Sustainable value chains in an emergent context: The case of BIO-SUSHY coatings

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1. Introduction

Advancing insights into the impacts of polyfluorinated alkyl substances (PFAS) on the environment and human health have brought about a mix of increasing public pressure, strengthened activism, and new regulatory developments.[1] In this emergent but insecure context, the search for sustainable PFAS-replacements is becoming increasingly prominent. As this issue has gained momentum, R&I funding on the topic is currently on the rise. Furthermore, this also fits into a wider trend of different sustainability transitions, which has led to a general increase in attention for biobased, sustainable materials that are to be developed on the basis of Safe and Sustainable by Design (SSbD) approaches.

The Horizon Europe-funded BIO-SUSHY project can be seen as part of this development as it targets to develop three PFAS-free novel coatings that are envisioned to be applied in textile, food packaging, and cosmetic glass. The goal is to create high-quality, durable, sustainable composite coating solutions that can replace PFAS-based coatings. This contribution reports on important aspect of the project's strategy: the focus on promoting the resilience, sustainability, responsibility of the value chains in each of the different coating solutions. This contribution is meant to discuss the ways in which these value chains can be strengthened in the volatile context that we operate.

2. The volatile context of alternatives to PFAS coatings

There are a few specific developments that spur the insecurity that characterizes the establishment of sustainable value chains. First, especially in its commitment to include a wide group of stakeholders, it is pivotal to engage with current regulatory developments when it comes to new PFAS regulation under REACH. Crucially, there is an important role that the availability of alternatives play in the proposal. [2] While such a ban can on the one hand create demand for biobased coatings, the insecurity around its approval and implementation makes for a high level of insecurity. Second, PFAS awareness is currently rising, leading to a rather high level of controversy around the topic.[3] This is generally often driven by pollution scandals, while also a rising number of consumers and consumer organizations are becoming engaged with PFAS in consumer products. PFAS, in this regard is becoming an increasingly widespread household term with negative associations. While this is generally creating an opening for alternative solutions, it also creates a situation where different stakeholder groups can subscribe to different realities that increase tension, thus makes it difficult to come to a consensus on establishing progress towards new equilibria. Third, the development process of PFAS alternatives needs a continuous range of new impulses in order to become properly

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established. This particularly concerns investments that can push the technology readiness level of the coatings, in order to accelerate a convincing substitution of PFAS-based coatings. Fourth, in a global context there is a rising need for elevating the resilience of value chains. While on the one hand the challenges in this regard (e.g. energy insecurity, pressures on global trade, worries over international competitiveness) help to establish the conviction that there is a need for broader change in the coatings industry, it also contributes to a more volatile context.

3. Towards durable value chains

Important to note here is that was never going to be easy to establish an innovation framework that aims to include different elements towards more just, safe, socially robust, resilient, and sustainable value chains. In general, the aim to include such elements in the early stages of R&I processes, contains a certain commitment to grapple with highly contingent and controversial issues. Instead of discrediting this volatility, our aim is to mobilize it in order to help building visions towards stronger, more sustainable value chains.[4]

Therefore, in the BIO-SUSHY project we try to anticipate on the abovementioned insecurities in different ways. First, it is done by building in different kinds of analysis and methods that are explicitly meant to include a wide variety of stakeholders and keep an eye on a range of issues. This helps to maintain a strong focus on the resilience and sustainability of the value chains, early on in the process. In the BIO-SUSHY project we do this by combining the overarching goals of SSbD development with a quadruple helix approach to the understanding of the innovation ecosystem. Second, a useful way to anticipate uncertainties is to gain a clear and neutral overview of the controversies that play a role for the relevant value chains. Not only does this help to understand the context, but it also is useful way of anticipating the possibility of change in the different value chains. Third, a good way to embed different insecurities in their wider context is by clear understanding of the broader trends in which the innovation ecosystem is embedded. In BIO-SUSHY we focus on understanding environmental issues and public health around PFAS to gain a better insight into the potential of biobased coatings. Furthermore, in direct relation to that we have studied the social setting and issues around public trust. Combined with that we also closely monitor regulatory developments as well as general trends in the chemicals industry when it comes to biobased materials and the potential for large scale transformative innovation. Fifth and final, we focus on the concept of interdisciplinarity as a basis for innovative approaches. This is mainly manifested through looking at different methods that can be combined to come to actionable solutions. Prominent examples from the BIO-SUSHY project include combining (Social) Life Cycle Assessment (SLCA & LCA) with co-design approaches and issues around social acceptance in the different value chains. Another example can be found in the way computational tools for SSbD can be combined with approaches focused on stakeholder involvement.

4. Conclusions

Finding replacements for PFAS-based coatings is inevitably linked to a range of challenges. From challenges in terms of quality of the coatings, to regulatory developments, to industry trends, to consumer preferences. Nevertheless, with the right focus it is possible to contribute to the right mix of innovations and measures in order to come to more sustainable solutions that increase the well-being of many.

5. References

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