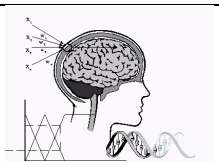
International

Innovation in Knowledge Based and Intelligent Engineering Systems



INVITED SESSION SUMMARY

Title of Session:
Circularity of critical raw materials (CRMs) as means for resilience and sustainability

Name, Title and Affiliation of Chair:
Anna Aminoff, Associate Professor in Supply Chain Management and Social Responsibility, Hanken School of Economics
Katri Valkokari, Research Manager in Foresight and Data Economy VTT Technical Research Centre of Finland Ltd

Details of Session (including aim and scope):

In the early 2000s the supply risks gained more attention in the EU, and since then European Commission have developed public policies aiming to secure the availability of Critical Raw materials (CRMs). CRMs, pivotal in sectors such as clean energy, defence, healthcare, and electronics, are identified based on potential supply risks, limited substitutes, and significant economic importance (Regulation (EU) 2024/1252). The growing demand for clean technologies is foreseen to drive increased demand for focal CRMs. The repercussions of supply disruptions in these materials are profound, impacting firms, consumers, and economies at large, with supply constraints characterized by both high probability and high impact.

Mitigating the risks associated with CRMs involves adopting circular economy (CE) strategies in supply chains to reduce the overall environmental impact and material use, while increasing the efficient use of CRMs through measures related e.g. to design, repair, reuse, recovery, and recycling. The transition from a linear to a circular economy is systemic and necessitates the involvement of multiple actors in a complex setting.

Embedding circular principles into CRM management is a critical enabler of resilience across different levels. At the **company level**, circular strategies help firms mitigate supply chain risks, reduce dependency on volatile markets, fulfil regulatory requirements, improve efficiency, stabilize production costs, and respond to customer demands. At the **supply chain level**, fostering collaboration between suppliers, manufacturers, and recyclers enhances adaptability to disruptions, improves resource efficiency, and ensures continuity in the availability of essential materials. At the **societal level**, the adoption of circular practices contributes to long-term resource security, supports economic stability, and reduces environmental impacts, thereby fostering a more resilient and sustainable society. Consequently, the benefits of circular strategies occur at all levels, i.e. micro (companies), meso (supply chain) and macro (society) level. By addressing vulnerabilities and reinforcing adaptive capacity at these interconnected levels, CE strategies increase sustainability but also position resilience as a cornerstone of CRM management in an increasingly uncertain global environment. Hence, circularity fosters the resilience and sustainability of the whole society.

Yet, extant research exploring the impacts of CE strategies on resilience is nascent, with only a few studies detailing if and how these practices enable firms, supply chains, industries and societies to adapt and transform in the face of disruptive events. For this special session, we seek papers that connect CE with resilience at multiple levels. Particularly, research that combines different disciplines or approaches in an innovative way is welcome.

Session topics:
- circular ecosystems supporting resilience
- multidisciplinary view to resilience from supply chain to society
-regulatory aspects related to the circularity of CRMs
- role of CRMs and their circularity in sustainability

This session is organized in the context of the UrbanSymbiosis (Towards urban symbiosis of critical raw materials: collaborative value creation models in circular ecosystems) project funded by the Strategic Research Council of Finland. https://www.urbansymbiosis.fi/

Main Contributing Researchers / Research Centres (tentative, if known at this stage):

In addition to UrbanSymbiosis project partners, Hanken, Syke (Finnish Environment Institute), and VTT, we aim to invite researchers presenting our international research collaboration partners such as TNO, Maastricht University, University of Kassel. Furthermore, we aim to provide our industrial partners an opportunity to participate to discussion through co-writing, or commenting research outcomes.

Website URL of Call for Papers (if any):
https://www.urbansymbiosis.fi/

Email & Contact Details:

Katri Valkokari, katri.valkokari@vtt.fi, +358408479352