Nature-Balanced Innovation (NBI): Linking Innovative Growth and Climate Resilience

Soo J. SOHN, Eunjoo KIM, Minji KANG

STEPI

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01. Motivation

☑ Industrialization and Nature

- ✓ Since the Industrial Revolution, industrialization and urbanization-pursed for economic growth-have regarded nature as a free resource. This led to indiscriminate exploitation and destruction, causing climate change and resulting in the ‘tragedy of the commons.’
- ✓ The growth driven by technological innovation after the Industrial Revolution provided wealth accumulation for major nations and convenience for humanity. However, it also triggered climate change as a consequence.
- ✓ In the era of the Digital Revolution, there is growing concern that deep-tech-driven innovation, while contributing to wealth accumulation, will exacerbate additional climate change burdens for future generations.
- ✓ This raises a question: Should we, as the current generation, refrain from innovation? Or do we need innovation that strikes a balance with nature?

Industrialization

AI Images(ChatGPT)

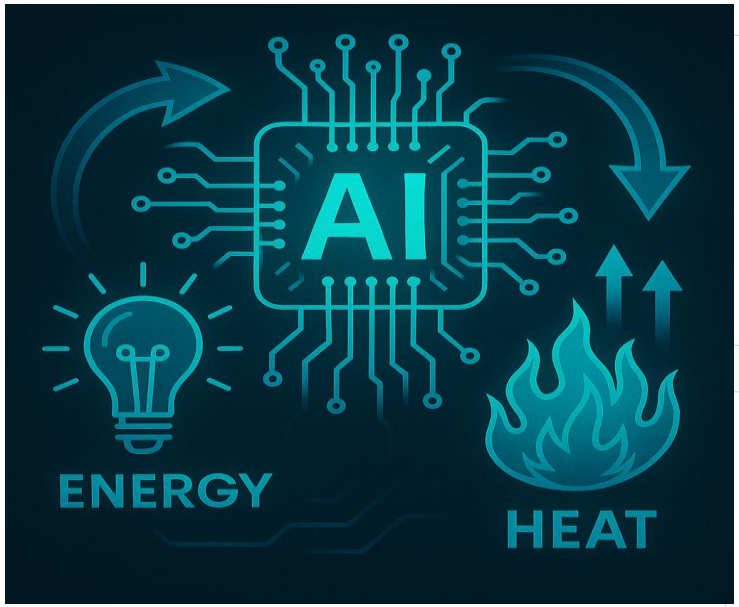
Humanity has witnessed remarkable growth over the past centuries, driven by the expansion of manufacturing industries through the Industrial Revolution, urban development, and the growth of diverse industries and professions. Additionally, investments in R&D and innovation have surged significantly to support this progress.

Human growth and nature's growth have moved in opposite directions.

- ✓ For example, between 1992 and 2014, while global per capita GDP grew by over 60%, the amount of per capita natural capital reportedly declined by nearly 40%. And per capita natural capital in 2019 was almost 50% lower than in 1990. (MIT, Elsa A. Olivetti)

Abnormal climate phenomena and variations in food resources are occurring around the world.
Rising global temperatures, dry climates, increased wildfires, and the loss of lives and property are ongoing threats to human life.

Digitalization



the Environmental Impact of generative AI's Soaring Energy & Cooling water consumption

Awareness is needed regarding the energy consumption for generative AI use and the cooling water required for data centers.

- ✓ In 2022, the power demand of data centers in North America was 2,688 megawatts. However, by the end of 2023, it nearly doubled to 5,341 megawatts. The primary cause of this surge is attributed to the proliferation of generative AI.

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All the issues mentioned earlier are things we are already well aware of. So, should we stop industrial growth and innovation here?

What is the best choice for sustainable growth and the future of humanity?

02. Concept

Balance between Innovation and Nature

- ✓ To ensure a balance between ‘natural environment’ and ‘growth engines’ for the safety of humanity’s life and survival, it is essential to minimize the threats to nature caused by innovation.
- ✓ A design is needed to create dual values(Twin-Engines) expected from innovation-such as stable survival, improved convenience in life, and wealth expansions: (1)Maximization of Innovation, (2)Minimization of threats to nature that innovation may cause.
- ✓ Based on past experiences, it is crucial to avoid repeating the same mistakes by establishing response strategies and management systems to minimize the negative external impacts of Innovation on nature.

