Sharing Economy for Sustainable Chemistry

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Pilot project "Open Labs Brazil"

Abstract

"Sharing economy" as a business model has the potential to support various Sustainable Development Goals (SDGs) of the United Nations. Suppliers can share their idle capacity with demanders, which ultimately leads to an overall reduction of adverse effects for the environment and society while also benefiting all participants economically. The International Sustainable Chemistry Collaborative Centre (ISC_3) seeks to support the SDGs by identifying and analysing barriers to entering the sharing economy while also providing a trustworthy and transparent collaborative environment for participants. As an established knowledge platform, ISC_3 serves as a catalyst for the recent sharing-economy pilot project "Open Labs Brazil". Together with the SENAI Institutes and the provider of the Clustermarket sharing platform, it has established a system for more reliable, faster, easier and affordable access to lab infrastructure and services for sustainable chemistry innovation in Brazil. In this way, innovators, entrepreneurs and start-ups have the potential to solve pressing issues for sustainable and inclusive development and to contribute to more sustainable value chains.

Background

The idea of sharing and making use of various things together is not new. In recent years, however, the **sharing economy**, which is built around the concept of sharing human and physical resources, has seen a major expansion and has become an increasingly popular business model. At its core, it follows the idea of collaborating across all social and economic facets of life

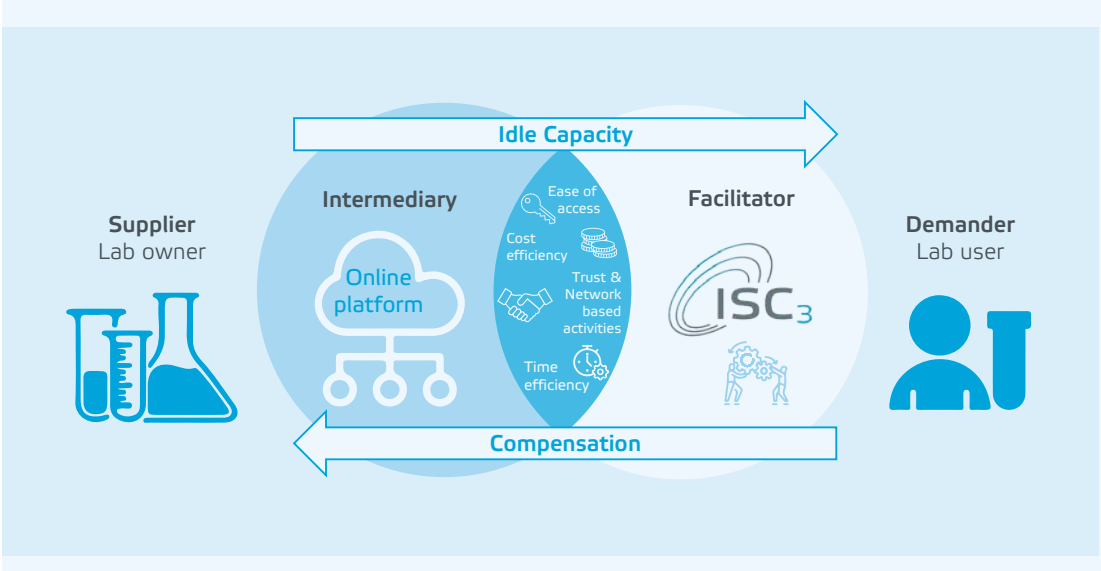

FIGURE 1
Framework for the "sharing economy" – concept: Lab owners offer their idle lab space through an online platform to lab users and receive a compensation. ISC_3 facilitates the scale-up to further markets with a focus on Sustainable Chemistry players.

PARTNERS

SENAI
The SENAI Institute for Innovation in Biosynthetics and Fibres (SENAI CETIQT) and the SENAI Institute for Innovation in Green Chemistry (Firjan SENAI) develop sustainable solutions through industrial chemistry and biotechnology for new products and processes. The SENAI team is composed of experts in biotechnology, chemical transformations, process engineering and fibres.

Clustermarket
Clustermarket offers a lab operating system that democratises access to expensive scientific instruments by allowing institutions to make them visible and available to others. This allows underutilised instruments to generate income while helping other researchers to use instruments to which they would not otherwise have access. The platform has over 70,000 users.

ISC_3
As a key principle, ISC_3 seeks collaboration across sectors and stakeholders and provides an international knowledge platform where players come together to exchange and **innovate together for sustainable development.** Hosted by the GIZ, ISC_3 aims to shape the transformation of the chemical sector towards sustainable chemistry, thus contributing to meeting the UN Sustainable Development Goals (SDGs).

ISC_3 Innovation Hub (IH)
The ISC_3 Innovation Hub, hosted by DECHEMA e. V., initiates and supports innovation in the field of sustainable chemistry, with the aim of contributing to solving urgent societal challenges. One of its core innovation activities is the Global Start-up Service, which helps entrepreneurs to become Sustainable Chemistry Changemakers. In 2021, it started its Corporate Challenge, focusing on developing joint solutions for chemistry-related problems.

by sharing access to goods and services through online platforms (Hamari et al., 2015[1]). By prioritising horizontal rather than vertical structures and fostering the idea that *using* is more important than *owning* (Ranjibari et al., 2018[2]), the concept represents a **socio-economic ecosystem that encourages and strengthens collaboration in a sustainable manner.**

ISC_3 builds on new (including **sharing) business models** that are based on sound ecological, social and economic principles as important transformation drivers. The ISC_3 Innovation Hub supports entrepreneurs along the entire innovation chain and appraises, advises and supports them – e. g. with access to shared lab space.

