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Article

From Neglect to Resonance? — The Twin Transition and Luhmann's Legacy

Margit Neisig[1],*

[1]Department of Social Sciences and Business, Roskilde University, 4000 Roskilde, Denmark
*Correspondence: neisig@ruc.dk (Margit Neisig)
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Abstract

Luhmann's theory of ecological communication examines how modern society addresses climate and ecological challenges through its functionally differentiated structure. Even though the functionally differentiation enables society to manage complexity, it also leads to challenges in addressing cross-cutting issues like climate and ecological concerns. This has resulted in the neglect of such problems, as no single subsystem, neither functional nor organizational systems, is equipped to address ecological concerns comprehensively. Luhmann suggests that society's response to ecological challenges depends on the ability of these subsystems to adapt their communication processes to resonate with ecological considerations. The article highlights the importance of the reflective capacity, linked to Luhmann's concept of observation, semantics and communication. It discusses if the Twin Transition, since Luhmann passed away, has changed the recurrent criticism about modern society's neglect, and what it means for organizations, especially small and medium-sized enterprises (SMEs). The article finds that important issues related to observation, reflection and semantics have changed, but the theme regarding neglect is still relevant. The article also discusses an intervention strategy based on a digital learning platform and engaged scholarship in a regional polycentric network. The article finds that it demonstrates potential regional impact on inclusion of challenged SMEs, but to achieve broader European effects, such initiatives must, however, be scaled up and tailored to the specific contexts across Europe.

Keywords: the modern differentiated society; Luhmann's criticism; functional systems' neglect; included/excluded as meta coding; Twin Transition; change of observation; reflection and semantics; digital learning platform; small and medium sized enterprises
JEL: D83, M10, O33, Q56, R50

1. Introduction

The term Twin Transition has entered the political discourse of the European Union (EU) by highlighting the potential synergies between the green and digital transitions. It focuses on the role digital technologies can play in fighting climate change and mitigating ecological damage (Diodato et al, 2023; European Commission, 2022a) and is thus a politically constructed concept intertwining ecological communication and digital technologies. However, the functional systems' neglect has been a recurring theme in Luhmann's critique of the modern society, — a theme he also underlined in his monograph about ecological communication (1989b) in which he explained that if the functional systems cannot resonate with ecological communication, they are unable to adjust their expectations and do not become 'irritated', meaning they fail to respond. Thus, as seen from a Luhmannian perspective, the concept of a "Twin Transition" easily render into these same challenges.

Luhmann had a rather negative perception of modern society's ability to adjust itself to become sustainable. Now, almost 30 years after Luhmann passed away, and about 40 years after he wrote his monograph about ecological communication (Luhmann, 1989b) it could seem that nothing has changed. Data reveals that the year 2024 was 1.6 °C warmer as a global average compared to the preindustrial temperature—surpassing the limits set in the Paris agreement (UNFCCC, 2015). This indicates that Luhmann's skepticism had good reasons, as neither the political, scientific nor the economic system has succeeded in resonating effectfully with climate communication and organizational decision-making has not succeeded in curbing the climate warming to keep the temperature as agreed.

SMEs may account for up to 60–70% of GHG emissions and industrial waste and lag larger companies in digitalization (OECD, 2021). SMEs are the predominant form of enterprise globally, accounting for approximately 99% of all firms in OECD countries, providing most of the employment, about 60% of jobs on average, and significantly contributing to value creation, generating 50–60% of value added. Addressing their role in the Twin Transition is essential, and understanding their requirements relative to the Twin Transition is important (Koirala, 2019). Many SMEs face challenges in the Twin Transition due to limited skills, time, and resources for digitalization as well as for a sustainable transformation (Hu et al, 2024). Despite this, the EU's political hope is, that SMEs can expedite their shift towards sustainable models by incorporating digital eco-innovations (Martínez-Peláez et al, 2023). Whether or not, this materializes may become essential for the ex- or inclusions of the various SMEs in the transformation process.

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In a critique of the modern society (Luhmann, 1997, p.76) Luhmann fears that the distinction of inclusion/exclusion could become a meta coding of the 21st century. He described this meta coding as linked to the functional systems' neglect of anything else, than their own coding. Therefore, persons, organizations etc. that do not meet the function systems' requirements are excluded by the various functional systems. Thus, the neglect by the functional systems has been a recurring theme in Luhmann's criticism of the modern society, and relevant to discuss also in the 21st century.

