

Riar Rizaldi  
**On speculation  
of tin value**

English version

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# On speculation of tin value

English version

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### **Abstract**

This project examines the entanglement of tin mining, technology, and global economies through Bangka Island, Indonesia—one of the world’s largest tin producers. Tin, crucial for electronics, becomes abstracted through commodification and financial speculation, disconnecting it from its ecological and social origins. Through field research, a video essay, and Marxist critique, the work explores labour, value, and time, revealing the complicity of screen-based digital technologies in extractive economies and ecological imbalance.

### **Key-words**

Extractivism, financialisation, materiality,  
labour theory of value, video essay

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## Lien de visionnage pour l'essai

<https://vimeo.com/1031248901/83ee6d671e>

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### Introduction

When we use screen-based technology, which is the derivative of cinema, we often ignore the materials contained in them. Mass-produced media technology is manufactured by a series of processes—processes that involve material transformation: mineral extraction, manual labour, manufacturing, shipping, and so on. One of the fundamental components in most, or almost all, screen-based devices is tin solder which is used as a conductor to provide a conduit for electrical charge and data processing. One-third of the global tin supply is extracted from Indonesia, both by small-scale artisanal miners and a state-owned company, on an island in the western part of the archipelago—Bangka Island. Indonesia is only second to China as the world's largest exporter of tin. But tin from Bangka circulates globally primarily, whereas tin mined from China is used largely for domestic purposes.

In contemporary times, the human relationship to tin from Bangka has morphed into that of a commodity with monetary value, an exploitable resource. Tin now travels around the world, shifting shapes at different phases—from ore embedded in the earth's layers to smelted ingots, and finally as the solder used to connect electronic components that create our technological subjectivity and mobile cinematic experience. Soldering shapes technological advancement; thus, while tin can still represent our cultural and technological development in contemporary times, this shape-shifting mechanism always begins from the practice of extracting and manufacturing a mineral which has ultimately devalued the agency of tin in Bangka, rendering it into a passive material.

The global consumption of tin and its commodification abstract the mutual dependency between inorganic material and humans. The relationship between tin and humans is 'black-boxed'—in the sense that the life of tin, as a geo-entity, is invisible and reduced to a 'standing-reserve' in the eyes of modern technology (Heidegger [1977] 2013). That is, tin becomes almost a notional product—traded, commodified, and always available without material consequence. Such ideas render humans into unique entities, with a form of life that is 'qualitatively different from all other life' (Bennet 2010, 86). The technology of soldering has thus contributed not only to the geological transformations that have occurred on the island but also to the social interactions between inorganic matter and humans.

In contemporary times, there are two categories of mining that are visible everywhere on Bangka Island: unconventional mining operated by individuals and small groups (*penambang inkonvensional*), and industrial-scale mining performed by the state-owned corporation PT. Timah. Unconventional mining is the terminology used to describe local, artisanal, and small-scale tin

mining, which has been increasingly active since 2000 (Nurtjahja and Agustina 2015). This dichotomy of labour and mining processes correlates to two different worlds of process framework; the artisanal is rural while industrial mining is associated with a more urban approach; the former is hand-operated while the latter with machines; one associated with tradition and craft while the other progressivity; unconventional mining responds to what is called a primitive society, and industrial mining answers to the needs of a broad-based industrial society. In contemporary Bangka, however, these two sides of the dichotomy actually intersect with one another. Only the production methods are different. As a whole, the distribution and consumption patterns are still based upon a mass-scale industrial society.

In a materialist search for a particular material, a method is needed to collect scattered knowledge in a particular landscape. This knowledge can not only be sought through theoretical reflection but also by way of field research. The conditions of the ecological landscape of Bangka, filled with mining sites, convinced me to make a direct observation in which the interactions that appear between humans, the landscape, and the material occur sensorially. In this context, human senses and first-degree knowledge are the primary determinants for the idea of interaction. It is the process of direct observation that allows me to then reflect my experience as a conceptual analysis.

While engaged in field researches on the island, I met several unconventional miners who revealed how they started mining activities as an effort to survive. Their mining activity is determined by their understanding of the value of tin. In early 2000 at the time when many began labouring as mine workers, the price of tin was at its peak in the mineral market. This conversation about value developed when I saw that the tin itself had practically no significant use-value for the miners except as exchange-value—in the sense that apart from kitchen tinware, old radios, and CRT televisions, these miners did not possess or use any tin-soldered technology; many of them did not even own smartphones or computers, let alone experiencing cinema in their screen-based devices. When I discussed the idea of the value of tin to the miners, they replied plainly, saying that tin is a material only valuable when it circulates in the market.