Why

Despite the acknowledged benefits of sharing as a business model, R & D faces particular issues when it comes to **sharing resources**. These are, among others, lack of transparency in respect of available instruments, very costly equipment, which is underutilised and does not generate income, and all other issues related to intellectual property and/or liability when allowing access to third parties. On top of this, the barriers to entering the scientific sector are so high that it is difficult for smaller companies not (yet) active in an academic/scientific community to obtain access to the instrumentation and expertise they need. In addition, acquiring funding is particularly challenging for start-ups based in the Global South.

FIGURE 2
Sharing resources can facilitate innovating together for sustainable development


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Collaboration for Sustainable Chemistry

To master these problems and introduce incentives for a better and more collaborative innovation approach in sustainable chemistry, ISC_3, Clustermarket and the National Service for Industrial Training (SENAI) (SENAI CETIQT and SENAI Green Chemistry) joined forces in a new collaborative initiative: **Open Labs Brazil.**

Working with these two SENAI Institutes presents an opportunity to replicate this model in the other 24 different innovation institutes that SENAI has throughout the country. This will help change the way researchers and innovators share and access instruments in Brazil.

The Project: Open Labs Brazil

The goals of this collaboration were to

- introduce a system for **faster, more reliable, easier and affordable access to lab infrastructure and services** for sustainable chemistry innovation in Brazil and thereby potentially accelerate the pace of innovation;
- assist laboratories and universities in organising the **scheduling of their equipment and services** for students, researchers and technicians.

As a second objective, the partners pursued a strategy of promoting a new environment for open innovation and networking in the country.

Results

Both SENAIs have successfully introduced the platform into their operations and can now efficiently manage and access lab infrastructure, which is done entirely online via Clustermarket. As a result, **over 300 instruments are now available for booking on the platform.** Furthermore, both research institutes are open to external collaboration, as shown by the four external bookings already received for a high-pressure reactor provided by SENAI Green Chemistry. To facilitate the access of researchers and innovative groups to laboratory tools, the consortium organised a start-up competition in Brazil, whose four winners won a travel grant of 2,000 EUR each and are currently benefiting from lab access and technical support. Up until the end of 2021, three OLB workshops were held to report on the pilot project's progress (available on YouTube).

ACTIVITIES

A fact-finding mission visited around 20 scientific institutions to learn about their problems and required solutions.

Introduction to/training on the software for both SENAI teams in order to digitalise their labs and increase sharing.

Workshops to introduce other SENAIs to the system and promote a sharing mindset.

FIGURE 3
Access to scientific equipment, lab space and services is crucial to bring Sustainable Chemistry innovations to market with little upfront investment

FURTHER EXAMPLES FOR SHARING ECONOMY IN CHEMISTRY

Kebotix offers a chemical lab that works autonomously. It combines data and AI with robotics to discover and create advanced chemicals and materials at a faster rate.

Triangular offers a platform that gives fast access to production capacities and know-how. It connects material and system owners with industrial experts.

FIGURE 4
Access to equipment and know-how to scale up from lab to production scale is now faster, more reliable and affordable

Further steps

Collaborative business models help to share resources and reduce negative environmental and societal impacts while at the same time fostering innovation. ISC_3 aims to put these innovative business models into practice. This embraces business models for pooling, scaling and transferring knowledge in order to develop and disseminate sustainable innovations (Eppinger et al., 2021[3]). Likewise, ISC_3 promotes service-oriented business models, such as chemicals leasing (Schwager et al., 2017[4]), for example, which effectively tackles and fosters a safer and more efficient use of biocides.

To further foster sustainably oriented innovation, ISC_3 is looking to intensify its international activities and work with movers and shakers in the field of green chemistry on a global scale.

If you are interested in supporting innovation ecosystems and new business models in your organisation, be part of the change: Join us for our next Open Labs or Biocide Leasing project. Together, we can transform chemistry!

Contact us at: info@isc3.org

FIGURE 5
ISC_3 engages with all start-ups from the Sustainable Chemistry space

1 Hamari, J., et al. (2015). The Sharing Economy: Why People Participate in Collaborative Consumption. DOI: 10.1002/asi.23552

2 Ranjibari M. et al. (2018). Conceptualizing the Sharing Economy through Presenting a Comprehensive Framework. DOI: 10.3390/su10072336

3 Eppinger E. et al. (2021). Sustainability transitions in manufacturing: the role of intellectual property. DOI: 10.1016/j.cosust.2021.03.018

4 Schwager P. et al. (2017). Success and failure of the Chemical Leasing model in addressing sustainability challenges: Evidence from practice. DOI: 10.1016/j.cogsc.2017.08.001

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ISC_3 – International Sustainable Chemistry
Collaborative Centre
Friedrich-Ebert-Allee 32 + 36
53113 Bonn/Germany
T + 49 228 90241 121

More information
https://www.isc3.org/

Edited by

Dr. Claudio Cinquemani
Email: Claudio.cinquemani@isc3.org

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On behalf of the

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV)
Stresemannstr. 128 – 130,
10117 Berlin/Germany

German Environment Agency (UBA),
Wörlitzer Platz 1,
6844 Dessau-Roßlau/Germany