

The role of entrepreneurs in stimulating systems change to reduce marine plastic pollution and the business models they use

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Extended abstract – adjusted with presentation screenshots and explanations

In this paper, we explore the role of entrepreneurs in stimulating the transition towards a new system in which marine plastic pollution is mitigated. To reduce plastic pollution of waterways and oceans, all types of system actors are needed. Producers need to increase recycled content, governments need to enact bans and improve waste management, research institutions need to develop alternative materials, NGOs need to raise awareness and consumers must be willing to choose different products. In this systems change towards reduced marine pollution, entrepreneurs also have a role to play as niche innovators that build momentum toward more sustainable socio-technical systems (Dijkstra, van Beukering and Brouwer, 2021). This forces incumbents to adapt (Hockerts and Wüstenhagen, 2010).

The transition literature studies such long-term, multi-dimensional, fundamental changes of production and consumption patterns (Markard, Raven and Truffer, 2012). To achieve systems change, companies, government actors, NGOs, financial institutions, research institutions and user groups need to act – individually as well as in collaborative networks. Entrepreneurial activities can be a key driver of systems change (Hall, Daneke and Lenox, 2010; Vogel and Fischler-Strasak, 2014). Businesses invent technologies and create new products, services and business models that can stimulate sustainable behavior, and they also engage in system building activities (Hall, Daneke and Lenox, 2010; Hockerts and Wüstenhagen, 2010; Farla et al., 2012; Musiolik, 2012; Planko et al., 2016; Cramer, 2020; Diepenmaat, Kemp and Velter, 2020). These system-building activities include: Product and technology development; Collaboration with the government for enabling legislation (which influences creation of demand and of supply); Raising awareness (to create supply and to influence policymakers); User behavior change; and Infrastructure development (Planko et al., 2016).

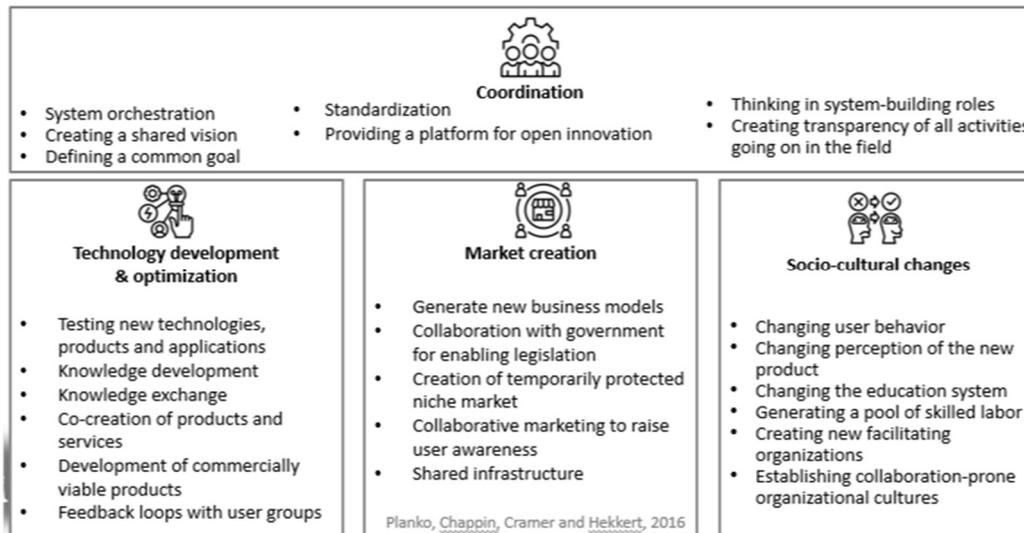


Figure 1: Overview of system-building activities for sustainability transitions (Planko et al., 2016; Planko & Cramer, 2021)

As a preliminary finding, based on workshops and discussions we identified concrete examples of entrepreneur’s activities in stimulating the transition towards a new system in which marine plastic pollution is mitigated. In Figure 2 we give two examples for each main category of system-building actions. Our preliminary findings showed that in the plastic sector transition, collaboration with government and infrastructure development seem to play a prominent role, more than just being one activity as part of ‘market creation’. (This indicates that for each sectoral system-transition, different sets of system-building activities might be more important than others.)

