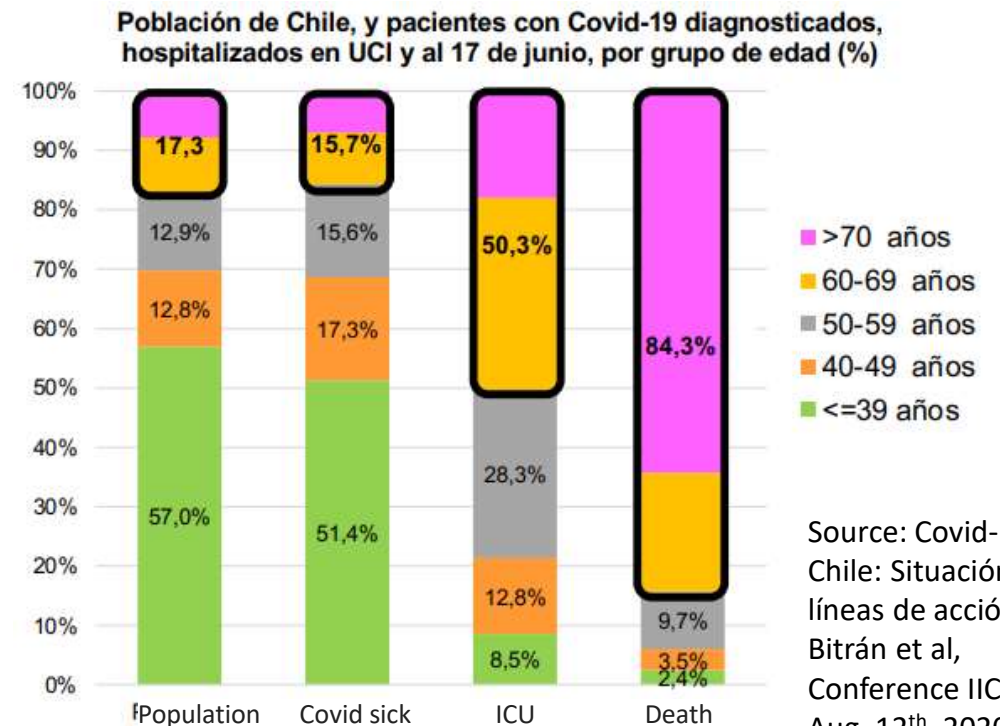
Wealth and economic well-being.

Education and culture.

Political stability.

Domestic violence.

Considering that a new outbreak is for sure and the vaccine will be available in many months more...



Source: Covid-19 en Chile: Situación y líneas de acción, R. Bitrán et al, Conference IICH, Aug. 12th, 2020.

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Projects were delay for some period of time...

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Teck's Chile expansion delayed by up to six months

Cecilia Jamasmie | July 23, 2020 | 5:59 am News Top Companies Canada Latin America USA Coal Copper



Construction at the Quebrada Blanca Phase 2 project could be delayed by six months.
(Image courtesy of [Teck Resources](#).)

