The mindset embodied in the Green Development Plan of BRI and the challenges for a global entropic transition in the case of China's dependency on international trade and economic growth: A review from South's critical theories of development and ecological economics.

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Based on a research that began in 2019 that analyzed the idea of development into the narrative used by the Chinese government since the last decade as part of its foreign diplomatic strategy, it was found that this discourse has taken place since the overture of the Belt and Road (BRI) proposal, within the concepts such as "win-win" or "common development" are used for all countries in a framework of "shared common destiny", as an alternative of the conventional development model based on the inequitable distribution of benefits from the exploitation of some regions all over the world, principally based on their natural resources, as well as on military, political, economic and ideological interventionism.

More important, the previous mentioned investigation raises a concern of greater depth and importance and that is whether the new leadership exercised by China, as a new global major player and its narrative of development, represents liable path that contributes towards real solutions to the unsustainability of an economic model that has produced an unprecedented socio-environmental crisis in human history. For this question, the critical development theories developed collectively by scholars from the global south, combined with the theoretical principles of thermodynamics and the entropy of systems of ecological economics, provide a framework of interpretation which raises the first hypothesis for this dissertation: **Considering the environmental urgency of the planet as a result of modern rationality, there seems to be no equally modern solution within it that is physically possible and that would allow humanity to move towards a sustainable socio-economic model as long as it continues to base its progress on the basis of unlimited economic growth.**

Based on the above, this presentation will focus on discussing the narrative-action connection of the Chinese government, centered on its capacity for structural transformation of the world order from its "green development" agenda, mentioned by President XI Jinping since 2016 under the BRI's political agenda, to deepen cooperation and environmental protection by setting the goal of meeting the Sustainable Development Goals (SDGs) by 2030. Achievements based on economic planning and state policies that mainly promote the decarbonization of the economy, decoupling and circularity in order to reduce polluting emissions (Cheng & Ge, 2020). This Chinese initiative has its origin, among others, in the words of President XI in 2014, in which he referred to the chinese conventional model of excessive consumption of resources as a "dead end" which, being insufficient, would affect the present comfort of its population and the world, for which the new path that the country could take would be under scientific innovation and innovation (Rosales, 2020).

For this analysis it is therefore necessary to address four determining scenarios to understand the panorama in which the Chinese development model, despite its discursive good intentions, could not only continue to be equally or worse harmful in environmental terms. In addition, it could be also reliable to consider that

its economic growth would continue to deepen the post-colonial sequels of dependence, as well as the phenomenon of the "middle-income trap" of developing countries (ie) Latin America and Africa, considering their articulation of their development processes to the needs and energy and resource demands of China through the BRI, situation that might not represent major productive transformations of these countries along the global value chains.

1. **The unseen ending: the entropic challenges of energy transition.**

The Chinese project, same as the rest of the other economies, continues to base its progress on the accumulation of capital in order to achieve the economic income to finance the structural transformations necessary, in the need of achieving transition scenarios of less dependence on unsustainable and polluting materials or energy. However, a transition to an energy model based on renewable sources will only be viable with a drastic reduction in the use of energy and materials, so it can be argued that a sustainable transition must adjust to planetary limits as well as to the basic laws of entropy and thermodynamics, which will eventually make this transition either forced degrowth(continuing to grow until reaching a point of no return and excessive exploitation) or sustainably degrowth (introducing economic planning policies that allow for change).

In this regard, China has committed to reduce its carbon emissions cap by 2030, aiming to become totally carbon neutral by 2060. To achieve this commitment, the country must move towards a low-carbon economy by promoting the "decoupling" of economic and social development from its production of carbon emissions (Yuwei et al, 2022). However, from a physical perspective, the total decoupling of productive cycles is theoretically impossible because the losses of matter and energy in a degraded form are inevitable. On the other hand, total recycling is not possible either, it has to be considered the fact that recycling requires the production of energy, which is also dependent on the percentage of recyclability of each material.

Therefore, to consider that the effects of economic growth on the environment can be reversible, such as soil erosion, loss of biodiversity, excess of toxics in water systems or the depletion of oil, are beyond the principles of entropy (Riechmann, 2015). Therefore, it has been argued that in order to balance the eco-social metabolism, ways must be found to operate within the material space of the planetary limits and its times and processes of self-regeneration (Krausman et al.,2016)

2. **Deeper and deeper: Dependence of the Chinese economy on international trade in goods.**

One of the "core interests" of the PRC government, in addition to national security, national sovereignty and territorial integrity, is the continuous and stable development of China's economy and society (Telias, 2021). This development has been obtained mainly from international trade, currently ranking second only to the U.S. and China.

Although China has decreased its dependence on world trade, from 64.5% in 2006 as a percentage of its GDP to 34.5% by 2020, it will continue to be relevant until the country manages to decrease its dependence on foreign suppliers, allowing it to focus more on domestic markets. This is a change in their strategy produced by the different economic crises that has affected the external demand for goods in the world and that has affected its economy.

