

Modelling value exchange and performance dynamics in an entrepreneurial ecosystem

Agusta JONSDOTTIR

15879 Research seminar on system dynamics course, MIT

Personal problem, draft

April, 21st 2025

Entrepreneurial ecosystems thrive on collaboration, generating economic and social value beyond individual outputs. From a circular economy perspective, they enhance efficiency by fostering synergies, such as repurposing waste into resources (Ferasso et al., 2020; Hopkinson et al., 2018; Lewandowski, 2016). While they are increasingly recognized as enablers for circular economy transition (Berghuis et al., 2023; Kanda et al., 2021), their governance structure remains poorly understood, particularly at the micro-level where value is created, exchanged, and captured (Cosenz et al., 2024).

Existing approaches often emphasize macro-structural views, overlooking how firms interact and coordinate within ecosystems to implement circular economy principles (Colombo et al., 2019; Nave et al., 2024). This oversight is particularly problematic given the complex interdependencies among actors, which challenge the design of coherent strategies and the development of performance metrics that reflect dynamic, real-world collaboration. On how micro-level value exchanges drive performance and system resilience.

Despite growing interest in the circular potential of entrepreneurial ecosystems, there is limited empirical research. To address this gap, this study applies the value system approach to empirically examine the micro foundations of the Icelandic Ocean Cluster (IOC), aiming to develop a performance governance system that supports continuous learning, improves decision-making, and aligns ecosystem activities with circular economy objectives.

This study develops a system dynamics stock and flow model to quantify key performance indicators (KPIs) that capture the dynamic performance of the Icelandic Ocean Cluster (IOC). The model serves as a policy testing tool, offering IOC managers a structured view of how value is created, exchanged, and leveraged within the ecosystem. The IOC is the primary

agent in the model, with its activities forming the central reference point. The model's scope is the micro-foundations, or the activities performed by the IOC, supporting ecosystem value creation, with a 24-month time horizon, reflecting the typical managerial planning cycle. The value exchanges are mapped based on semi-structured interviews with key players within the IOC. Two research questions guide this work:

1. Which key performance indicators (KPIs) best capture the dynamic performance of the IOC?
2. How can system dynamic modelling be used to quantify and simulate these KPIs over time?

Key sources of systemic inertia that may reinforce or delay performance changes in the ecosystem include:

- Organizational capabilities (firm capabilities, motivation, attractiveness)
- Market dynamics (sales opportunities, product attributes, revenues),
- Relational capital (network, reputation)

Preliminary analysis of the CLD introduced in Figure 1 indicates multiple feedback mechanisms that would benefit from being quantified, which is the purpose of the model. The challenge is formulating the non-monetary values, and their complex relationships. Model calibration and sensitivity testing are then critical for testing the model.

References

- Berghuis, E., Loorbach, D., van Vulpen, A., Verkuijl, M., van Orden, C., & Greer, R. (2023). Coming together for transition? Entrepreneurial ecosystems for a circular economy. *International Review of Applied Economics*, 37(3), 372–388. <https://doi.org/10.1080/02692171.2023.2205111>
- Colombo, M. G., Dagnino, G. B., Lehmann, E. E., & Salmador, M. P. (2019). The governance of entrepreneurial ecosystems. *Small Business Economics*, 52(2), 419–428. <https://doi.org/10.1007/s11187-017-9952-9>
- Cosenz, F., Noto, G., & Cavallo, A. (2024). Understanding the Microfoundations of Entrepreneurial Ecosystems: Toward a Value-Based Method and Theory. *IEEE Transactions on Engineering Management*, 71, 7298–7310. <https://doi.org/10.1109/TEM.2023.3275097>
- Ferasso, M., Beliaeva, T., Kraus, S., Clauss, T., & Ribeiro-Soriano, D. (2020). Circular economy business models: The state of research and avenues ahead. *Business Strategy and the Environment*, 29(8), 3006–3024. <https://doi.org/10.1002/BSE.2554>
- Hopkinson, P., Zils, M., Hawkins, P., & Roper, S. (2018). Managing a Complex Global Circular Economy Business Model: Opportunities and Challenges: <https://doi.org/10.1177/0008125618764692>, 60(3), 71–94. <https://doi.org/10.1177/0008125618764692>
- Kanda, W., Geissdoerfer, M., & Hjelm, O. (2021). From circular business models to circular business ecosystems. *Business Strategy and the Environment*, 30(6), 2814–2829. <https://doi.org/10.1002/BSE.2895>
- Lewandowski, M. (2016). *sustainability Designing the Business Models for Circular Economy-Towards the Conceptual Framework*. <https://doi.org/10.3390/su8010043>
- Nave, E., Torres, P., Ana, , Querido, R., João, , Ferreira, J., & Fernandes, G. (2024). Entrepreneurial ecosystems governance: critical perspectives and steps forward. *The Journal of Technology Transfer*. <https://doi.org/10.1007/s10961-024-10172-9>

MIT OpenCourseWare
<https://ocw.mit.edu/>

15.879 Building Serious System Dynamics Models from Scratch
Spring 2025

For information about citing these materials or our Terms of Use, visit: <https://ocw.mit.edu/terms>.