SIGN UP FOR THE ENERGY
DIGEST

Sign Up

mine expansions

Commodities

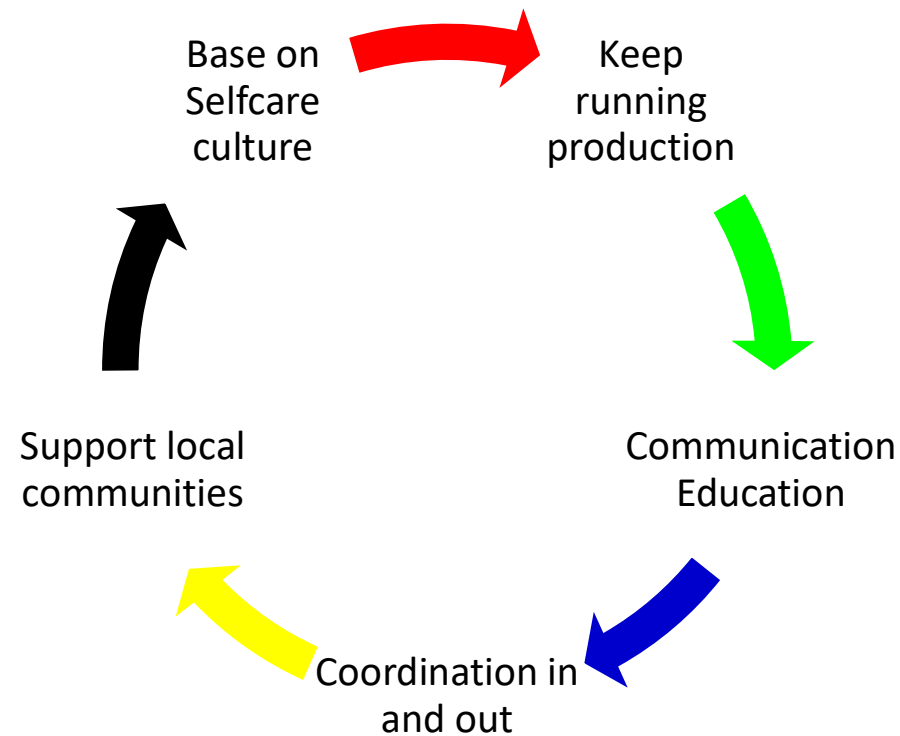
Show 2 more

erals' Los Pelambres,
and Codelco's Inca Pit and
US\$30.1bn invested in
after two months of

This strategy gave to current operations flexibility in buses, mining camps, casinos, etc.; reducing the people exposure to Covid-19.

Summary of Covid-19 Mining Strategy (1/4)

Presenter's webcam image



The ten steps Covid-19 Mining Strategy

Presenter's webcam image

1. To get help of Health System and experts to plan.
2. To understand that it is an ongoing process.
3. Stop projects to give flexibility the currents operations, **but also mine developments for the current operation.**
4. Adjustments to facilities in order to get room for “social distance”, plus many medical controls (thermal measurements in casinos, directly to the people, etc.)
5. Lockdown offices and homeworking to staff and risky people (by age and health).
6. Education and communication to the workers based on selfcare culture.
7. Support communities, villages, local and small suppliers.
8. **Testing, Tracking and Isolating Method (TTA):** testing to workers before the commute to the mine in their cities, avoiding sick people traveling.
9. TTA: Testing to workers in the mid of their shifts in order of taking those off if present symptoms, allocating them in Special Care Houses.
10. Crisis Covid-19 Committees and PR area actively communicating how mining industry is managing the crisis.



