
Game-changer business models for sustainable development*

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Abstract

To address the grand challenges that society faces, incremental change and gradual organizational renewal are not sufficient. A radical transformation of business models is needed. In this paper, we explore game-changer business models that incorporate sustainability principles into their organizational DNA. We draw on two examples from the agrifood sector to illustrate the components of the business model, the impact of Industry 4.0 technologies and the sustainability outcomes. We reinforce the importance of collaboration between policymakers, business leaders and researchers to identify, promote and scale up these business models for transformative societal change.

Keywords: business model innovation, game-changer business models, grand challenges, Industry 4.0 technologies, scaling, sustainability

JEL classification codes: D20, L20, M13, O14, Q01

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1. Introduction

How can organizations become conduits of transformative change and sustainable development? How can they facilitate new ways of doing business by addressing societal challenges and limiting harmful impacts on the planetary resource base? During the World Investment Forum 2023 in Abu Dhabi, members of the global investment-development community highlighted the potential of innovative business models to address grand challenges, including wicked problems such as climate change, food security, poverty, terrorism, infectious diseases, exploitative labor, discrimination and migration (Ferraro et al., 2015; George et al., 2016). Although, or perhaps because, businesses are significant contributors to these challenges, they can serve as agents in addressing these issues (Buckley et al., 2017; Sinkovics et al., 2021c; World Economic Forum, 2020). One line of discussion at the World Investment Forum 2023 emphasized the promise of Industry 4.0 technologies for transforming business models such that business objectives are aligned with social and environmental goals and directly contribute to creating a more sustainable and equitable world. In this paper, we extend this discourse by exploring two examples of game-changer business models.

Game-changers are purpose-driven organizations that aim to create a long-term positive impact on society and the environment. An organizational culture that promotes sustainability and innovation, which is reinforced by visionary leadership, guides them. As opposed to business-as-usual, game-changers break through the conventional ways of industry (Sinkovics et al., 2021b). Their approach to scaling up their business solutions involves intricate integration within an ecosystem and strategic collaborations with partners, such as venture philanthropists, research and development institutions, consumers, governments and regulatory organizations. Although these models are locally based, they may provide global solutions (Ready et al., 2014; Sinkovics et al., 2015; Sinkovics et al., 2014; Subramanian et al., 2023). Industry 4.0 technologies offer unprecedented opportunities to transform business models; firms can harness the capabilities they provide to address aspects of the grand challenges. Examples of these technologies include additive manufacturing, artificial intelligence, big data analytics, biotechnology, blockchain, cloud computing, cyberphysical systems, the Internet of Things, robotics and virtual reality (Bag et al., 2021; Lopes de Sousa Jabbour et al., 2018).

2. Dimensions of game-changer business models: examples from the agrifood sector

Food insecurity and hunger are two pressing grand challenges the world is facing. The World Food Programme advises that more than 333 million people are experiencing acute food insecurity, and 783 million people are facing chronic

hunger.¹ Climate change, warfare, economic shocks and rising raw material expenses exacerbate these challenges. Two game-changing companies, RedSea and NatureDots, recognized the urgency to address these issues. By incorporating sustainability into their cultural DNA and leveraging Industry 4.0 technologies, they are creating economic, social and environmental innovations. To illustrate their strategic choices and implementation approaches, we combined and adapted an abridged version of the integrative framework by Sinkovics et al. (2021a) and the triple-layered business model canvas by Joyce and Paquin (2016) (figure 1). The value proposition of a firm in the business model refers to the package of products and/or services offered to the target market. Value creation and delivery comprise key activities, resources, partner networks, channels and customer relationships that support the implementation of the value proposition. Value capture activities include innovations in revenue streams and cost structure. The value intention refers to the attitudes of leaders and managers.

RedSea, a participant in showcase discussions at the World Investment Forum 2023, is a start-up that emerged as a spin-off from a science project at King Abdullah University of Science and Technology in Saudi Arabia in 2018.² The company aims to solve the challenge of feeding more than 10 billion people sustainably and to improve the working conditions of agrifood farmers working in extreme weather. They harness Industry 4.0 technologies, particularly genetic technologies, to cultivate crops in climates characterized by droughts, restricted water availability and increasing salinity levels. In addition, they use nanotechnology and wireless technologies to develop greenhouse roofs and monitoring systems. The company created brands like *iyris*TM, *SecondSky*TM, *Kairos*TM Intelligent Agriculture and *Volcano Plant genetics*TM for the agritech market. Furthermore, RedSea's innovations led to reductions in water consumption and greenhouse gas emissions, as well as fertilizer and pesticide usage.

