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Process mapping for relevance – revisiting the sustainability opportunity study

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Abstract

Purpose of the paper: Any change initiative needs a clear scope and pre-defined indicators of progress and targets. Setting the scope can be an iterative process of selecting and reflecting critically on boundaries set for the change. In the complex case of innovation for improved sustainability performance in the Swedish cement industry, the lack of clear boundaries hinders progress. This paper draws from a process-based system model to explore if and how relevant boundaries can be derived through a process approach.

Methodology: Conceptual development of logic for identifying how process mapping can support the identification of relevant sustainability outcomes for organisations. Drawing from previous literature to derive a theory-informed schematic overview.

Main Findings: The use of a process approach contributes to the initial scoping of the system but needs to be complemented to specify the relevant system elements and interrelations that constitute the system structure enabling or hindering the identified processes.

Practical implications: The applied method for exploring, selecting and reflecting on system boundaries using a process approach can be used to guide the initial stage of various change initiatives.

Originality/value: This is an original contribution to the theoretical foundation upon which the sustainability opportunity study rests, clarifying the role and relations of process mapping for deriving relevant outcomes.

Type of paper: Conceptual paper

Keywords: System boundaries, processes, sustainability, opportunity study, sustainable development

1. Introduction

The pursuit of sustainability has become a pressing global imperative as societies strive to address the challenges posed by environmental degradation, social inequality, and economic instability. Organizations across various sectors are increasingly recognizing the need to adopt sustainable practices and develop innovative solutions to tackle these grand challenges. One key aspect of this endeavor is the identification and evaluation of sustainability opportunities within a defined system boundary. The process of selecting system boundaries for sustainability opportunity studies remains a complex and multidimensional task, often influenced by subjective judgments, stakeholder interests and contextual factors.

This paper aims to shed light on the importance of appreciating the system of processes for setting the system boundaries for a sustainability opportunity study. The selection of appropriate system boundaries is critical as it defines the scope, scale of analysis, determines the entities and interactions to be considered, and influence the outcomes of the study. Understanding the underlying connections between the system of processes and other relevant systems is essential for ensuring comprehensive and meaningful sustainability assessments.

RQ: How can an appreciation for a system of processes support the choices of system boundaries for a sustainability opportunity study?

2. Theory background

The idea of an sustainability opportunity study is inspired from a manual for the preparation of industrial feasibility studies released in 1991 by the united nations industrial development organization (UNIDO) (Behrens and Hawranek, 1991). In the manual the opportunity study is described as the first rough estimate done to check potential viability for a pre-feasibility study followed by a full feasibility study for any industrial project. The idea being that the initial round of exploration into a new case should use less resources but still give good enough indications whether the opportunity is worth further pursuit or should be left behind. This is reflected in the cost estimates for each type of study:

- Opportunity study cost approximately 0.2-1.0 per cent of total investment
- Pre-feasibility study cost approximately 0.25-1.0 per cent of total investment
- Feasibility study for small to medium-sized industrial projects cost approximately 1.0-3.0 per cent of total investment (Behrens and Hawranek, 1991, p. 39)

The sustainability opportunity study is based on the opportunity study by Isaksson (2015) which has three steps of diagnosing, analyzing and solving with the purpose of creating a sense of urgency for change. These steps of the opportunity study are combined with a common sense logic describing the process from understanding to leading change as understanding-defining-measuring-communicating-leading in (Isaksson and Rosvall, 2021), resulting in a 3-by-3 grid called the sustainability opportunity study. The latest development to the sustainability opportunity study suggests “*an approach for doing an sustainability opportunity study which is needed when an organization or process lacks relevant sustainability performance indicators*” - (Isaksson, Ramanathan and Rosvall, 2022, p. 1344). Here focus is on diagnosing and deriving relevant improvement potentials for organizations in relation to their sustainability performance.

Shifting the focus of opportunity studies from industrial development project to organizational sustainability projects entails a change in the procedure of conducting the study. The major change is in the challenge of understanding, defining and measuring sustainability improvement potential as compared with mainly an economic evaluation of the industrial

development project. However, the general goal of identifying opportunities for further exploration without extensive resources remain the same.