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Some figures

Source: Codelco www.codelco.com figures July 11th, 2020

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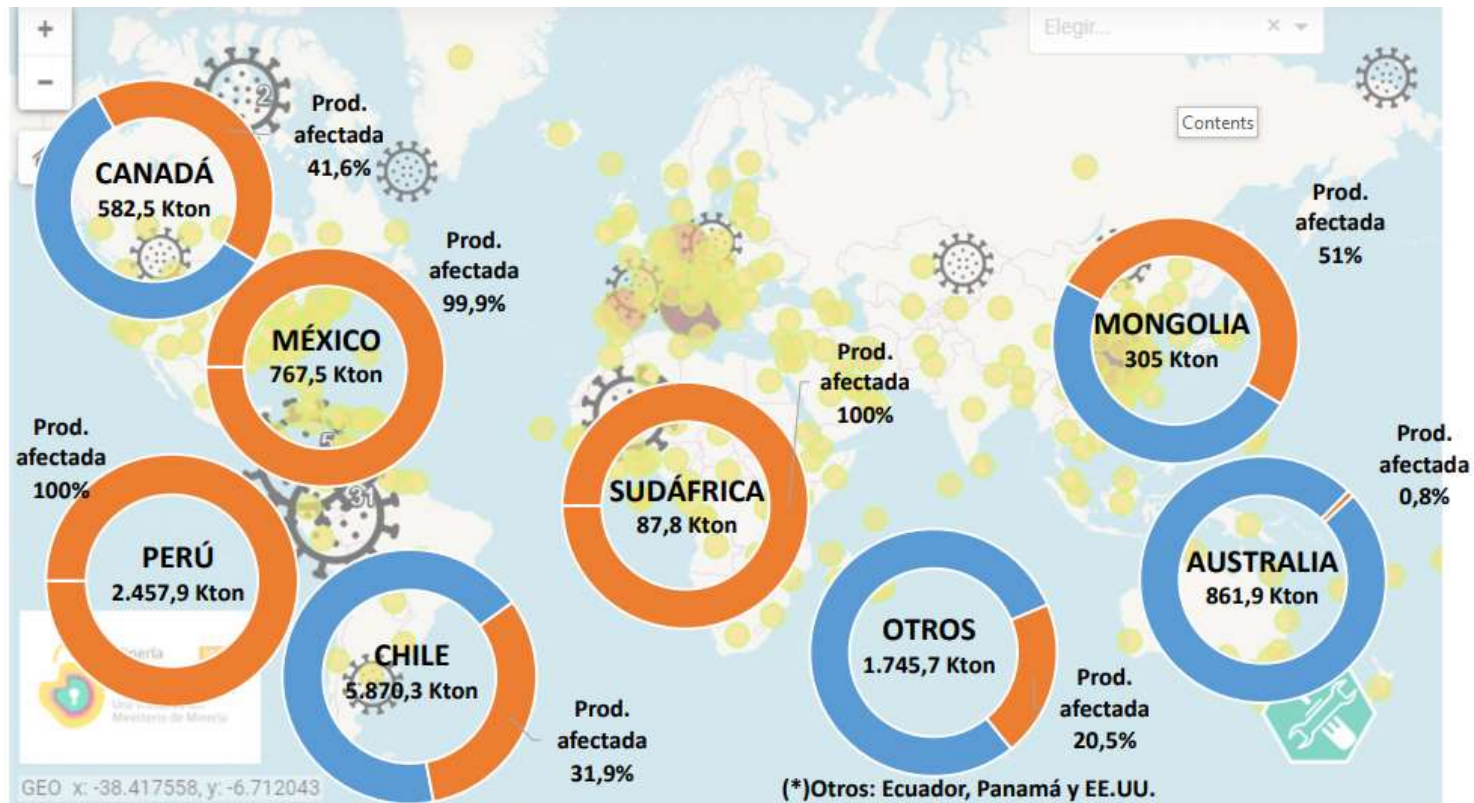
- 16.200 people in the working force:
 - ✓ 3.200 infected.
 - ✓ 2500 recovered from Covid-19.
 - ✓ 9 death
 - ✓ 37 at the hospital (to August this figure fell to 12).
- People working at field 30 – 50%.
- 5 – 7% of infections are occurred at work, while 70% are related to outside working, 25% under revision.

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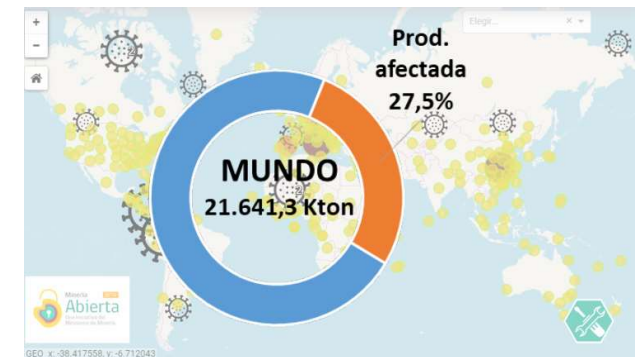
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World & Local

Copper production impacted by Covid 19 by country.



World summary.



- No impact production.
- Impacted production.

Source Cochilco May. 2020

Company production (aprox. 83% chilean copper) 2020.

