

Paper Summary

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Title: Creating actionable knowledge one step at a time: An analytical framework for tracing systems and

Authors: Katharina Hölscher, Julia M. Wittmayer, Alfred Olfert, Martin Hirschnitz-Garbers, Jörg Walther, C

DOI: <https://doi.org/10.1016/j.eist.2022.11.007>

Year: 2023

Publication Type: Journal

Discipline/Domain: Sustainability Transitions / Environmental Studies

Subdomain/Topic: Actionable knowledge, niche innovations, coupled infrastructures, analytical framework

Eligibility: Eligible

Overall Relevance Score: 92

Operationalization Score: 88

Contains Definition of Actionability: Yes (explicit and implicit)

Contains Systematic Features/Dimensions: Yes

Contains Explainability: Yes (linked to understanding innovation dynamics and options for action)

Contains Interpretability: Yes (narrative/process tracing approach)

Contains Framework/Model: Yes (multi-dimensional analytical framework)

Operationalization Present: Yes (four-step analytical process with applied cases)

Primary Methodology: Mixed Methods (conceptual framework + applied case studies + qualitative interview

Study Context: German infrastructure innovation projects (energy, water, mobility, ICT)

Geographic/Institutional Context: Germany (national, regional, local policy and practice contexts)

Target Users/Stakeholders: Policy actors, practitioners, planners, utilities, infrastructure developers

Primary Contribution Type: Analytical framework for generating actionable knowledge in sustainability tra

CL: Yes — clarity in understanding pathways, contexts, and agency is positioned as essential for actiona

CR: Yes — contextual relevance embedded in system definition, system factors, and agency analysis

FE: Yes — feasibility linked to technical, institutional, and socio-cultural system factors

TI: Yes — timeliness addressed via sequencing of development moments and anticipation of opportunitie

EX: Yes — explainability achieved through narrative, process tracing, and explicit system–agency integra

GA: Yes — goal alignment via sustainability and transformative impact criteria

Reason if Not Eligible: N/A

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Creating actionable knowledge one step at a time: An analytical framework for tracing systems and agency

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****Subdomain/Topic:****

Actionable knowledge, niche innovations, coupled infrastructures, analytical frameworks

****Contextual Background:****

This paper is situated in sustainability transitions research, focusing on producing knowledge that both ex

****Geographic/Institutional Context:****

Germany; national ministries, federal agencies, municipalities, utilities, and infrastructure developers

****Target Users/Stakeholders:****

Policy-makers, planners, public utilities, infrastructure developers, practitioners in sustainability transitions

****Primary Methodology:****

Mixed Methods — conceptual framework design, applied case studies, qualitative interviews, document a

****Primary Contribution Type:****

A multi-dimensional, practice-oriented analytical framework for tracing niche innovation development path

General Summary of the Paper

The authors present a stepwise, iterative analytical framework that integrates system-centred and agency

Eligibility

Eligible for inclusion: ****Yes****

How Actionability is Understood

Actionable knowledge is “knowledge that supports actors’ understanding of how to create transformative

> “The generation of actionable knowledge ... can be supported through connecting system-centred and

> “Our premise was ... to offer an understanding of the complex dynamics of niche innovations ... and in

What Makes Something Actionable

- Integration of system and agency perspectives to reveal both complexity and options for action
- Clear identification of development pathways, contextual factors, and actor roles
- Linking insights to sustainability and transformative impact criteria
- Involving policy and practice actors for contextual relevance and uptake potential

How Actionability is Achieved / Operationalized

- **Framework/Approach Name:** Analytical framework for tracing systems and agency in niche innovation
- **Methods/Levers:** Process tracing, multi-level perspective (MLP), multi-actor perspective (MAP), multi
- **Operational Steps / Workflow:**
 1. Define system boundaries and elements
 2. Identify critical development moments
 3. Identify system factors influencing those moments
 4. Identify actors and activities
 5. Assess sustainability and transformative impact
- **Data & Measures:** Qualitative interviews, grey literature review, sustainability criteria matrix
- **Implementation Context:** German coupled infrastructure innovation projects

Dimensions and Attributes of Actionability (Authors' Perspective)

- **CL (Clarity):** Yes — understanding pathways, contexts, and roles is essential for actionability.
- **CR (Contextual Relevance):** Yes — system factors and actor roles are analysed in relation to the sp
- **FE (Feasibility):** Yes — addresses technical, institutional, and socio-cultural feasibility explicitly.
- **TI (Timeliness):** Yes — development moments mapped over time to identify opportunities and risks.
- **EX (Explainability):** Yes — narrative and visualisation of pathways aid comprehension.
- **GA (Goal Alignment):** Yes — explicitly linked to sustainability and transformative goals.
- **Other Dimensions Named by Authors:** Sustainability impact, transformative impact

Theoretical or Conceptual Foundations

- Multi-Level Perspective (MLP)

- Multi-Actor Perspective (MAP)
- Multi-Level Governance (MLG)
- Pathways concept (Leach et al., 2010)
- Agency capacities frameworks

Indicators or Metrics for Actionability

- Sustainability criteria (performance, resilience, resource efficiency, social/economic viability)
- Transformative impact (extent of regime challenge/shift)

Barriers and Enablers to Actionability

- **Barriers:** Conflicting regulations, institutional misalignment, technological immaturity, financial insecurity
- **Enablers:** Political leadership, aligned sustainability strategies, funding programmes, technical feasibility

Relation to Existing Literature

Builds on transition theories but addresses their limited operational utility for practice by integrating systems thinking

Summary

This paper develops and applies a multi-dimensional analytical framework to generate actionable knowledge

Scores

- **Overall Relevance Score:** 92 — Strong conceptual clarity on actionability, explicit integration of features
- **Operationalization Score:** 88 — Fully operationalised with clear steps, data collection methods, and indicators

Supporting Quotes from the Paper

- “Actionable knowledge ... supports actors’ understanding of how to create transformative change towards sustainability
- “The generation of actionable knowledge ... can be supported through connecting system-centred and actor-centred approaches
- “Our premise was ... to offer an understanding of the complex dynamics of niche innovations ... and in turn to support actors’ understanding of how to create transformative change towards sustainability

Actionability References to Other Papers

- Caniglia et al. (2020) — pluralistic, integrated approach to action-oriented knowledge
- Mach et al. (2020) — actionable knowledge and engagement
- Frantzeskaki & Rok (2018) — co-producing sustainability transitions knowledge

- Leach et al. (2010) — pathways concept in sustainability
- Geels & Schot (2007) — MLP in socio-technical transitions