Sustainability is a concept burdened with ambiguity and interpretive flexibility. For the purpose of the sustainability opportunity study, sustainability is understood as an ideal dynamic state which can be temporarily measured as an aggregate of main outcome indicators for a certain system (Isaksson, Ramanathan and Rosvall, 2022). Sustainable development is understood as the continuous process of organizations in various forms to achieve the ideal state of sustainability. The ideal state is understood as a state of equilibrium where the outcome levels of main indicators are within defined limits. The dynamic nature of sustainability is a result of its evaluative character. Where the selection of which main indicators are to be included in the definition of the ideal state essentially is decided by each stakeholder. Finding universal consensus and agreement for how this ideal state should be defined is an ongoing struggle for many institutions and researchers. Reasons for this are similar to the nature of ‘grand challenges’ which are complex, interconnected and evaluative (Ferraro, Etzion and Gehman, 2015). Dealing with these characteristics of sustainability seems to be a major challenge for organizations (Isaksson and Rosvall, 2020; Isaksson *et al.*, 2022), and is a central part to the sustainability opportunity study.

The descriptions of complexity and interconnectedness stems from systems thinking where a system is a set of elements and a relation among these elements. Complexity relates to the difficulties in reliably being able to predict system behavior which stems from large number of elements and/or the nature of the relationships. E.g. non-linear relationships are much more difficult to predict than linear. The interconnectedness sets conditions for feedback loops which also makes prediction more difficult and thereby also control over the system behavior challenging. The evaluative nature refers to the relationship between stakeholders of sustainability in the system and their preferences for what is desirable and not, e.g. a local fishing tourism organization might value the health of the livestock of fish in the lake while an chemicals company might not and therefore release their toxic by-products into the lake.

Systems thinking is a field under the general area of ‘organizational management’, popularized by Senge’s (1990) bestselling book ‘The fifth discipline’. Flood (1999) expands on the system dynamics approach used by Senge and introduces the concepts of prismic thought and systemic appreciation as ways of dealing with the unknowable in his book ‘Rethinking the fifth discipline’. While Flood in many ways embrace the ideas of the learning organization put forward by Senge a key difference in their contribution to the management of organizations is the appreciation for complexity theory. While the sub-title of Senge’s book is ‘the art and practice of the learning organization’, Flood’s sub-title is ‘learning within the unknowable’.

“Complexity theory questions whether long term intended action is possible. It points out that the way things unfold is inherently unknowable to the human mind, emerging through spontaneous self-organisation originating from some distant detail, rather than advanced planning. The most we can do is to manage what is local, whilst appreciating the incomprehensibility of global complexity. Managing what is local entails continually considering outcomes that extend over a small number of interrelationships, very few stages of emergence, over only short periods of time into the future.” - (Flood, 1999, p. 90)

Accepting the fact that humans, even in organized groups, are not able to systematically map and plan for any change process beyond the local level has significant implications for how organizations deal with sustainability. The vast number of elements and their interrelated connections affecting the planetary health, measured with the planetary boundaries (Steffen *et al.*, 2015), serves as an example of how complex the tracing of cause-effect relationships looking for root causes to fix. The exercise of deriving sustainability outcomes, indicating organizational sustainability performance, forms part the materiality analysis, which belongs to the field of accounting and reporting sustainability (Jørgensen, Mjøs and Pedersen, 2021). The

vast amount of information needed and the value-based decision needed to derive materiality has led to an understanding of the exercise as more of an art than science (Garst, Maas and Suijs, 2022), indicating the challenges in deriving one true answer and risk of getting stuck in paralysis by analysis.

The diagnosing of the sustainability opportunity study aims to derive for the organization relevant sustainability outcomes that then can be assessed for potential improvement opportunities (Isaksson and Rosvall, 2021). To increase the relevance of the prioritized outcomes for the organization, two criteria can be introduced: feasibility and desirability (Checkland and Scholes, 1999, p. 52). Feasibility regards the organization's agency to make change happen in the larger value chain. Desirability regards the organizational ambitions towards sustainable development. With these criteria four spaces of possible process outcomes can be identified. The known and the unknown outcomes along the value chain the organization is part of. Within these two spaces two overlapping spaces of (1) outcomes that the organization has ambitions to change and (2) outcomes the organization has agency to change, create a Venn-diagram where the overlap within the known area would constitute the relevant outcomes for the organization, see figure 1. The remaining sections aim to highlight how an appreciation for the system of processes can support the identification these relevant outcomes.

