Master of Sustainability
Capstone Research Project

THE UNIVERSITY OF SYDNEY

EXNOVATION IN SUSTAINABILITY TRANSITIONS:
A QUALITATIVE LITERATURE REVIEW OF CONCEPTUALISATIONS & CONTEXTUALISATION

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INTRODUCTION

Sustainability transitions research has traditionally prioritised **innovation**, focusing on introducing new technologies and practices (Havas et al., 2023) to tackle the current socio-ecological polycrisis (Scheffran, 2025). However, **innovation alone is insufficient**, as unsustainable systems often persist due to **structural lock-in** and **institutional inertia** (Kemp et al., 2007).

Meanwhile, **exnovation** has gained attention. Yet the exnovation literature remains ***fragmented***, with ***inconsistent terminology*** (e.g. phase-out, dismantling, decline) and ***limited conceptual clarity*** (Nashwan et al., 2026). To explore the gaps in the exnovation literature, this study adopts a **semi-systematic literature review** to explore how exnovation is conceptualised and contextualised.

OBJECTIVES

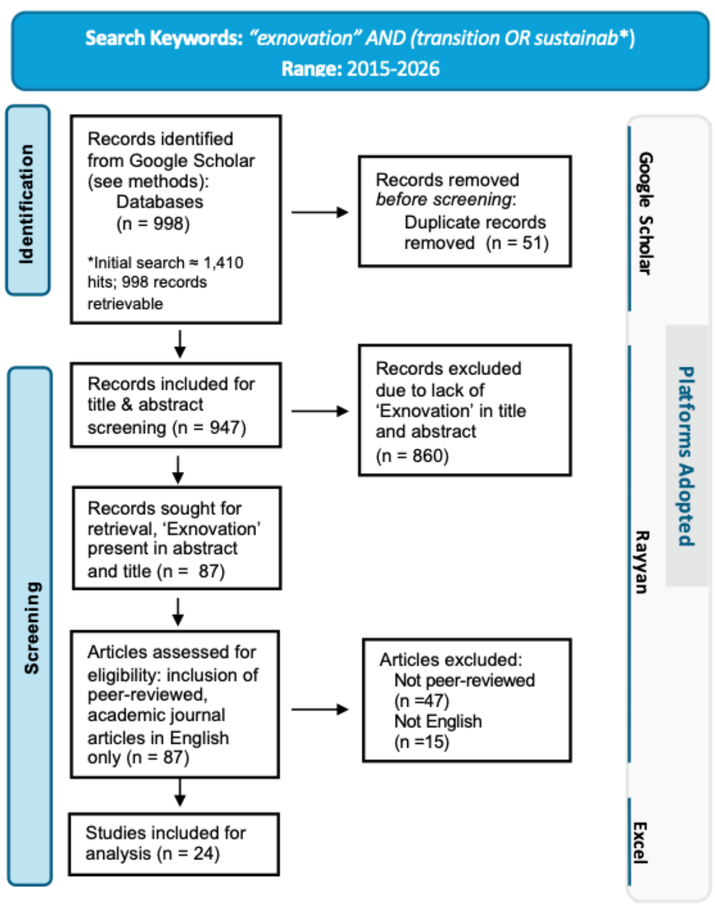
1. Explore **how exnovation is conceptualised in sustainability transitions** literature through thematic coding.
2. Identify **how exnovation is contextualised** across different domains and actors.
3. **Identify methodological and geographical** gaps that exist in the current exnovation literature.

METHODOLOGY

Review Design & Scope

- Semi-systematic review (Snyder, 2019)
- **Scope:** 2015*–March 2026 literature. The year 2015 coincides with milestones of international governance commitments (Kivimaa & Kern, 2016)