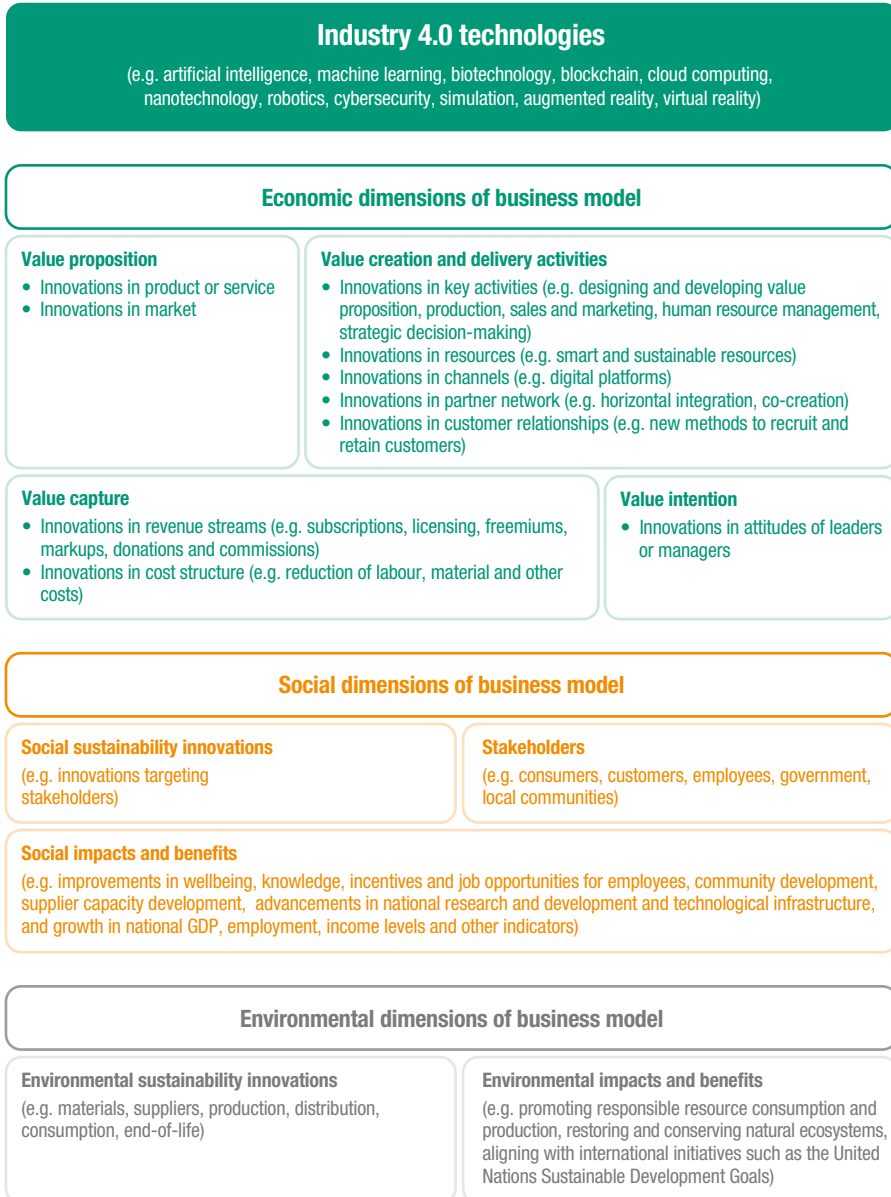
NatureDots, an Indian start-up, aims to overcome the challenges faced by fish farmers, including reducing business risks and, by extension, poverty.³ It has developed the *AquaNurch*® System for the aquatech market, a real-time data collection technology to monitor water quality parameters and predict risks associated with climate change and weather. The system harnesses the capabilities of artificial intelligence, machine learning, the Internet of Things and big data analytics. NatureDots also expects the system to improve fish health and thereby to increase food and protein security. The company has facilitated market access for fish farmers and increased revenue by offering end-to-end services such as

¹ See "A global food crisis", www.wfp.org (accessed 29 November 2023).

² See <https://redsea.ag/company> (accessed 4 December 2023).

³ See <https://naturedots.com/product> (accessed 4 December 2023).

Figure 1. An abridged framework for mapping game-changer business models



fish seeds development, nursery pond construction and fish health monitoring. Implementing these technologies has also led to a reduction in costs because of enhanced productivity. NatureDots anticipates a reduction in water pollution and scarcity, alongside an enhancement of climate change resilience.