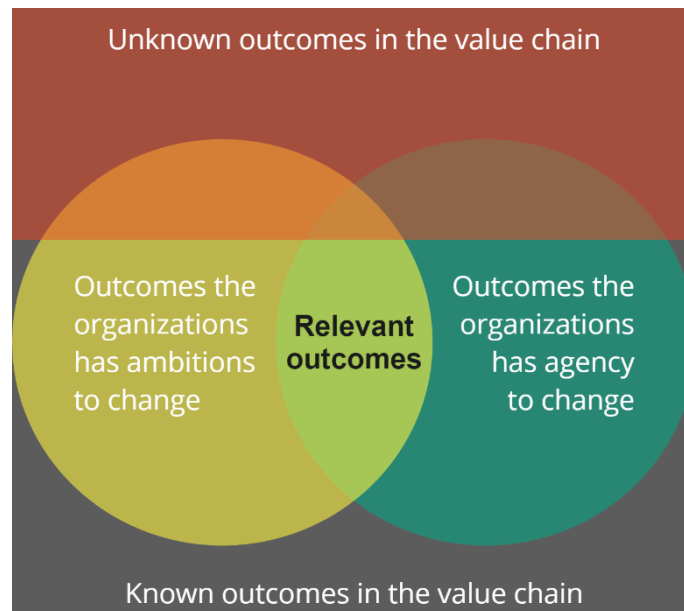


Figure 1: Quantity space for possible process outcomes in a system, initially separated by known and unknown outcomes, and further sliced with the Venn diagram distinguishing the relevant outcomes as the intersection of known, within the ambition and agency of the organisation.

3. Method

In contrast to theoretical papers that aim to propose new theories at the construct level (Cropanzano, 2009), conceptual papers, as emphasized by Gilson and Goldberg (2015), focus on establishing connections between different disciplines, providing insights at multiple levels, bridging existing theories, and expanding the scope of our thinking. Among the various types of conceptual papers, typology papers make valuable contributions through differentiation, which involves distinguishing, dimensionalizing, or categorizing the existing knowledge of the phenomenon, construct, or theory in question (Jaakkola, 2020).

According to Cornelissen (2017), typologies offer a multidimensional perspective on the subject being studied by grouping theoretical attributes or dimensions into distinct profiles,

which serve as coordinates for empirical investigations. In the context of this paper, the objective is to understand how appreciating the system of processes can facilitate the establishment of system boundaries when selecting relevant sustainability opportunities. Given the need to explore how the system of processes can support these activities, the typology approach is particularly suitable.

By employing a typology, we can effectively explore and differentiate the various dimensions of the system of processes that play a role in setting system boundaries. This enables us to identify patterns, establish categories, and gain meaningful insights into how the system of processes can guide the selection of relevant sustainability opportunities.

4. Results

This section will review four systems that (Flood, 1999) derives as key for deepening systemic appreciation; system of processes, system of structures, system of meaning and system of power. “*Systemic thinking [...] treats each of the four categories with equal concern*” (Flood, 1999, p. 95).

The idea is to position a focus on processes in relation to the three other systems for the continued development of the procedure to derive relevant outcomes in the diagnosing stage of the sustainability opportunity study.