Search and Selection



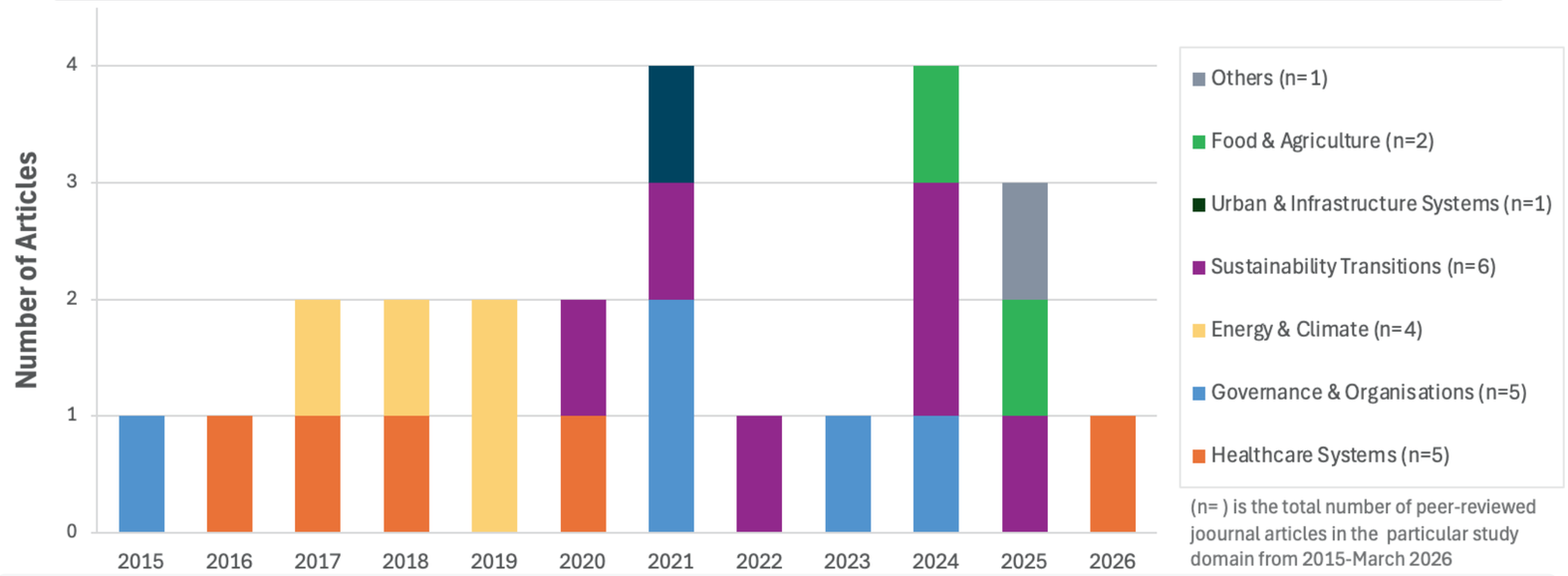
Analytical Approach

- The review combined:
  - **Inductive thematic coding** to identify **recurring patterns** (Braun & Clarke, 2006)
  - Thematic coding to synthesise **conceptual** and **analytical dimensions**

*September 2015: Sustainable Development Goals, December 2015: Paris Agreement

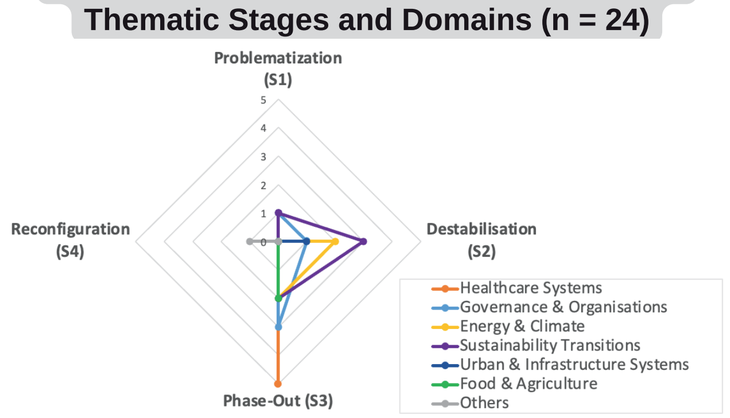
RESULTS & DISCUSSION

Figure 1. Temporal Distribution of Exnovation Literature by Primary Domains of Study (2015–2026)