The scalability of these business models is enhanced by the availability of a unique combination of resources and capabilities: both companies possess competent internal research and development teams comprising scientists and specialists from diverse disciplines. The teams are dedicated to generating new ideas, acquiring patents and successfully commercializing their innovations. Their high-performance orientation is built on advanced knowledge and talent management capabilities. They invest in training and development and use cross-functional teams for knowledge sharing. Company leaders play a significant role in identifying environmental changes, creating strategic partnerships and reinforcing the organizational culture. These businesses also collaborate with various stakeholders, including clients, suppliers, retailers, governments, local communities and non-governmental organizations. Notably, they partner with local and foreign universities for open innovation projects and engage with venture philanthropists, impact funders and governments to increase financial capacity. For example, RedSea has partnered with the University of Arizona for innovation projects. They have accessed investors, including AppHarvest and Aramco, for funding. NatureDots has engaged with institutions such as the Biotechnology Industry Research Assistance Council of India and AMRUT 2.0 of India, both government programmes, to fund their projects. Frequently, their ecosystem partnerships are facilitated through online platforms. Access to open innovation platforms, such as UpLink, provided by the World Economic Forum, enables them to collaborate with a multitude of partners to unlock innovative business solutions.

These two cases additionally exemplify the spillover effects of generating positive economic, social and environmental outcomes at the firm level on the national economy, on industry and on the global economy. The efforts of RedSea and NatureDots have ramifications for unemployment, sustainable cities and communities, health and climate change.

3. Implications for policymakers and concluding remarks

As the cases demonstrate, there is significant potential for game-changer business models to help address grand challenges. Therefore, policymakers, business leaders and researchers can play an important role in supporting and scaling up these models internationally (Reuber et al., 2021; Tippmann et al., 2023). Building a culture that encourages breakthrough innovators and game-changers is a crucial starting point for the emergence of these businesses. Therefore, the establishment

of incubators and accelerators is necessary to cultivate entrepreneurial spirit, provide training and development opportunities, and facilitate access to finance, sales and distribution networks. Specifically, these institutions need to prioritize the development of the cognitive capabilities essential for navigating global volatility and uncertainty.

Multi-stakeholder partnerships play a crucial role in facilitating the rapid growth of these firms. Hence, establishing an external ecosystem with governments, international organizations, the private sector, civil society, researchers, funders, non-governmental organizations and other stakeholders is essential for collaborative efforts and resource mobilization. To promote human capital development, governments and regulatory organizations need to create infrastructure, including research and development institutions and educational and training facilities. They need to design legal and regulatory frameworks that account for unique needs and specificities. These rules and regulations will facilitate access to fiscal incentives and protection of intellectual property rights and promote fair competition. To provide financial support, they must establish tax incentives, seed-corn funds and other non-dilutive financing mechanisms.

To finance rapid scaling, it is essential to have access to bank loans, impact funding and venture philanthropy. The involvement of impact funders and venture philanthropists can benefit game-changer firms by granting them access to valuable resources and capabilities that facilitate international growth. In addition, it is crucial to have platforms that connect these businesses with ecosystem partners to accelerate their development (Nambisan et al., 2018).

Implementing Industry 4.0 technologies can not only facilitate the creation of sustainable innovations, but also transform the economic model. They play a key role in fostering a better understanding between companies that have corresponding input needs and output opportunities, ultimately leading to the establishment of aligned business relationships (Hofstetter et al., 2021). This is especially important for scaling up innovative solutions. Therefore, policymakers and business leaders are advised to invest in enhancing digital and technical capabilities. They can develop digital platforms to improve their visibility and expand their international presence. To foster a game-changing culture, business leaders should focus on developing effective human resource management practices, such as attracting and keeping talented employees, as well as enhancing their knowledge and talent management capabilities to increase absorptive capacity.

Policymakers also play an important role in reducing and ultimately putting a stop to planned obsolescence. Furthermore, game-changer business models incorporate elements of circularity. Material circularity at an international level is only possible if governments work together within development cooperation programmes to design and implement policies to enable it (Hofstetter et al., 2021). Another avenue

for positive change and scaling up game-changer business models is public procurement. It can be nimbler and more dynamic than regulation, thus being a potential tool for experimentation and process innovation that can ultimately lead to a more empowered government procurement system with a market-shaping impact (Hamilton, 2022).

Researchers play a significant role in contributing to this transformation agenda through their choice of research topics, methodologies and dissemination strategies. The academic literature has generated a multitude of frameworks and tools that are equally valuable for both researchers and policymakers (Sinkovics et al., 2021; Sinkovics et al., 2021a; van Tulder and van Mil, 2023). However, there is a need to consolidate these frameworks and the knowledge that exists in disciplinary silos. There is also a need for a more engaged approach to conducting research. Researchers need to become an active part of multi-stakeholder initiatives through action research and other forms of collaboration.

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