System of processes

The Diagnosing stage should include the materiality analysis and this should be clearly visualized in a process map. The visualization should include main activities along the entire value chain from cradle to grave. This is part of the first window of the systemic appreciation where focus is on processes. Previous development of the sustainable opportunity study suggests the use of a process-based system model for mapping such main processes in the value chain (Isaksson, Ramanathan and Rosvall, 2022). In this generic process model a process is defined as “a network of activities that, by the use of resources, repeatedly converts an input to an output for stakeholders” - (Isaksson, 2006, p. 634). This initial mapping includes not only the processes but also process measurements for each of the main processes along the entire value chain. The process measurements are inputs, outputs and outcomes. Here output is the direct result of the process while the outcome is the interpretation of stakeholders of the output and expressed as a level of satisfaction. Each main process therefore needs a set of identified stakeholders and some idea of their perceived interpretation of process output. Depending on the scope of the value chain the resulting system of processes can be beyond the locality criteria of complexity theory and thereby a number of unknown system outcomes are present in the system even after the mapping. At this stage a materiality analysis could be conducted based on a scheme for prioritizing among the identified stakeholder outcomes to derive those that are most urgent to improve.

System of structure

The system of structure is the second window of systemic appreciation by Flood (1999). With a focus on actors, their agency and ambitions the system of structure can be understood as a network of interrelated actors that have varying capacity to affect each other. The system of structure is understood here as the enabling context that the system of processes is embedded in and dependent on. Any change in the system of processes is therefore a result of a change in the system of structure.

The concept of agency is here based on the typology for power in transitions where the derived definition for power as “*the capacity of actors to mobilize resources to realize a certain goal*” - (Avelino, 2011, p. 69). The notion of power is here actor-based and the agency of an

actor is therefore a result of its capacity to mobilize resources to realize a certain goal. The conditions for agency are described as the willingness, the access to resources, the strategies and the skills of the actor (ibid). Willingness relates to the desirability criteria while the access to resources, the strategies and skills of an organization relates to the feasibility of change for improved system outcomes. Resources are used to enable processes and is a core part of the system of structure that condition process results.

System of meaning

The third window, system of meaning, deals with the concept of willingness and desirability. When organizations are described as systems they are often assumed to have a purpose, understood as purposeful systems (Ackoff and Emery, 1972). The purpose of the organization looking to conduct a sustainability opportunity study will inform the level of ambition towards sustainable development in the value chain it is part of. Here the purpose informs about what is desirable for the organization which in turns motivate the willingness to act. A tentative classification for such levels of ambitions for certain sustainability outcomes are:

- (1) a passive approach, wherein "dilution is the solution" is the motto,
- (2) a reactive approach, which involves addressing environmental problems as a cost through end-of-pipe solutions,
- (3) a preventive approach, wherein pollution prevention and cleaner production become recognized as potential competitive advantages,
- (4) a proactive approach, which involves improving products by applying a life-cycle management perspective, and finally
- (5) a systemic approach, which embraces complexity and systems thinking and integrates sustainability initiatives into company strategy (Schulte, 2021).

System of power

In a system of actors, the power relations among them have been described based on three types of relations: power ‘over’, ‘more/less’ power than, and ‘different’ power to. Based on the nature of the relation between actor A and B, nine typical manifestations are described in table 1.

Table 1: Typology of power relations from (Avelino, 2011, p. 75) table 8.

Type of relation	Manifestation of power relations		
Power ‘over’	A depends on B but B also depends on A -> A and B have power over each other	A depends on B but B does not depend on A -> B has power over A	A and B do not depend on each other -> A and B have no power over each other
	Mutual dependence	One-sided dependence	Independence
‘More / less’ power to	A exercises more power than B, but A and B have similar, collective goals	A exercise more power than B, while A and B have mutually exclusive goals	A exercise more power than B, A and B have independent co-existent goals
	Cooperation	Competition	Co-existence
‘Different’ power to	A’s and B’s different power exercises enable and support one another	A’s and B’s different power exercises restrict, resist or disrupt one another	A’s and B’s different power exercises do not (significantly) affect one another
	Synergy	Antagonism	Neutrality

Connecting the four windows for deriving relevant outcomes

Based on the two introduced criteria for relevance of the larger quantity space of process outcomes in the value chain of an organization, the four windows of focus connect differently. The desired output from the procedure of diagnosing in the sustainability opportunity study is a set of process outcomes that are relevant for the organization. For which the organization can decide if further analysis should be conducted before initiating change projects for improving organizational sustainability performance. The two criteria for relevance, desirability and feasibility are through this analysis informed by the window of meaning and the window of power respectively. The window of structure informs the actor-network map that describes the system actors related to the identified main processes along the value chain, creating the context in which the organizational agency can be derived and understood. The process window informs both the process map of main processes along the value chain as well as the management and support processes that supports and enable the main processes. Beyond the four windows with theoretical support for the procedure of identifying relevant outcomes there is a need for a stakeholder theory that informs the process outcome map with the operationalization from local and global stakeholder needs to perceived process outcome. The relations described here are visualized in the scheme in figure 2.