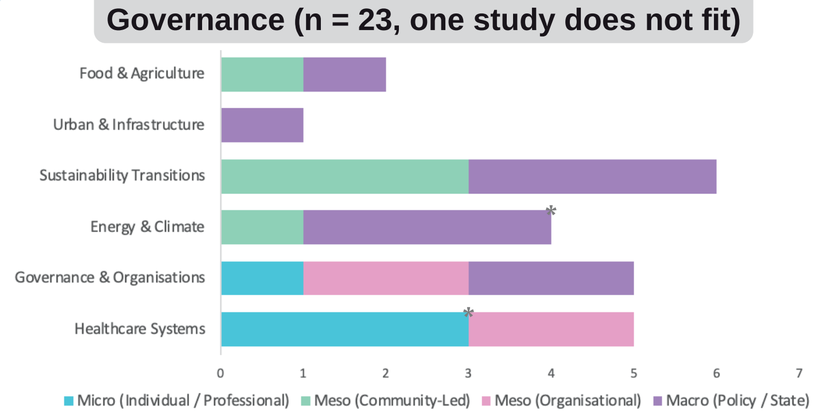
There has been **an increase in publications post-2020,** with **recent diversification beyond energy into governance and sustainability transitions,** while **overall volume remains limited and fragmented.**

Figure 2. Distribution of Exnovation Across Thematic Stages and Domains (n = 24)



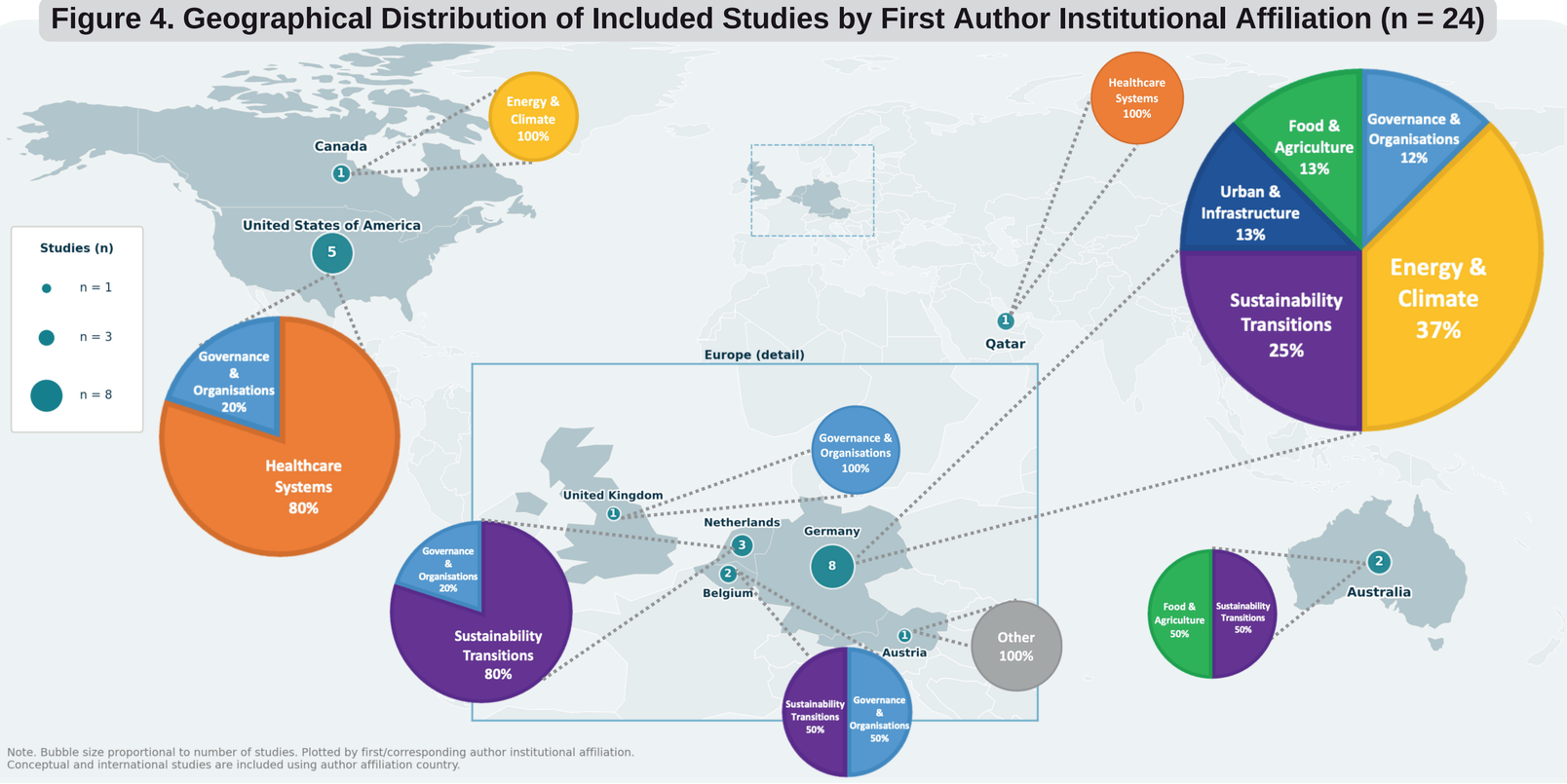
Exnovation can be synthesised into a **staged process (S1–S4)**; however, the literature is **heavily skewed toward later stages (destabilisation and phase-out)**, indicating a **predominantly reactive and fragmented conceptualisation**, with limited attention to early problematisation (Davidson, 2019; Hebinck et al., 2022).