## Financialisation of tin

Material itself can evolve according to the social life implicated with it. When Marx discusses value in the first volume of *Capital*, he compares butyric acid and propyl formate, both composed of the same quantity of a chemical compound but manifest differently on a physical level. In *Liquid Crystal* (2016), Esther Leslie elaborates that in that period, Marx did not know there were different formations of the atoms of these two compounds, explaining why even though they are chemically the same, they have different physical forms—one being very oily, colourless and smelly, and the other's sweet fragrance utilised as a main ingredient for perfume (2016, 55). Quantitatively, they have identical chemical formulas, but they are qualitatively dissimilar. In this case, similarity in the value of a material can be understood as qualitative and quantitative difference. Marx uses this chemical analogy to explain our assessments of material and how they can be positioned as an analytical tool to observe our social world.

In *Capital: Volume 1* (1867), the comparison between butyric acid and propyl formate is part of a discussion on measures of value that intersect with commodities and labour. For Marx, within the capitalist mode of production we need a method to compare one object to another as a principle of exchange. Value is used as a means of commensurability. A material cannot be judged from only one particular perspective of understanding, be it its utility encoded as use-value or value in an exchange—but should rather be seen from the angle of how the material is conceived as an evolving value-forming. For Marx, each object that has use-value has its own particularity and each commodity object has its abstract labour, but in this regard, I argue that these differences that make the social life of a material should be able to be examined in order to find alternative potentialities, regardless of use-value or the abstract labour contained therein.

Commensurability between material is determined by the labour needed to produce the commodity—this includes the labour of land cultivation, that of social capital, and so on. Momentarily ignoring the automation of large-scale extraction, the production of tin should warrant a higher price than what the market dictates with today. With multiple forms of labour-power and labour-time necessary to produce a single ounce of tin ore, a labour theory of value would value the work of unconventional miners as the largest part of production costs.

The utility theory of value conceives of value as a quality external to the material, valid once it is evaluated by the consumer. In other words, the materiality of tin vanishes once the value of it is pegged by subjective assessment at the level of consumption and circulation. This process becomes more complex when technological development is driven by obsolescence planned into modes of consumption. Moreover, the act of extracting large reserves of tin deposits increases the value of this mineral in the market. When we consume screen-based technology, we gradually ignore the realities of mining, the sociocultural value of tin is lost, and it vanishes at the level of its utility value.

When tin loses its materiality and transforms into an object of speculation, it transforms into pure exchange. It becomes an instrument for a financial derivative which then mutates into a data form for financial operations (Cubitt 2017, 79). Ironically, such financial operations run automatically using high-frequency trading algorithms run on a supercomputer that also relies upon the act of extracting minerals. Financial speculation shapes the material of tin in the global financial market. The practice of extractivism reconstructs itself to what Cubitt terms 'datafication'. The utility theory of value

constructs economics as a domain that deals within financial services (stock trading sector) outside the reality of the real economy (the production and exchange of concrete commodities in the form of goods and services). There is an absurd assumption that knowing the ins and outs of the stock market equals knowing the totality of a state's economy. This perspective goes hand in hand with exchange becoming increasingly abstract. If in the past exchange always meant the exchange of commodities that were the result of production and labour, it now appears that exchange is no longer even attached to commodities but rather to the exchange of the *prospect* of exchanging—this is what has emerged in the derivatives market.

Nitzan and Bichler (2009, 30) explain via David Hume that this derivative economy is constructed based upon the polarisation of politics and economics in neoclassical economy:

Neoclassicists separate economic life into "real" and "nominal" domains. Of the two, the real sphere is primary, the nominal is secondary. The real sphere is where production and consumption take place and relative prices and distribution are determined. The nominal sphere is the domain of money and absolute prices, and it both lubricates and reflects the input-output processes of the real economy.

Apart from the dichotomy of the real and the nominal in economics, financialisation is not rooted in the formation of value from materiality and social relation. Even though financialisation imaginatively plays with speculation, such as creating its own value, the creation of value is only based on the interest to accumulate capital. In this regard, the main difference between speculation on financialisation and speculation on alternative values that I try to put forward in my practice is that in financialization value creation is constructed by a small part of the group who organise power and capital, not as a social order agreed upon by all levels of the community.

The global-scale war on tin prices started when financialisation began to spread. The financial market was used as the basis for determining the value of all commodities. Ownership and privatisation of tin mines created expectations of value and future earnings. This expectation was then thrown into the financial market to be manipulated artificially as a determinant of the price of tin. Tin is used as material for speculation to see prospects—prospects that may never be distributed among the miners that helped to condition tin's global circulation. Beyond the determinants of value by units of measurement such as the util or abstract-labour, it is a 'fictitious capital'—as described by Marx to discuss financial assets in the financialisation process—amidst the financialisation of the mining industry which plays a major role in the geophysical and social evolution of Bangka Island.