On the other hand, from a Luhmannian perspective, societal restructuring, new technology, and new semantics, e.g., related to sustainability and digitalization, co-evolve (Luhmann, 1980, 1981, 1989a, 1995a, 1998a, 2013). Semantics according to Luhmann (1980, p.19) is "*socially available sense, that is generalized in a higher level and relatively independent of specific situations*". This can, for example, include concepts, standards, reporting frameworks, models, tools, or measurements. Both structure, technology and semantics play a role in the feedback mechanisms regarding sustainability enhancing or complexity maintenance trade off, which is described by Valentinov (Valentinov, 2013, 2014, 2017). Valentinov describes feedback mechanisms from a social systems theoretical perspective as a trade-off between sustainability and internal complexity. The sustainability-enhancing mechanism reduces internal complexity to ensure long-term viability by simplifying a system's internal operations. In contrast, the complexity-maintenance mechanism increases the complexity of a system to handle diverse challenges but risks long-term sustainability issues due to higher resource demands and reduced sensibility towards the system's environments. Valentinov emphasizes the importance of balancing these mechanisms, as overemphasizing one can lead to system failures through either oversimplification or excessive complexity.

The coevolution of structure, technology and semantics also counts for the current Twin Transition. Therefore, it is worth revisiting if the Twin Transition could be about to change anything regarding the Luhmannian theme of neglect. The research question thus is, if the "Twin Transition" is changing the functional systems capacity to resonate with and become responsive to the ecological communication, and if the "Twin Transition" changes organizations observation, reflection and decision-making as well as semantics and the feedback mechanisms regarding sustainability enhancing or complexity maintenance trade off (Valentinov, 2013, 2014, 2017).

As SMEs account for a large share of organizations related to the economic system, and many are struggling to adapt to the Twin Transition, it is important also to ask if any interventions can make challenged SMEs included in this transformation.

The article is structured from a Luhmannian perspective to first explain the key concepts to understanding the Twin Transition. Next, it is explained how the Twin Transition seems to be changing both feedback mechanisms regarding sustainability enhancing or complexity maintenance trade off, semantics, and organizations' observation, reflection and decision-making.

Third, the article discusses if an intervention strategy enacted through engaged scholarship with a regional ongoing learning perspective may help challenged SMEs to be included in the Twin Transition. Finally, the article returns to the research question and ends to revisit if anything could be about to change the functional neglect that Luhmann criticized modern society for.

2. Understanding the Twin Transition from a Luhmannian Perspective

Initially, the green and digital transitions were treated as distinct processes. However, the 2022 Strategic Foresight Report by the European Commission (2022a), titled *"Twinning the Green and Digital Transitions in the New Geopolitical Context"*, examines the interplay between ecological sustainability and digital transformation within the evolving global landscape. It found key synergies but also tensions, and names action points to utilizing opportunities and mitigate risks associated with twinning the digital and green transitions. The report thus advises a pathway to creating more resilient, sustainable economies, with policies increasingly focusing on integrating digital tools to achieve climate and ecological goals.

Despite its potential, the Twin Transition is not without conflicts. Diodato et al (2023) discuss how digital technologies—like artificial intelligence, big data, and the Internet of Things—can create inequalities among high-skilled and low-skilled persons as well as along regional lines. Also, the resource intensiveness of digital technologies has been a theme of discussion. Particularly the focus has been on energy consumption for powering and water for cooling data centers. Wang et al (2023), nevertheless, show that digitalization has greater potential to support a sustainable transition in other sectors than the counter-effect for carbon emissions from the information and communication technology sector itself. This has previously been contested (Lange et al, 2020) and shown to be dependent on electrification of energy consumption as well as a shift to sustainable energy supplies. Also, it seems to depend on further development of energy efficient AI computer chips as well as of the telecommunication infrastructure.

A discussion based on Luhmann's legacy would rather ask to what extent the Twin Transition changes anything regarding the neglect versus resonance of the ecological communication (Luhmann, 1989b). This is closely related to the question of whether the Twin Transition seems to be changing societal feedback mechanisms, and organizations observation, reflection and decision-making.

Since Luhmann's monograph on ecological communication (1989b) political communication about ecology and climate has evolved, and new semantics has emerged. The European Green Deal, endorsed in 2020, aims for EU climate neutrality by 2050 (Fetting, 2020). It mandates corporate social responsibility, requiring economic actors to contribute to sustainability and human rights (European Commission et al, 2022b). New sustainability reporting standards, including the ESRS, CSRD, and CSDDD directives, demand comprehensive sustainability reporting and due diligence from large companies.