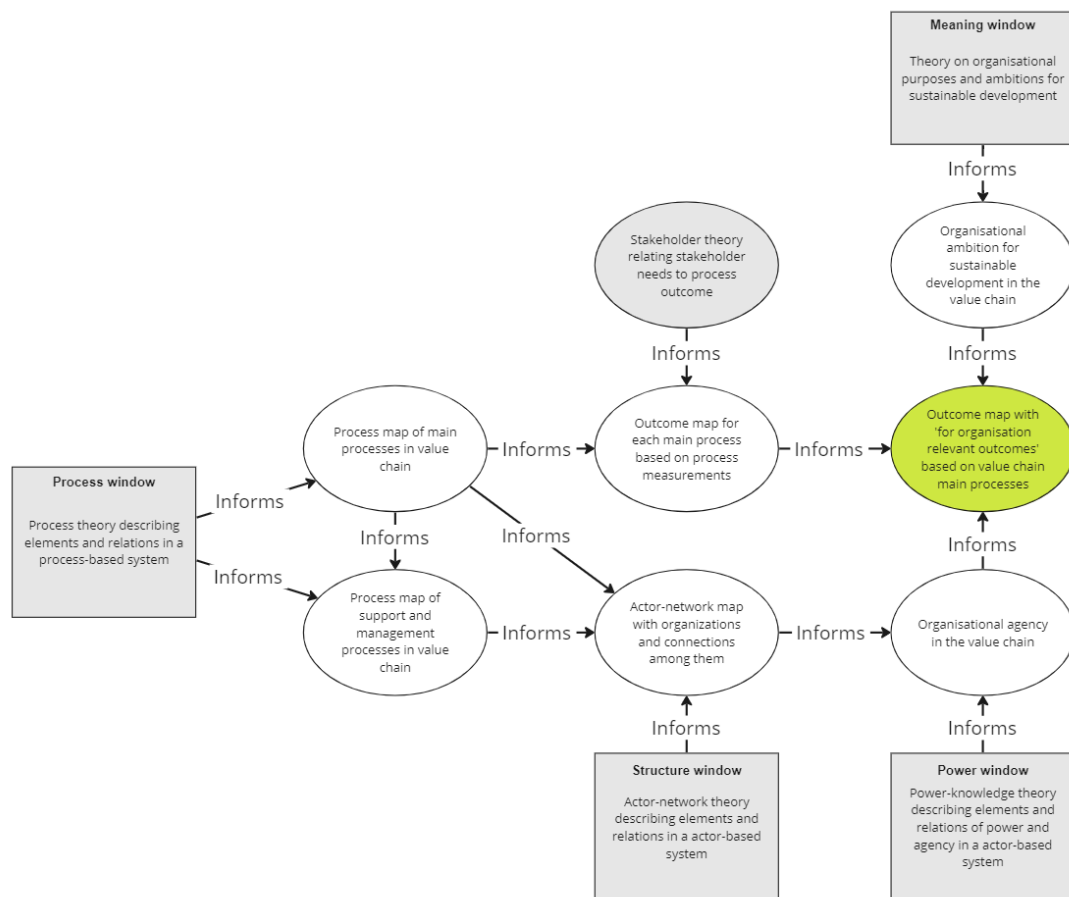


Figure 2: Schematic overview of typology for how the four windows of systemic appreciation informs and support the identification of relevant sustainability outcomes for organisations.