## **Tin production and time**

Tin mining on Bangka cannot be seen as an isolated and disconnected local issue. It connects to a complex system of global commercial trade, the universal valuation of material, and the notion of growth and progress as a singular economic purpose. The cartographic research that connects the dots of mining sites to endless conversations with actors in the mining industry shows that the ecological and sociological issues of the island are connected to global structural problems. One of the salient results from this investigation is knowledge of the development of industrialisation on the island.

This industrialisation is also multipolar, spanning the creation of artificial tin prices to planetary-scale geochemistry experiments—all the way to implementing and upgrading mining technology.

During the field research conducted at a mining site in Bangka, I met several unconventional miners, and we chatted about the amount of tin they could mine in one day. One miner I met presented an argument that contradicts the assumptions of depletion of tin. While joining me on an hour-and-a-half walk in February 2019 around Central Bangka, Amri explained that tin deposits will increase over time because the earth continues to produce tin from its crust. For him, tin is similar to organic life on the earth's surface; it will continually be reproduced. Amri's assumption that the earth can be an inorganic object that reproduces itself when the capacity to reproduce has heretofore always been categorised as a characteristic of living things. Amri's argument brings forward an alternate construction of production and consumption cycles between humans and nature. Human involvement in the earth's production cycle resonates with the new materialism approach of discussing the dichotomy of nature and culture and distinctions between organic and inorganic. To avoid the depoliticised traps of monism where nature and humans are one metabolic entity, we must also see how human intervention in the natural production processes of the earth has alienated the earth as only a producer. This form of alienation not only ontologically affects the earth but also affects the humans who contribute their labour.

In the meeting with Amri, the idea that something must be organic matter—something organised and growing—in order to qualify as living challenges the very organisation of life. According to Amri, if the earth can be reconsidered as a living being then humans also bear a moral responsibility with regard to the issue of extraction. For him, this moral responsibility is currently missing from the extractive economy. His ethical argument based upon the relationship between humans and tin, where humans could reimagine tin as something more than simply an object ready to be extracted. Tin should also be seen, like the earth, as a living being just like humans, and this relationship must be based on affection and emotional attachment.

Amri's idea of moral consensus illustrates that the connection between humans and minerals in Bangka is currently not built by intimacy, awareness of social relations, or 'the gift of being'. The extractive relation to minerals implies a state where minerals are seen as objects that do not have sociopolitical and cultural histories attached to them via process and time. Theoretically, minerals may continue to be produced and reproduced by the earth with all mechanisms functioning indefinitely. But the rate of mineralisation may not compare to the acceleration of mining in Bangka, a speed and technological awareness that is also ever-evolving. Therefore, at least temporally speaking, there is no balance between extraction and production. Extraction does not give the earth time to breathe. Miners inevitably have to participate in the extractive economy because they have no other choice. The wage labour paradigm forces them to hold on to exploitative mining professions in order to survive.

While walking to observe how the mining landscape is rapidly changing, Amri and I contemplated about how industrialisation can only be sustained by big mining players such as a state-owned company. Minerals embedded within terrestrial and oceanic surfaces have been formed by both geologic and hydrologic natural processes. Humans, through a series of industrialising manoeuvres, then participate in this geological process of the transformation of the earth. They complicate natural

processes with other processes that are mechanically determined. The result is a vertical process based upon mastery, with an indication that the natural processes of the earth move more slowly than mechanical extraction processes. There is a temporal gap between human extraction of the earth's minerals and earth's process of mineralisation.

From here, I argue that the context of time is imperative to find other possible relationships between humans and the earth. If the earth's rate of producing minerals is not commensurate with the human acceleration of mineral-based extraction and production of technological media, then the refuse and excess from these materials will return to the earth faster than the earth can produce new minerals. In line with Amri's assumptions, the most problematic thing about the concept of mining, especially in Bangka's landscape, is the concept of time. For Amri, an alternative relationship between humans and the earth can be achieved on the island by looking at the imbalance in the distribution of time. He refers to mining practices before massive industrialisation occurred, when mining was carried out in rhythm with earth mineralisation processes. In this framework, ideas of development and growth adjust in balance with the natural production of minerals.