These new reporting directives represents a semantic displacement, which predominantly deal with the criticism of previous versions of sustainability reporting frameworks of being inconsistent neither with the SDGs nor across various standards, not mandatory, and not controlled by third parties (Neisig, 2023a; Betti et al, 2018; Eccles et al, 2020; Huck, 2019). Despite significant responsible investments, issues like non-standardized metrics and unreliable ratings have delayed SDG achievement, exacerbated by the Covid-19 pandemic (Macht et al, 2020; Pucker, 2021; Neisig, 2023a). This means, structural change coevolved with a shared semantic reservoir (Neisig, 2017, 2021, 2022, 2023a).

While SMEs are generally exempt, larger companies may pressure SMEs to comply, indirectly creating a requirement to comply. Thus, the driver for SMEs to learn more about ESG-reporting comes from the pressure (irritation) within the supply chains and from the market (Hanley et al, 2023). While digitalization in small and medium sized enterprises (SMEs) took a big leap forward driven by COVID-19 (Rupeika-Apoga et al, 2022), now a main driver seems to be sustainability (Philbin et al, 2022).

Furthermore, from 2027 the European Single Access Point (ESAP) is expected to be launched which will require the uploading of financial and sustainability reports, allowing many observers access to services using big data and AI for observing, analyzing, making financial and other decisions based on a new level of transparency (European Financial Data Space, n.d.). Again, the SMEs will not be mandated to use the ESAP, but pressure (irritation) for SMEs to be visible at the ESAP will come from banks, as banks are required to use the ESAP for their financial decision-making.

The aim of the ESAP is to create a forceful tool for the European Capital Market Union (CMU), which is in the making (European Financial Data Space, n.d.). The CMU will among other things provide SMEs and other businesses with the financing they need, while also helping Europe deliver its New Green Deal and digital agenda.

The new EU reporting framework enhances sustainability reporting through increased data requirements, standardization, and third-party audits, improving transparency and aligning sustainability metrics. This builds on to the next challenge facing many SMEs in in the Twin Transition,

to be aware of and able to use own and others business data. In the context of the Twin Transition, the emergence of EU's new ESG-reporting directives provides a semantic displacement from older types of ESG-reporting frameworks. The EU-generated new competency frameworks also represent new semantics to communicate about digital and sustainability competences, and as pointed out by Kitchin (2014, 2017), new technologies risk, furthermore, to generate epistemologies and biases when data-driven processes are used without critical reflection.

To understand the Twin Transition from a Luhmannian perspective requires understanding of how digitalization and sustainability transformation may change observations, feedback mechanisms and reflection.

3. Luhmann, the Twin Transition and the Concept of Observation

Central to Luhmann's theory is the concept of observation, which he divides into two types: self-observation and other-observation. Self-observation refers to the process by which a system reflects on itself using its own distinctions, operations, and criteria. This internal, reflexive monitoring allows the system to adapt and evolve while maintaining its identity. The system uses its internal codes to observe its own processes, ensuring operational closure and protecting its autopoiesis (i.e., self-regeneration) (Luhmann, 1995b, 2000b). In the context of the Twin Transition this implies that organizations may observe data from their own operation and reflect on these.

Other-observation, on the other hand, involves observing other systems or the environment. A system uses its internal distinctions to interpret external systems, creating an understanding of its own place relative to its environment including other systems. This type of observation is crucial for facilitation of communications probability to communication between systems while maintaining the system's internal coherence (Luhmann, 1995b, 2000b), and it is crucial for structural change. In the context of the Twin Transition, this implies, that organizations observe requirements from customers, suppliers, legal regulations, risks from the natural environments, ability to recruit employees with the perceived right competences, etc.

Self-and other-observation work together to help systems maintain their autopoiesis while being able to coevolve with external changes, ensuring their continued evolution in a complex world.

In regard to the Twin Transition, it is worth noting that the ESAP combined with the new sustainability reporting standards are making other-observation regarding sustainability much more digitalized, and transparent.

Luhmann further elaborates on different orders of observation. First-order observation involves directly perceiving objects or events without reflecting on the observation itself. Second-order observation reflects on who the observers making these observations are, and acknowl-

edges the perspectives and biases involved (Holmström, 2006; Luhmann, 1995b). Third-order observation, according to Luhmann (2013, p.328): *"does not differ in principles (but only in its reflectedness) from the position of second-order observation"*. Luhmann (2000a, 2013, p. 313, 328, 337) explains that third-order observations are grounded in reflectedness, where self-descriptions become a topic of self-descriptions. Thus, third-order observations go further than second-order observation only by applying *meta-reflection*. This multi-layered observation and reflection framework enhance communication, knowledge production, and adaptability within social systems.