Figure 3. Exnovation Across Domains and Governance (n = 23, one study does not fit)



Exnovation is primarily framed as a **meso-** and **macro-level governance**, with **limited representation of micro-level behavioural** actors, suggesting that it is **understood more as a systems and policy challenge** than an **individual-level transition**. Sectoral patterns show **strong clustering in energy and healthcare**, where **institutional and infrastructural lock-in are most visible**.

Figure 4. Geographical Distribution of Included Studies by First Author Institutional Affiliation (n = 24)



Note. Bubble size proportional to number of studies. Plotted by first/corresponding author institutional affiliation. Conceptual and international studies are included using author affiliation country.

The figure shows a **strong concentration in the Global North**, particularly in Europe, with **limited methodological diversity** and **Global South representation**, revealing **significant epistemic and contextual gaps** in current exnovation research. However, analogous dynamics are reflected in non-English literature under different terms (e.g., 系统可持续转型阻力; Kaizen), suggesting that exnovation may be **conceptually fragmented rather than absent** across linguistic contexts (Nashwan et al., 2026).

CONCLUSION

- Exnovation is a **staged process, not just a singular act of removal.** The process is **shaped by sector, actor, and context.**
- Governance appears to be context-dependent, with energy, food, and healthcare transitions requiring distinct interventions.
- Critically, the field remains conceptually and geographically narrow, and must **expand beyond the English-language**, **Global North scholarship** to capture parallel dynamics where unsustainable systems persist. Advancing sustainability transitions requires integrating exnovation as a core strategy, alongside innovation, with **greater sectoral sensitivity** and **global inclusivity**.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
Davidson, D. J. (2019). Exnovating for a renewable energy transition. *Nature Energy*, *4*(4), 254–256. https://doi.org/10.1038/s41560-019-0369-3
Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems. *Research Policy, 33*(6–7), 897–920. https://doi.org/10.1016/j.respol.2004.01.015
Havas, A., Schartinger, D., & Weber, K. M. (2023). Innovation studies, social innovation, and sustainability transitions research: From mutual ignorance towards an integrative perspective? *Environmental Innovation and Societal Transitions, 48*, 100754. https://doi.org/10.1016/j.eist.2023.100754
Hebinck, A., Diercks, G., Von Wirth, T., Beers, P. J., Barsties, L., Buchel, S., Greer, R., Van Steenbergen, F., & Loorbach, D. (2022). An actionable understanding of societal transitions: the X-curve framework. *Sustainability Science, 17*(3), 1009–1021. https://doi.org/10.1007/s11625-021-01084-w
Kemp, R., Loorbach, D., & Rotmans, J. (2007). Transition management as a model for managing processes of co-evolution towards sustainable development. *The International Journal of Sustainable Development & World Ecology, 14*(1), 78-91.
Kivimaa, P., & Kern, F. (2016). Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. *Research Policy, 45*(1), 205–217. https://doi.org/10.1016/j.respol.2015.09.008
Nashwan, A. J., Joy, G. V., Mannethodi, K., Kunjavara, J., Alhalaiqa, F., Alomari, A. M. A., & Abujaber, A. A. (2026). Exnovation: a Concept Analysis. *Nursing Open, 13*(1), e70349. https://doi.org/10.1002/nop2.70349
Scheffran, J. (2025). Systemic risks and governance of the global polycrisis in the Anthropocene: stability of the climate–conflict–migration–pandemic nexus. *Global Sustainability, 8*. https://doi.org/10.1017/sus.2025.10026
Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Reviewed Articles (n=24)

Thematic Coding

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SPECIAL THANKS TO
Master of Sustainability Capstone Team