4 Discussion

The schematic in figure 2 rests on an assumption of organizational willingness to become leader for sustainable development and take responsibility for the process outcomes in their value chains that are beyond the contemporary regulations and government enforced policies. This assumption is motivated by the fact that the political system seems unable to break from the unsustainable system designs currently threatening life on the planet as we know it. The level of bureaucracy embedded in our democratic institutions seem to hinder and slow down the acutely needed change in our value-creating systems. This is why certain organizations are stepping up to the task and driving the transition towards sustainability, and hopefully their efforts are rewarded by their customers and other stakeholders.

Comparing the schematic for how processes can support the diagnosing procedure in the sustainability opportunity study with previous results a few changes can be noted. The previously suggested procedure includes the steps described in table 2.

Table 2: The proposed matrix for understanding, defining, measuring in diagnosing from table 8 in (Isaksson, Ramanathan and Rosvall, 2022).

	Understanding	Defining	Measuring
Diagnosing	Scope, using value chain from cradle to grave by defining input, output and business idea of the studied business	Based on the Pareto principle define the vital few stakeholders, value needs and harms caused	Measure sustainability as a state and sustainable development as change
	Identifying main sustainability stakeholders, their value needs and the harms they are subjected to by in the value chain with focus on climate biodiversity and poverty as well as any other significant harm as identified with the four sustainability principles	Focus on people and planet needs and convert this to a proposed definition that can be operationalized	Identify value and harm indicators – the KPIs (y-values) that can be used to describe current sustainability and the sustainability performance over time Value and harm are expressed in terms of impacts on people, the planet and profit
	Defining the qualitative improvement potential as the difference between possible and/or required performance and current performance		KPIs should be expressed in absolute and relative terms Assess the quantitative improvement potential for chosen y-values in terms of level and rate of change

In the guidelines from table 2 the focus is on processes and process measurements without any reference to how relevance for the organization can be distinguished. The main contribution in this paper is therefore the introduction of the feasibility and desirability criteria for identifying relevant process outcomes. Further the schematic connecting of the four windows of systemic appreciation to the desired output of identified relevant process outcomes complements the previous approach where it has mainly been a focus on the system of processes combined with an approach of focus on climate, biodiversity and poverty combined with the pareto principle for deriving the process outcomes in focus. The current method would consider the ambition of the organization regarding sustainable development prior to narrowing the focus to climate, biodiversity and poverty. This could however become the focus depending on what stakeholder theory for sustainability outcomes and the level of ambition the organization has towards sustainable development.

The current schematic is a first conceptual model based on systems thinking as described (Flood, 1999). Further exploration will be conducted by attempting to create the system maps informed by the four windows and the stakeholder theory as suggested by the developed schematic in this paper. The initial idea for the sustainability opportunity study, deriving relevant opportunities for sustainability improvement for organizations while using only limited resources, guides the criteria for success in the continued development of the sustainability opportunity study. Where focus should be on the support the method can provide to an organization conducting initial exploration for opportunities to improve their sustainability performance.

5 Conclusion

This conceptual paper sets out to explore the question: How can an appreciation for a system of processes support the process of selecting system boundaries for a sustainability opportunity study? The conclusion is that the system of processes directly informs the overall set of process outcomes that could be considered by an organization searching for sustainability opportunities. Further, through the introduction of two criteria for relevance for the diagnosing of relevant sustainability outcomes the appreciation for process has another indirect contribution. The mapping of main, support and management processes will set the scene from where the actors in the network of actors that provide the structure for the processes can be derived. This network of actors provides the map in which the agency of the organization is assessed which in turn helps determine what sustainability outcomes that are relevant in combination with the organization-internal ambition for sustainable development in the process system. An appreciation for processes is here understood as core, alongside an appreciation for the system of structure, the system of meaning and the system of power in terms of deriving relevant sustainability outcomes to be considered as potential sustainability opportunities.

In summary, this paper aligns with the conceptual approach of linking disciplines, providing multi-level insights, and expanding existing theories. By employing a typology, we explore how the system of processes can support the establishment of system boundaries for selecting relevant sustainability opportunities. Through this investigation, we strive to deepen the understanding of the role played by the system of processes in sustainability studies, fostering more informed decision-making and promoting effective sustainability strategies.

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