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COMMENTARY - ASKING ARTIFICIAL INTELLIGENCE ABOUT REGENERATIVE ECONOMY

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Abstract: *This commentary studies how AI/LLM defines the concept of regenerative economics and compares their interpretations to an academic definition. While LLMs (Large Language Model) capture elements such as systemic thinking and net positive impacts, they seem to omit the transformational change required across individuals, organizations, and societies. Through a comparative analysis of responses from ChatGPT, Grok, and Copilot, we highlight the strengths and gaps in AI-generated definitions. The findings raise important questions about the pedagogical implications and risks of relying on AI tools to convey complex and evolving academic concepts.*

Keywords: *Regenerative economy, artificial intelligence, definitions, LLM comparison.*

1. Introduction

Regenerative economy has gained popularity in academia over the past decade, spanning from classic economic theories to biodiversity in urban planning (Čegar et al., 2024). Given the climate crisis, it has become a pressing topic with a breadth and depth that the understanding of regenerative economy has impacted all walks of life with an ever-increasing complexity.

However, although the concept is well established, the realms, meaning and implication of the concept overlaps and poses pedagogical problems when

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communicated to students, practitioners and the public and when broken down into components, fields and applications.

A contemporary common practice among the listed groups is the use of LLM for description and detailing of concepts such as regenerative economy. This makes sense if the descriptions also make sense, but can lead astray if descriptions are partly incorrect, or if different LLM promotes parts that other models don't (see for instance Kourtit et al., 2024; Östh et al., 2025). This leads us to the fundamental questions of this commentary text; how do LLM describe regenerative economy, and how does the description compare to each other and to conventional descriptions.

If we depart from a recent paper having the aims of defining regenerative economy (see Unter et al., 2024) we find the following definition:

A holistic, dynamic system that fosters renewal, restoration, preservation, and net positive impacts across ecological, economic, and social systems, necessitating transformational change within and across individuals, organizations and societies.

Although definitions would vary between researchers, fields, agencies and practitioners, the benefit of using a paper such as that of Unter et al., (2024) is that the definition has scooped wide to find a definition that is agreeable from most angles. This means that the definition has a useful core meaning and can as such be used as a point of departure for comparison to LLM output. In short, the definition can be broken down into three segments; 1) a holistic and dynamic system, 2) a need for net positive impacts, and 3) a transformational change. These three segments will be used in the comparison below.

To mimic assumed common searches for regenerative economics on LLM, we have employed ChatGPT 4, Grok 3, and Microsoft Copilot, and we have specified the following prompts/questions: (i) Define regenerative economy, and (ii) What fields have the most potential for a regenerative economy in the future?

i. Definition and comparisons

Using the specified definition as a baseline, we compared the output for each provider to the core definition, and used the three segments to further the analysis. The LLM output/response to the prompts is provided in the Appendix of the commentary. In Table 1., The providers are listed as rows, and the comparative response for the text segments are listed as columns. Finally, the rightmost column summarizes texts and deviations.

The results are clear: net-positive impacts are well described and understood by all LLM providers included in the study, with moderate to strong alignment in their responses regarding the definitions of holistic and dynamic systems. However, the transformational change (among/within individuals, organisations and societies) is to a large extent missing.

This is unfortunate since the transformative part also can be understood as the strongest agency needed for change towards regenerative economics. It also suggests (although the analyses conducted in this commentary are limited) that provided definitions are convincing enough to pass as valid all-encompassing definitions,

although an essential pillar is missing, and when/if LLM is used to define the topic, the transformative part is likely to be left out.