As the complexity of society increases, and when advanced transition such as the Twin Transition evolves, competences in reflecting not only in first and second order, but also in third order become crucial, as well as to be able to communicate about these meta-reflections. Therefore, competency development and facilitation of knowledge sharing not only within an organization but also across supply-chains and at societal level is becoming an important theme in the Twin Transition (European Commission, 2020). Having access to competences with highly reflective skills become essential for not being excluded in the Twin Transition.

From a Luhmannian perspective, technology plays a pivotal role in knowledge production by mediating communication and creating mediated social interaction systems (Baecker, 2023a; van Lier and Hardjono, 2011; Tække, 2022a; Tække and Paulsen, 2022b).

Luhmann (2000b) also examined the impact of mass media on society and knowledge production. He delved into how media technologies influence the dissemination and perception of information, shaping societal knowledge. Also, in many occasions, Luhmann, discussed semantics impact on knowledge production and how knowledge is constructed (Luhmann, 1980, 1981, 1982, 1988, 1989a,b, 1990b, 1995a, 1998a,b, 2000a, 2012, 2013; Luhmann et al, 2022).

In the Twin Transition, technologies like artificial intelligence and machine learning contribute to complex knowledge production in social systems by analyzing vast data volumes and providing suggestions for decision making. Augmented and virtual reality enhance the possibilities of learning, as well as knowledge sharing among experts and new-comers or customers. Thus, such technologies both enhance systems' capabilities of self-observation and other-observation improving adaptability and responsiveness.

To be able to reflect on and to avoid pitfalls of inherited epistemologies and biases, and to be able to deal with all the tensions of the complexities, as well as to imaging changes of a company's business model in a way that are both sustainable and digital, require meta-reflective capabilities. Acquiring capabilities to perform such reflections needs both new competences and new semantics.

Luhmann extensively studied semantics from both a historical and empirical perspective (Neisig, 2022). His ideas are compiled in "The Making of Meaning" (Luhmann et al, 2022), based on Luhmann's four-volume series on semantics (Luhmann, 1980, 1981, 1989a, 1995a). An essential notion in Luhmann's theory is the coevolution of social structures and semantics, where meaning plays a central role. Semantics stabilizes social structures (systems) while also evolving continuously (Stichweh, 2006, 2016) and is essential for understanding the coevolutionary relationship between meaning and societal structures, for example in the context of the contemporary Twin Transition (Luhmann, 2013; Baecker, 2023b).

Semantics, according to Luhmann, is essential for enabling social systems to distinguish relevant from irrelevant information, guiding communication processes and facilitating the production of knowledge (Luhmann, 1980). Semantics evolve along with social systems, and these shifts allow systems to develop new knowledge frameworks. Moreover, the operational closure of subsystems ensures they process their own specific semantics, fostering complexity and autonomy in knowledge production (Roth and Schütz, 2015).

4. Engaged Scholarship Strategies: Including SMEs into the Twin Transition through Regional Learning Interventions

As pointed out by both Hu et al (2024) and Diodato et al (2023) inequalities seems to increase due to the Twin Transition both along regional and competency lines—regardless that sustainability also underlining inclusiveness. Even though SMEs are only indirectly affected by the EU legislation and can voluntarily report and use simplified standards, the question of how not to exclude and to avoid overburdening the SMEs, in the strive to reach a Twin Transition is highly important–especially in regions lagging national averages on several dimensions (income, education, jobs etc.).

The intervention strategy of a project conducted in the South Baltic Interreg region is based on the engaged scholarship which is described from a Luhmannian perspective by Neisig (2021, 2023b). It is inspired by Design Thinking from the dschool (Stanford dschool, 2009; IDEO, 2015), which by Neisig (2021) is explained as a method fostering iterative communication and problem-solving allowing for a structured way of enabling various system participants (like different organizational departments or stakeholders) to perform interaction communication with a design team engaged in designing an intervention. In Neisig (2023b) the method is added one more layer—working backwards from the future.

From a social systems theoretical perspective, this intervention strategy represents an ongoing learning process in a broad polycentric network linked by digital technology and an evolving shared semantic reservoir. Also,

the intervention strategy emphasizes developing metacognitive skills to manage complex problems. Metacognitive skills, encompassing third-order observations and reflections, are crucial for mitigating the tensions within the semantics, and select a pathway through "grey tones" of distinctions (Roth, 2019, 2023). Teubner (1993) defined a polycentric network to describe a decentralized, dynamic network where multiple, autonomous actors or subsystems (such as organizations, institutions, or legal entities) structurally couple with each other without a central authority. These networks are characterized by self-regulation, and mutual adjustment, meaning the subsystems remain operationally closed yet structurally coupled. He escribes (Teubner, 1993) that a polycentric network can get emergent properties as a higher-order system, if the continuous flow of communication reinforces the overall system, giving rise to self-regulating and self-reproducing patterns at the higher level.