- **Product and technology development**
 - Development of plastic-free or biodegradable materials and products
 - Development of recycling technologies
- **Collaboration with government for enabling legislation**
 - Enabling laws or regulations : Collateral on packaging / Ban on single-use plastic
 - Stimulating demand for alternatives: Public procurement / EPR / Levy tax on plastic use
- **Market creation** – “changing the system through market mechanisms”
 - Development of new business models
 - Creation of demand for alternatives through collaborative marketing (B2B, B2C, B2G)
- **Raising awareness** of consumers, citizens, producers, policymakers
 - To reduce plastic use
 - To influence policymakers
- **User behavior change**
 - Empowering users to monitor their behavior (e.g., through apps)
 - Consumer ‘education’
- **Infrastructure development** [together with government]
 - Provision of technologies or services that “boost infrastructures” (e.g., microfiber filters) that help keep existing plastic in a loop
 - Better recycling technologies for alternatives to plastic

Figure 2: Roles and activities of entrepreneurs in system-building in marine plastic reduction case

In the transition to a more sustainable production and consumption system, it is important that entrepreneurs develop collaborative business models, in order to design value propositions, set collective goals and share the costs of system changing activities. Figure 3 shows an example of such collaborative business model, the ‘networked business model’. This networked business model can be set up by networks of system actors who aim for system-changes. The networked business model helps finance and organize the

collaborative system-changing efforts. The individual network actors' business models feed into this networked business model and vice versa. Next to these collaborative business models, individual companies also have their own company-level business model (Planko and Cramer, forthcoming).

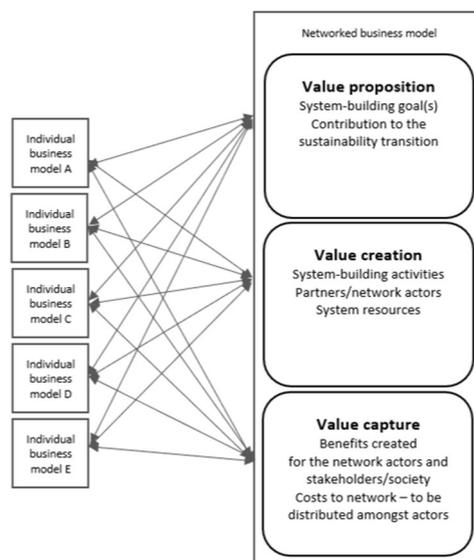


Figure 3: "The networked business model for systems change"; Planko, J., Cramer, J. "The networked business model for systems change: Integrating a systems perspective in business model development for sustainability transitions"; in Aagaard, A., Lüdeke-Freund, F. & Wells, P. (Eds.), *Business Models for Sustainability Transformation*; Palgrave MacMillan; forthcoming

System change requires **individual** business models and **collective** business models. In this paper, we focus on the systems change entrepreneurs aim for and the **company-level business models** and strategies they use to achieve this change.

Our research question is: What is the role of entrepreneurs in stimulating systems change to reduce marine plastics pollution and what business models do they use to achieve this? To answer this question, we conducted an explorative multiple case study in the Dutch sustainable plastic sector. We conducted semi-structured interviews and interactive workshops with four organizations which are key actors of change in the Netherlands.

We identified different types of ventures that are striving for systems change: First, ventures with the goal of marine plastics prevention, aiming to stop the source of the problem of plastic entering the environment. These (I) develop alternative materials and products; (II) encourage the reduction of plastic use (e.g. through awareness raising or monitoring apps) or (III) contribute to closing plastic loops (e.g. through better recycling technologies). And second, ventures with the goal of marine plastics cleanup, aiming to clean up the plastic that has already entered the environment. These entrepreneurs (I) develop cleanup technologies and services, or (II) focus on raising awareness (e.g. through social media or voluntary cleanup initiatives).