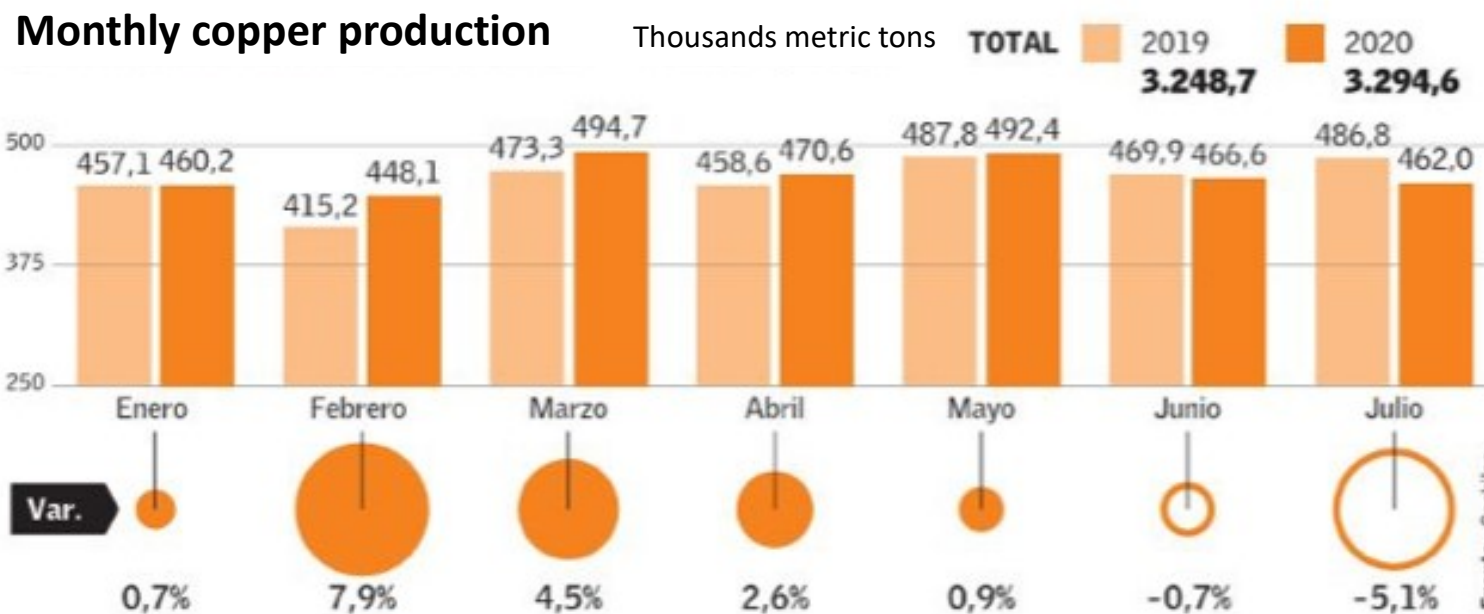
Source: website of each company (Jul. 2020).

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- Codelco: production for the 1st semester growth 4,7% compared to the same period 2019, but with a direct cost reduction of 9%.
- BHP Escondida: the production of the second quarter of 2020 grew by 2% compared to the same period of 2019, also de fiscal year ended in 2020 in comparison to 2019.
- Antofagasta Minerals: sales volume for the 1st semester fell only 2% compared to the same period 2019, but with a cost reduction of 6%.
- Collahuasi: copper production of fiscal year ended in 2020 grew by 27% in comparison to 2019.
- Anglo American: copper production in the 1st semester was 18% less compared to the same period 2019, **but because of water restriction due to a severe drought related to climate change.**
- Candelaria: the production of the 1st semester of 2020 grew by 7,4% compared to the same period of 2019, with a reduction of 37% of the all-in sustaining cost.

On going news...

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Copper Covid-19
disease...

Source El Mercurio Sept. 3rd, 2020

Financial results

Presenter's webcam image



Source El Mercurio Oct. 2nd, 2020

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Homework...

Challenges

- ✓ Tough markets.
- ✓ Covid-19 compatible industry.
- ✓ Employment.
- ✓ Acceptance & Acknowledgement.
- ✓ Keep the business sustainable in all dimensions possible (n+1)...