Table 1., LLM responses compared to definition of regenerative economics

LLM provider	Holistic & Dynamic System	Net Positive Impacts	Transformational Change	Summary of Key Deviations/gaps
Chat GPT	Strong: explicitly mentions systems thinking, interconnections, and long-term focus	Strong: Explicitly states “restore and renew”; includes restoration of ecosystems and equity	Weak: Lacks strong emphasis on transformational or deep structural change (mentions Indigenous knowledge, but not systemic overhaul)	Descriptive and thorough, but stops short of emphasizing transformational change as a necessity. More focused on principles and components than systemic improvement.
Grok	Moderate: Some holistic framing (mentions equity, sustainability, resilience) but lacks a systems-level dynamic structure	Strong: Clearly aims at positive outcomes – “enhance,” “regenerate,” “long-term prosperity”	Weak: Suggests improvements, but does not explicitly mention fundamental shifts or transformation	Short and clear, but omits both the system's dynamic nature and the transformational change component of the core definition.
Copilot	Strong: Mentions systems thinking, interconnectedness, local economies, and “self-renewing systems”	Strong: Emphasizes “restore and enhance” and “doing more good,” not just harm reduction	Moderate: Describes a “shift” and “healing,” but transformation remains more implied than explicit	Closest match overall (to core definition). It conveys directional change, but avoids the word transformational.

A possible link to transformative change could be found in prompting/asking for the future. The second prompt directs attention to the fields of the future for regenerative economics.

ii. What fields have the most potential for a regenerative economy in the future?

When we asked the LLM which could be the most promising fields in regenerative economy in the future, we got a long range of answers, and although not all suggestions were similar, there is a striking resemblance of where the future lies according to AI. The LLM output suggests agriculture (of different kinds) as central to regenerative economics; and if we add ecosystem restoration/rewilding, green sustainable planning and blue economies (the latter not listed by copilot) it becomes clear that our use of the nature/environment is seen as the cornerstone of the concept. Energy and economics (wide definition) belong to groups of fields that are seen as vital, but for fields related to tourism, education, behavior, health and social innovation not all of the LLM providers underscores its importance.

If we consider democratization, and governance few or no suggestions are given. Copilot suggests that decentralization of governance is important but gives no clear reason to why centralization should be more harmful for regenerative economics. The results rather seem to underline what we learned from querying the definition, i.e., that the transformative change across/between individuals, organizations and societies are absent also when defining future fields. This is of great interest, since the definitions and future outlooks direct most of the attention to technical or practical applications, but fails to see the role of governance.

Table 2., LLM responses for the identification of future fields of regenerative economics

Field	ChatGPT	Grok	Copilot
Regenerative Agriculture / Food Systems	transformation of global food systems, improving soil health, CO2 reduction	Agroforestry, permaculture and food sovereignty	Suggest as most important field and as the cornerstone of regeneration, biodiversity and soil health
Renewable Energy / Decentralized Energy	Focus on clean, distributed and local controlled energy	Focused on the technologies such as solar, wind, smart grids and battery storage	Focus on environmentally friendly energy distributions such as solar microgrids and the aim to reduce environmental harm
Circular Economy / Materials Innovation	Focus on zero waste and reuse	Biodegradable packaging and industrial symbiosis (i.e. resources sharing, co-location, etc.) in focus	Textile oriented with potential for circular fashion and regenerative textiles
Ecosystem Restoration / Rewilding	underlines rewilding, wetland restoration and green infrastructure	underlines 350M ha goal (Bonn challenge to restore degraded land), biodiversity and carbon sinks	Focus on restoring habitats and on nature-positive tourism
Green / Sustainable Urban Planning	planning focused on zero-waste cities, retrofitting and (energy) passive design	Planning focus on greening and PT including urban forests, public transit, green buildings	planning with Biophilic cities and net-zero buildings in focus
Sustainable Finance / Regenerative Capital	Local currencies and regenerative finance are listed as important	More global focus including green bonds, carbon markets and wealth-building	global perspective with focus on investments in ecological and social well-being

Blue Economy / Ocean Restoration	Kelp farming and marine permaculture (farming while mimicking local marine conditions)	focus on vulnerable areas such as mangroves, reefs and on coastal livelihoods	–
Tech / Data for Regeneration	Technology focused with AI, IoT, blockchain and ecological governance	Underlines AI-powered restoration and monitoring	Underlines local smart systems and decentralized decision-making
Health & Care Economies	Underlines preventative healthcare and food as medicine	–	–
Education & Behavioral Change	Focus on mindset shifts and regenerative design training	–	–
Tourism / Regenerative Travel	–	–	Only LLM that highlights tourism, and suggests importance of eco-tourism that improves ecosystems and culture
Social Innovation / Community Economies	–	indicate the potential for time banks and community land trusts	highlights the local community with cooperatives and decentralized governance
Fashion / Textiles	–	–	Circular models and regenerative cotton
Construction / Built Environment	–	–	Circular methods in construction and the creation of carbon-sink buildings