During the conversation with Amir, we came up with an idea. I told Amir about the potential for de-growth as an effort to reconfigure social metabolism, especially in the realm of consumption. The productive model of economic development forces miners to be complicit with the extraction business. In post-independence era Indonesia, the paradigm of productivism and its accompanying myth of developmentalism are the mantras for rapid economic growth. The mining boom in mineral-rich zones such as Bangka is evidence of exponential growth, but the demand of this mineral is not accompanied by a sustainable manner of technological advancement. In the end, growth became part of a slow process of violence afflicted not only upon the inhabitants of Bangka but also on the landscape and the island's geophysical condition. Proponents of de-growth theory criticise consumption patterns that demand tertiary needs tied to technological development.

### **Tin extraction as process genre**

As a response to the idea of time that keeps popping up in conversations about tin and value in Bangka, through an investigation with artistic practice, I explore another method to rethink the idea of time and value through visual language that I captured from observations using cinematic technology as a tool.

Referencing my dialogue with Amri about time and labour, this video essay represents the notion of duration needed for the unconventional miner to extract enough tin to accommodate the most common mobile screen-based devices in the planet, iPhone. As ubiquitous devices we encounter everyday, iPhones are used here to observe the complicity of screen-based media technology to tin mining in Bangka. Apple is one of the largest consumers of tin produced in Bangka (Edwards 2014). Unfortunately, Apple is not transparent about the official amounts of tin used to make one phone, Brian Merchant's (2018) report in *The One Device: A People's History of the iPhone* reveals that mining consultants 911 Metallurgist have calculated that one iPhone (from series 6 onward) contains 0.66 grammes of tin.



According to the unconventional miner, such as Amri, and our experiment on time and mining, approximately 50 grammes of raw pure tin ore can be collected per day from the abandoned PT. Timah site in Sungailiat where he works. Considering a 14 to 16-hour workday (based on Amri's own working hours), obtaining 0.66 grammes of tin metal would require Amri to mine for roughly 21 minutes. This calculation of time is based on the cinematic language which mediates by the camera that I used to record the mining activities—which captures 24 frames per second.

The mechanisms of cinema and time also form the basis for thinking about labour and moving images in terms of material production. Thinking of time through cinematic-technological conceptions of time becomes a suitable means for exposing the labour theory of value. This relation between labour and cinema is also critically explored in process genre theory, although the latter does not cover the entanglements of moving images and labour to materiality. As cinema and media theorist Salomé Aguilera Skvirsky (2020, 2) wrote:

The process genre is characterised by the special way it organises the representation of processes. The represented processes are typically, though not always, processes of production, and crucially, they are represented as having a sequentially ordered series of steps with a clearly identifiable beginning, middle, and end.

In this regard, I argue that this video essay can also be characterised as part of the process genre. The departure from Skvirsky's theory is the avoidance of clear chronological representations. Without beginning, middle, or end, what is represented here is a process related to labour-time and the quantity of commodities it produces. The process genre reveals the dynamics between the labour theory of value and its relation to scale and time. If industrial mining tools such as dredgers can operate with extremely high efficiency, as Amri says, there is no balance between the tin production from the earth and its extraction by industry. Because of the great gap in scale, the unconventional miners can only continue to a collaborative survival practice of slow mining. In addition to their marginalised and precarious situations, unconventional miners work at a vastly different scale and with vastly different technology, positioning themselves to continue digging mining debris. Therefore, addressing the dynamics of scale, technology, and time of mining here, their existence becomes virtually absent.

Although not explicitly revealed in sequential and ordered series of steps, the footage of this essay can be read as a how-to manual for each of the two types of tin extraction that occur in Bangka. While Skvirsky questioned the conceptual border between image-based or durational modes of cinema within the process genre (2020, 4), this video essay tries also to expand the definition of process genre by showing how the materiality of moving images is formed outside of the representation shown on screen. The how-to manuals of this video uncover the entanglement between materials that condition the moving image itself, and thus the categorisation of genres in the cinematic context here creates a meta-narrative of moving image production in terms of materiality. The moving image process starts from mineral extraction. Eventually, the consumption of moving images is the consumption of minerals.

Once you finished watching this video essay, a 0.66 grammes of tin enough to accommodate an iPhone device, which is mostly the device people use to watch this video, is done to mined by unconventional miners.

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## Riar Rizaldi

Riar Rizaldi works as an artist and filmmaker. His works have been shown at various international film festivals as well as Museum of Modern Art (2024), Whitney Biennial (2024), Taipei Biennial (2023), Istanbul Biennial (2023), Venice Architecture Biennale (2021), etc. Recent solo exhibitions and focus programs of his works had been held at Gasworks London (2024), Institute of Contemporary Arts (ICA) London (2024), Z33 Hasselt (2024), and Centre de la photographie Genève (2023) amongst others.

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