Given that the intervention aims to raise SMEs' awareness of their own business data and its potential utility in the transition process, it engages with the SMEs' self-referential processes and the way they observe and interpret both themselves and their environment in the context of their future development. The guiding distinction for the intervention strategy therefore is inclusion/exclusion of SMEs in the South Baltic region in the Twin Transition.

The South Baltic Interreg region is mainly rural, without major cities, and with many SMEs lagging their country averages in digitalization (Neisig, 2022; Skouby and Williams, 2019).

In the case of the Interreg project, a polycentric network of partner organizations is collaborating on creating a digital learning platform with lots of semantics about the Twin Transition. The project links up with associated partners such as chambers of commerce and industries, business hubs, educational institutions and public authorities. From these network nodes, the project is reaching out to SMEs in the South Baltic region. Thus, the project works as a polycentric network structurally coupled through a digital platform and a shared semantic reservoir related to SMEs and the Twin Transition.

5. Discussion and Conclusion

Concluding, based on Niklas Luhmann's theory of ecological communication, society's response to climate and ecological issues is mediated through its various functional systems—such as politics, law, economy, and education— each operating with its own distinct communication codes. Luhmann emphasizes that society can only address ecological problems through communication, as it is fundamentally a communication system. This means that societal reactions to climate and ecological challenges are inherently communicative, rather than direct actions.

A key concept in Luhmann's theory is "resonance", which describes how environmental issues, e.g., ecological, elicit responses within the functional subsystems. He warns of ecological challenges failing to generate sufficient concern or response within society's subsystems, leading to inadequate response to ecological dangers. Ecological and other so-called grand challenges may also in the end provoke excessive "irritation" overwhelming the subsystems and leading to unmanageable internal demand. Such situations are by Teubner (2011) in another context described as "A Constitutional Moment? The Logics of 'Hit the Bottom'".

Luhmann argues that ecological communication often produces both too little and too much resonance simultaneously, resulting in societal irritation without effectively addressing the issues at hand. In summary, Luhmann's theory suggests that society's ability to address climate and ecological challenges is constrained by the communicative structures of its subsystems. Effective ecological communication requires a balance that avoids both insufficient and excessive resonance, enabling society to respond appropriately to such issues.

Luhmann critiqued modern society by highlighting the potential dominance of the inclusion/exclusion distinction as a meta-coding in the 21st century. He argued that functional systems, such as the economy, politics, and education, operate based on their specific codes and tend to neglect aspects outside their operational focus. This self-referential nature can lead to the exclusion of individuals, organizations, or groups that do not conform to the systems' criteria, thereby marginalizing those who fail to meet their requirements. Luhmann's critique emphasizes the importance of addressing this systemic neglect to foster a more inclusive society.

Since Luhmann passed away, the proliferation of digital platforms and data analytics has enhanced organizations' capabilities to observe both internal operations and their external environments. Also, there is an increasing emphasis on developing skills and competencies of employees that enable organizations to critically assess their own decision-making and adapt to complex, changing environments. Thus, developing competencies in meta-reflection is increasingly in focus. Furthermore, new semantics has emerged such as concepts like "sustainability", "circular economy", and "corporate social responsibility" reflecting a shift in the semantics towards greater ecological awareness. However, these concepts, models and tools has had tensions and limitations which over time has led to semantic displacements.

These advancements have influenced knowledge production in society, enhancing feedback mechanisms and improving organizations' observation, reflection, and decision-making processes. Consequently, functional systems have become more attuned to ecological communication.

However, inclusion in the Twin Transition remains unequal. Despite EU policies emphasizing inclusiveness, dis-

parities persist due to differences in competencies and regional access to necessary resources. This suggests that, although progress has been made, the neglect by functional systems that Luhmann criticized continues to some extent.

The intervention strategy exemplified by the project, conducted in the South Baltic Interreg region through engaged scholarship, demonstrates potential regional impact. To achieve broader effects, such initiatives must, however, be scaled up and tailored to the specific contexts across Europe.

Availability of Data and Materials

Datasets used and/or analyzed for this study are available from the corresponding author upon appropriate request.

Author Contributions

Author is the sole author. The author has participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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