Opportunities

- ✓ More diversity, less ideology and less pure knowledge.
- ✓ More Local but connected to Global.
- ✓ Efficiency (Homeworking and Process improvement).
- ✓ **Cultural Landscape** (as a way to understand reality and define a target).
- ✓ **Thinking about Dynamic Complexity** (as a way to think and management).

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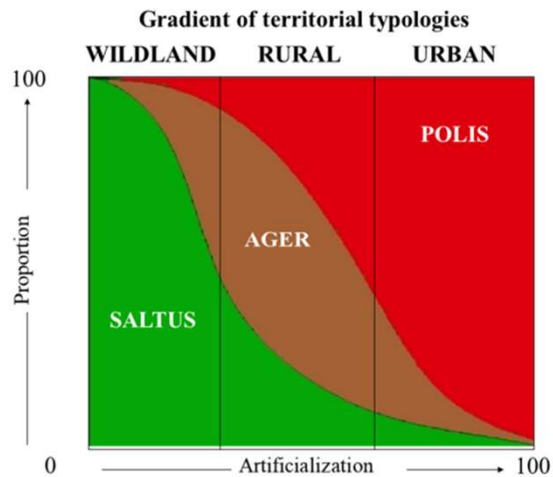
How can we build it?

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1. The vision for the future through the concept of **Cultural Landscape**.
2. Managing through the concept of **Dynamic Complexity**.

Cultural Landscape

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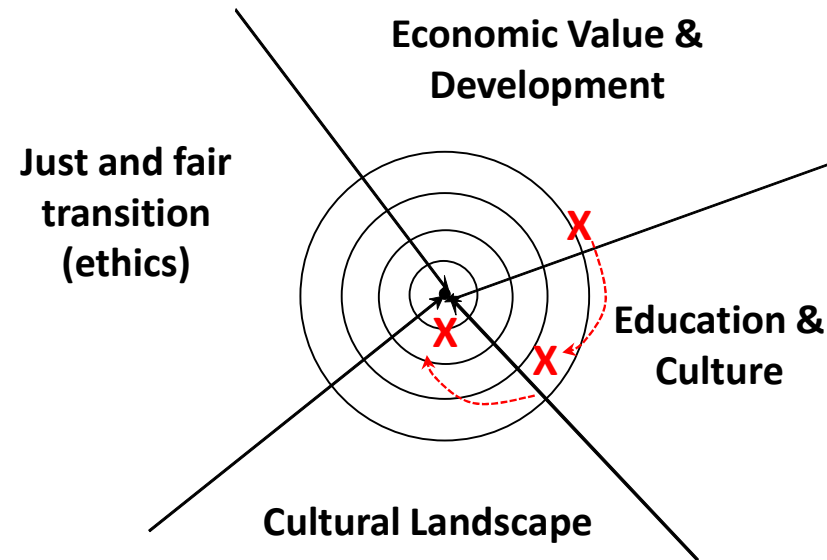
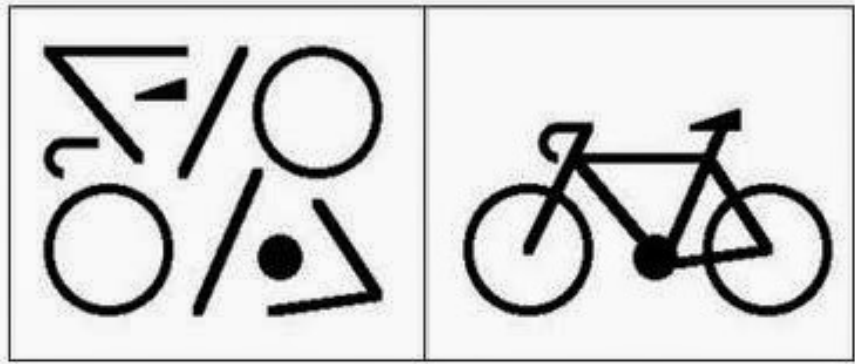
Construction and Metabolism of Cultural Landscapes for Sustainability in the Anthropocene, D. Subercaseaux, J. Gastó et al, Centro de Desarrollo Local, UC, 2020.