However, the Chinese economy continues to face the challenge of seeking a positive impact on the environment, while still their exports continue to be resource-intensive in the production process, a situation which has not diminished in recent years. In addition, CO2 emissions from these carbon-intensive industries are not exclusive to the industrial production process within its borders, but extend throughout the entire global value chain. For example, the country's massive imports of timber, grain and energy continue to put pressure on the country's environmental impact in other latitudes through extraction and transportation. Likewise, the production of cement, ceramics, steel exports and aluminum-based products, sectors in which China is a world leader, are energy- and pollution-intensive products.

In fact, it is with steel that China, as the world's main supplier of this material, producing nearly half of the world's steel, is seeking through the BRI project an opportunity to open new markets for importing primary mining resources, but even more for exporting its surpluses and its overcapacity in the production of steel, aluminum, cement and glass, materials that are the key basis for building the infrastructure that supports the approach of BRI to other countries (He & Guo, 2021). This suggests that China's need to continue sustaining a considerable part of its development model is still dependent on the commercial exchange of goods, which in this case are still energy-carbon intensive, and the dynamism that different multilateral trade agreements allow it to achieve.

3. New LATAM Sino-dependence: Rare metals and food in exchange for PV panels

The global consumption of resources has grown exponentially since the industrial revolution, from the extraction of fresh water, cultivation areas for food production, iron extraction, among others, are just some examples of a trend that is well alive and present today. In this sense, the place that LATAM has occupied in its integration to the world economy has not changed considerably, being so that now the export of energy resources and raw materials has become functional in the urgency of China's energy transition, which does not necessarily represent a socio-ecological transition of all countries equally.

Strictly speaking, China's priority is to guarantee its "green development" agenda in order to ensure the sustainability of its model without this expressly meaning a collective ecological transition, unless we try to consider the financing of infrastructure by direct chinest loans which prioritize investments of sustainable projects based on clean energy and low carbon emissions.

This makes it difficult to experience a version of development where the idea of the common good prevails, since the international division of labor seems to continue to be reproduced, currently by a neo-dependence of Latin American countries whose economies are now directly affected by the economic behavior of China, where the sensitivity to any change has direct effects on the economy of the global country.

As an example of the above, some Latin American countries do not escape this influence, as China demands large quantities of soybeans, copper, pork and lithium from countries such as Chile, Argentina and Brazil. However, despite the market opportunities with this country, production practices for these raw materials and living resources are maintained under management systems that continue to be unsustainable and seek to guarantee competitive prices for Chinese demand at a high environmental cost.

Recent figures evidence the level of demand for resources by this country, being so that,

according to MIT's Observatory of Economic Complexity (OEC), China consolidated by 2019 as the world's largest importer of crude oil (US$ 204 billion), iron (US$ 83.1 billion), natural gas (US$ 47.8 billion), soybeans (US$ 32.1 billion) and copper (US$ 31.3 billion) (Romero & Sarapura, 2021).

While this is happening, the possibilities of energy transition of Latin American countries are subject to the Chinese market. In the Chilean case, it cannot be denied the contribution that the Asian country has made in the adoption of clean energy, who managed to achieve the goal of 20% of renewable energy production with the support of the Chinese government; however, the road to this achievement was conditioned from the beginning because China maintains a dominant position in the production of panels and photovoltaic technology, thanks to its production capacity (Nuñez, 2022).

4. Order now, receive tomorrow: The challenges for the transition / decoupling / or decarbonization of China's international trade along BRI

Finally, highlighting the importance of the BRI proposal for China in terms of its need to deepen trade links with different regions of the world, for which the import of resources and raw materials together with the export of manufactured and technological goods will continue to be one of its priorities, leads us to reflect on how viable it is to achieve an energy transition in the case of international trade, mainly maritime transport, which is responsible for about 80% of world trade.

This last point of reflection is based on the premise of how possible it is for China to achieve a decarbonization of its economy if it does not consider as part of this the decarbonization of transportation along the entire BRI logistics chain, which involves land, sea and air transportation. The problem with any alternative proposed for this, according to a study conducted by the Cyprus Marine and Maritime Institute in 2021 (Mallouppas & Yfantis, 2021), analyzed the different alternatives applicable to maritime transport, including the use of new fuels, modifications in engines or the combination of different types of technologies driven by different energy sources. In conclusion of this article, there is still no solution to an energy source that is safe to handle, has sufficient energy density or is economically competitive in terms of cost. For all these reasons, international trade, and its desire to maintain increasing levels of shipment quantities and greater efficiency in transport accuracy of time using renewable energies, is still a major path block, considering the challenges of thermodynamics laws and entropy.

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