02. Concept

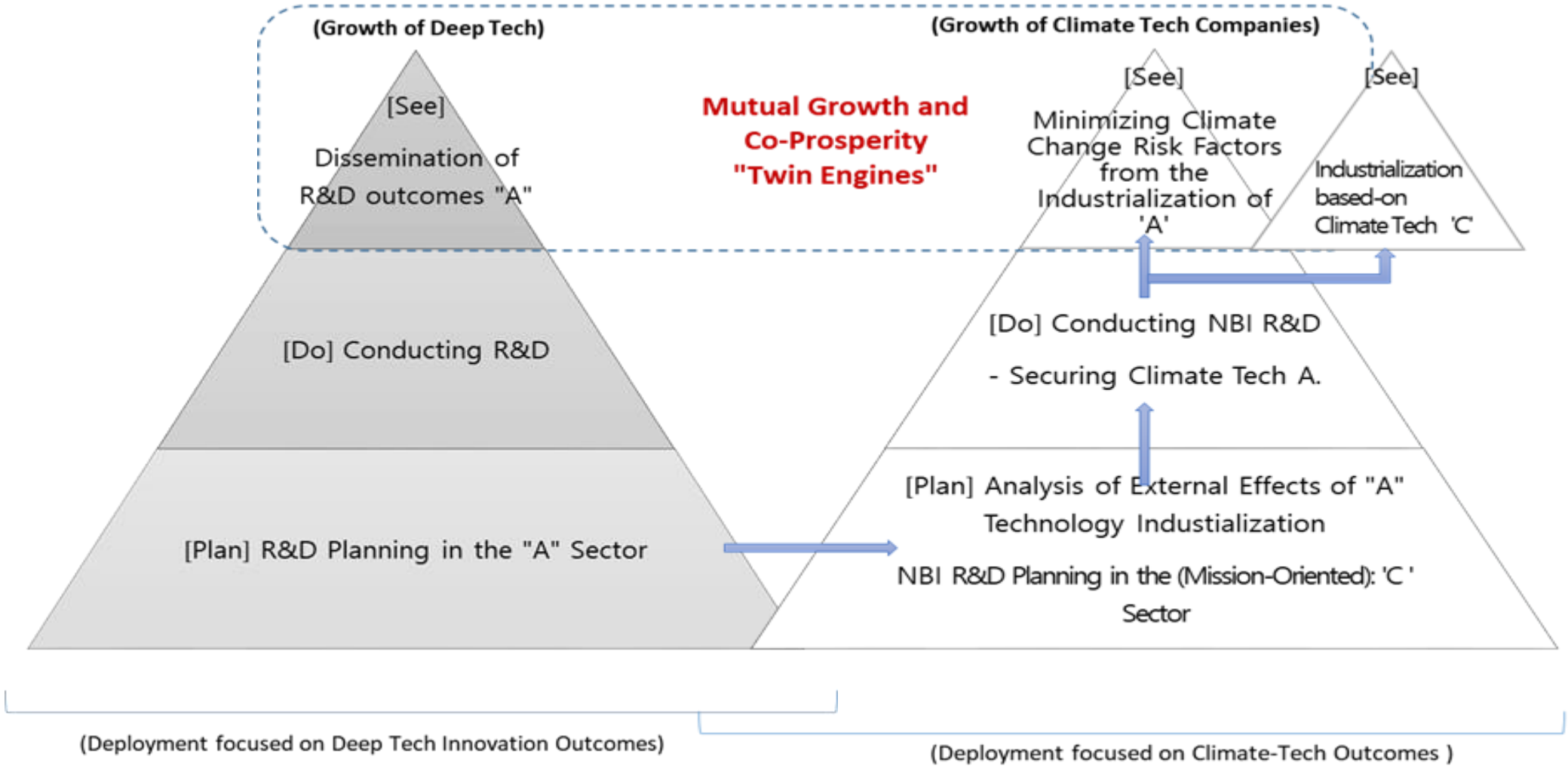
A fundamental shift in Questioning

> The goal of innovation is to consider not only the industrial ecosystem, but also the nature ecosystem simultaneously.

- ✓ (Existing Question) What are the alternative fuels to fossil resources?

- ✓ The use of ammonia as an eco-friendly energy source for ship fuel is expected to expand. However, there are concerns regarding certain factors during combustion.
- ✓ (NBI Question) (1st engine)What is the R&D for developing an ammonia co-firing engine based on eco-friendly ammonia energy? (2nd engine)Additionally, what is the R&D for reducing nitrogen compounds, which are known to be harmful substances generated during the combustion of co-firing engines?

03. Approach : Twin Engines for NBI



Sohn, Soo J. et al.(2024)

03. Approach : Input

Input for Industrialization	
Input for Knowledge-based Economy	
Input for NBI	

Let’s embrace the future costs with today’s investment!

To ensure that the prosperity brought about by the current generation’s innovative activities does not become the heavy burden of climate change for the next generation, let’s include "investment for balance with nature" in R&D efforts for innovation.

Thank you for your attention !

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