Dynamic Complexity

What are the dimensions to plan the mining development of Chile?

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Consilience: the Unity of Knowledge, Edward O. Wilson, 1998.

Construction and Metabolism of Cultural Landscapes for Sustainability in the Anthropocene

Diego Subercaseaux ^{1,2,3,4}, Juan Gastó ¹, José Tomás Ibarra ^{5,6,7}  and Eduardo C. Arellano ^{1,7,*} 

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⁶ Millennium Nucleus Center for the Socioeconomic Impact of Environmental Policies (CESIEP), Pontificia Universidad Católica de Chile, Santiago 7820244, Chile

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Received: 25 June 2020; Accepted: 1 August 2020; Published: 5 August 2020



Abstract: In the Anthropocene, humans have become the dominant force behind the transformation of the planet and its cultural landscapes. In recent decades, there has been a paradigm shift in the sciences, changing the focus from the study of separate components to the study of wholes. In light of this, several fields of study have attempted to address the dichotomous paradigm of nature versus society by developing integrative concepts, such as ‘social metabolism’, to explain the inextricable interrelations between nature and society for building a sustainable future. In this paper, we examine the metabolism of cultural landscapes, considering the actions of social actors in their territories. Cultural landscapes emerge from the artificialization of nature and the opening of the land, resulting in a landscape that conforms to the culture and the availability of technologies, thus creating a whole system with either higher or lower levels of life quality and sustainability. Three central elements operate interactively in the construction of cultural landscapes: the territory, the social actors who act in the territory, and the articulators (e.g., technology and regulations). The construction of cultural landscapes gives rise to a gradient of territorial typologies, including wildland, rural and urban, which have different requirements and consumption of resources and energy. In the Anthropocene, many cultural landscapes have been constructed in such a way that they require and consume increasing amounts of energy. We describe carrying capacity, polycentricity, and Universal Lawfulness as three of the main considerations for the design of sustainable cultural landscapes.

Keywords: carrying capacity; complexity; nature artificialization; polycentricity; universal lawfulness; landscape design; social metabolism

<https://centrodesarrollolocal.uc.cl/index.php/publicaciones-2/739-construction-and-metabolism-of-cultural-landscapes-for-sustainability-in-the-anthropocene>

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Management of Dynamic Complexity in Mining Projects, redefining the concept of Uncertainty and recommendations for the Corporate Governance.

J. Pedrals

Civil Mining Engineering – Universidad de Chile, Master in History – Universidad Adolfo Ibáñez and Certificate Program in Management and Financial Strategies – Facultad de Economía Universidad de Chile.

ABSTRACT: This paper aims at providing an explanation as to why certain mining projects face major difficulties that can lead to their failure, even when a considerable share of the investments has already been made. This research reviews the literature on the topic and was developed after the author led two projects of a very different nature. The first one was a mining-port investment –amounting to US\$ 600 million– in a remote and uninhabited island in Magallanes (Riesco Island), including an open pit coal mine and port facilities which have been in operation for the last six years and export to different countries around the world and to Chile’s north region. The second project was the expansion of CODELCO’s El Teniente Mine (New Mine Level), a project worth more than US\$ 4 billion, and which involved a thorough reformulation that led to a new structure to address risks differently, capturing the complexities inherent to megaprojects. The common ground in such different projects is Dynamic Complexity and a new understanding of uncertainties. Given the speed in information and societal changes, there is a need to introduce new tools and/or adapt existing ones to support the way a firm’s corporate governance can manage uncertainties and Dynamic Complexity.

Key words: Mining projects, Dynamic Complexity, Corporate Governance, Uncertainties, Site Investment, Geotechnical Baseline Report, Risk Management, Megaprojects, Environment, Learning Process.

https://www.researchgate.net/publication/335472925_Dynamic_Complexity_in_Mining_Projects

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”Taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities”

Paris Agreement (2015)

Source: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

Presenter's webcam image

Thanks



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