Preliminary findings of our cases studied are:

Case	Company goal	Value proposition	Financing mechanism	System changing activities
A	to raise awareness for the marine plastics problem and other ocean health problems and to reduce marine pollution	providing a re-usable water bottle	selling of their product is merely a vehicle to raise revenues in order to finance their system changing activities	<ul style="list-style-type: none"> - raising awareness - enhancing ocean literacy - user behavior change
B	to develop and sell technology and services in order to filter plastic from rivers	help governments to better manage plastic waste leakage	raise awareness so citizens put pressure on policymakers and municipalities – revenues through selling technology	<ul style="list-style-type: none"> -infrastructure development - influencing policymakers - awareness raising
C	to turn individuals into activists, encourage citizens to demand legislation change; enable user behavior change by providing an app	awareness raising campaigns; provide app that helps consumers find products without microplastics	their revenue model based on private funding and crowdsourcing	<ul style="list-style-type: none"> -mobilizing funds for systems change - to raise awareness - change legislation
D	to reduce plastic pollution (through developing biodegradable plastic from renewable material)	an alternative material for regular plastic	revenues from product sales; they invest their revenues into further technology development	<ul style="list-style-type: none"> - co-creation of products - collaboration with knowledge institutions (knowledge generation) - resource mobilization

Figure 4: Overview of preliminary findings case studies

Case A: Their goal is to raise awareness for the marine plastics and other ocean health problems and to reduce marine pollution. The value proposition is to sell a re-usable bottle, which they produce and market. However, the selling of this bottle is merely a vehicle to raise revenues in order to finance their system changing activities such as enhancing ocean literacy. They contribute to raising awareness and user behavior change.

Case B: Their goal is to develop and sell technology and services in order to provide a solution and reduce the problem (filtering plastics, including microplastics from rivers). This technology gives governments an opportunity to better manage plastic waste leakage, and thereby contributes to the infrastructure development to enable a more sustainable system. They raise awareness for plastic problem in order to influence policymakers and consumers to put pressure on policymakers and municipalities who are potential customers (legitimacy of new technology; show that there is a need) and herewith contribute to demand creation.

Case C: This non-profit organization has the goal to develop campaigns and products to raise awareness and change legislation. They want to build campaigns that turn individuals into activists, contributing to awareness raising but also encouraging citizens to demand legislation change. Next to campaigns, they enable user behavior change by providing an app that helps consumers find products without microplastics. Their revenue model is based on private funding and crowdsourcing (thereby mobilizing funds for systems change), and they use utilize entrepreneurial strategies for their system changing activities.

Case D: Their goal is to develop an alternative material for plastic, namely biodegradable plastic from renewable material. The company was founded with the mission to reduce plastic pollution. They invest their revenues into further technology development. They

collaborate with knowledge institutions to generate new knowledge and they also acquire funding for research (resource mobilization) to optimize their product and innovate new product ranges. They moreover collaborate with partners to co-create products and secure demand.

To conclude, the entrepreneurs we studied do more than only developing and selling a product or service. They also conduct value creation activities that contribute to systems change ('dual modes' of business models). These entrepreneurs work on different parts of changing the system, though many engage in multiple system-changing activities. In some business models, selling a product mainly has the aim to generate revenues for system-changing activities. In others, developing and selling a technology, material or product is the primary aim. This product itself generates revenues for its value creation and delivery activities, with which they directly contribute to system change. We identified two main system-change business model structures: In the first, the product itself contributes to system change, in the second, the product or service is merely the vehicle for revenue generation to fund system changing activities.

Two main system-changing business model structures identified:

- A) the **product itself contributes** to system change (developing and selling technology/product/service is primary aim)
- B) the product or service is merely the **vehicle for revenue generation** to fund system changing activities

In this study, we linked business models to transition studies. The insights gained from this exploratory research will serve to set up a larger study with more interviews and quantitative data collection, to study the different business models deployed in the system transition of the plastic sector. Based on the data gathered we want to develop a framework in which business model elements are connected to system changing activities.

Whereas developing collective business models is crucial for enabling social and economic transition, our findings indicate that additionally the development of company-based business models aiming at system-change plays an important role in enabling this transition.

Keywords

Sustainability transition, systems change, business models, sustainable entrepreneurship

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