2. Conclusions

AI/LLM is a tool of growing importance for the understanding of our society simply because AI/LLM is used by students, stakeholders and researchers when looking for a quick summary of topics. The responses are quick and well composed and often convincing in its message, but are we at risk of missing out on important facts, if we rely too much on LLM for our information generation. In this small study we have shown that when asking AI to define regenerative economics, we are getting long and convincing answers, but the answers lack parts which are the defining fabric of regenerative economics if we turn to the scientific definition. In the example where we are defining regenerative economy using LLM, the definition lacked the transformative change of organizations and individuals and focused more on technical or environmental factors.

We fear that the accessible and often pedagogical output of Ai/LLM may alter our understanding of this and other fields, and that the curation of information using

LLM as a tool happens on the basis of comprehension from a probability/AI perspective and not on the basis of dynamics of the community that drives the field forward. This means that over-time development, critique and adaptation to changes caused by disruptive technologies, modernization, political change or similar, fails to be recognized.

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Appendix

Responses from LLM providers when prompted: Define regenerative economy.

Chat GPT

A regenerative economy is an economic system designed to restore and renew natural, social, and human capital, rather than depleting or exploiting them. It goes beyond sustainability by actively improving ecosystems, communities, and well-being through its operations.

Key characteristics include:

Circularity: Waste is minimized or eliminated by reusing, recycling, and designing products and systems that keep materials in use.

Restoration: Economic activity contributes to the regeneration of ecosystems, such as soil, health, biodiversity, and clean water.

Equity: Social systems are structured to support inclusiveness, resilience, and the fair distribution of resources and opportunities.

Systems thinking: A holistic approach considers the interconnections between economy, environment, and society.

Long-term focus: Prioritizes resilience, adaptability, and the health of future generations over short-term profits.

A regenerative economy often draws on principles from Indigenous knowledge systems, ecological economics, and the doughnut economics or bioregionalism frameworks.

Grok

A regenerative economy is an economic system designed to restore and enhance natural and social systems rather than deplete them. It prioritizes sustainability, equity, and resilience by fostering practices that regenerate resources, ecosystems, and communities. Unlike extractive economies, it focuses on circular processes, renewable energy, local production, and fair distribution of wealth, aiming to create long-term prosperity while addressing environmental and social challenges.

Microsoft AI Copilot

A regenerative economy is an economic system designed not just to sustain, but to restore and enhance the natural, social, and economic capital it depends on. Unlike traditional models that often deplete resources in pursuit of growth, a regenerative economy aims to work in harmony with nature and communities, creating systems that are self-renewing and resilient over time.

Key features include:

Circular design: minimizing waste by reusing, recycling, and regenerating materials.

Regenerative agriculture: farming practices that restore soil health and biodiversity.

Local and place-based economies: emphasizing community well-being and ecological balance.

Systems thinking: recognizing the interconnectedness of ecological, social, and economic systems.

It's a shift from "doing less harm" to "doing more good." Think of it as moving from damage control to proactive healing—economically, socially, and environmentally.

KOMENTAR: POSTAVLJANJE PITANJA VEŠTAČKOJ INTELIGENCIJI O REGENERATIVNOJ EKONOMIJI

Apstrakt: Ovaj komentar proučava kako veštačka inteligencija i veliki jezički modeli (LLM) definišu koncept regenerativne ekonomije i upoređuje njihova tumačenja sa akademskom definicijom. Iako LLM modeli obuhvataju elemente kao što su sistemsko razmišljanje i neto pozitivni uticaji, čini se da izostavljaju transformacione promene koje su neophodne na nivou pojedinaca, organizacija i društava. Kroz komparativnu analizu odgovora ChatGPT-a, Groka i Copilot-a, ističemo snage i nedostatke u definicijama koje generišu AI alati. Nalazi otvaraju važna pitanja o pedagoškim implikacijama i rizicima oslanjanja na AI alate prilikom prenošenja složenih i evolutivnih akademskih koncepata.

Ključne reči: Regenerativna ekonomija, veštačka inteligencija, definicije, poređenje LLM modela.