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Commentary

The potential of sustainability-oriented digital platform multinationals: A comment on the transitions research agenda

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ABSTRACT

This article points at insights from the subfields of international business and strategic management that are relevant for sustainability transitions research. Specifically, building on the emergent ‘mainstream’ literature on ‘generic’ digital platforms, we explain how a range of digital platform multinationals has emerged which address sustainability challenges, and highlight their potential for accelerating multi-sector transitions across geographies. The article does not cover contested platforms such as AirBnB and Uber, but focuses on sustainability-oriented digital platform multinationals (SO-DPMs), which directly tackle social and/or environmental issues by enabling new linkages between individuals and/or organizations. These SO-DPMs deserve more research attention because of their ability to affect sustainability transitions in their own (home) and foreign (host) countries, and realize interconnections and replication across borders. Besides explicating their relevance for sustainability transitions research, we propose promising areas for investigation, considering SO-DPMs, actors in their networks, and society more broadly.

1. Introduction

In their comprehensive stock-taking article, Köhler et al. (2019) highlight the many insights from a decade of sustainability transitions research (STR), and indicate further areas and challenges for scholars. Building on these suggestions, we argue for more attention to insights from the subfields of international business (IB) and strategic management, applied to newly-emerging ‘digital’ actors that have the potential to address and accelerate multi-sector transitions across geographies. Our contribution focuses on what we call sustainability-oriented digital platform multinationals (SO-DPMs). These are multinationals with business models that are characterized by two main features²: (1) they are “sustainability-oriented” (Schaltegger et al., 2016), i.e. they are designed to directly tackle social and/or environmental issues, while also ensuring economic value capture; (2) they rely on the digital platform as key resource to enable novel forms of connectivity between ‘users’ (see Table 1 for a few examples), linking individuals and/or organizations for the exchange or sharing of goods, services and information. Below we rely on emergent ‘mainstream’ work

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² We note the existence of a taxonomy of 45 business model patterns published in a sustainability journal (Lüdeke-Freund et al., 2018), of which a few (e.g. the “online waste exchange platform” and “sharing business” patterns, cf. Frenken, 2017) include our features. However, due to the novelty and rapid expansion of SO-DPM types, we refrain from inscribing them with pre-defined categories and instead focus on the emergent phenomenon across borders as explained in sections 2 and 3.

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Table 1

A few illustrative examples of SO-DPMs.

SO-DPM	Key focus	Countries	Sustainability issues
Hello Tractor	Connecting tractor owners and smallholder farmers for equipment sharing	Bangladesh, Kenya, Mozambique, Nigeria, Pakistan	Optimization of asset use, thus reducing (future) resource extraction; poverty reduction; job creation
TooGoodToGo	Connecting customers with supermarkets, shops and restaurants to exchange edible unsold food	Austria, Belgium, Denmark, France, Germany, Italy, Norway, Poland, Spain, Switzerland, Netherlands, UK	Food waste recovery, efficient use of scarce resources, reduction of air, water and soil pollution
WeFarm	Connecting smallholders to share ideas, help solve problems and spread innovations in farming practices	Kenya, Uganda, Tanzania	Improvement of farmers' livelihoods; poverty reduction; promotion of more sustainable agriculture
Getaround	Giving drivers access to cars shared by owners who live nearby	Austria, Belgium, France, Germany, Spain, UK, US	Optimization of cars' utilization; acceleration of transition towards greener vehicles and more sustainable mobility habits
QuiCargo	Matching real-time shipment requests with carriers with unused empty space	Belgium, Germany, Netherlands	Carbon dioxide emission reduction; reduction in traffic congestion

(Sources: www.hellotractor.com; <https://www.weforum.org/agenda/2017/09/new-tech-sustainable-circular-economy/>; www.toogoodtogo.com; www.drivy.com; www.getaround.com; www.wefarm.com; www.quicargo.com).

regarding 'generic' digital platform multinationals to explain the relevance of SO-DPMs for STR and propose promising areas for investigation, which could help to shed light on "how digitization is potentially changing the geography of sustainability transitions more widely" (Köhler et al., 2019, p. 15).

2. The relevance of digital platform multinationals for sustainability transitions research

IB and strategy scholars have noted that network effects, "wherein consumers place a higher value on platforms with a larger number of users" (Cennamo and Santalo, 2013, p. 1331), enable a fast scaling of digital platforms, with "winner-takes-all dynamics" (Chen et al., 2019, p. 175) leading to the dominance of one or few platforms. While disconcerting from a competitive perspective and potentially harmful to society, it also means that SO-DPMs may quickly obtain substantial power to influence the pattern of sustainability transitions. Platforms also enable relatively easy replication across borders, as the digital nature greatly reduces the costs and efforts associated with their expansion to foreign markets, compared to traditional firms (Brouthers et al., 2016). Consequently, SO-DPMs can help accelerate sustainability transitions, influencing "how transitions travel between places" (Köhler et al., 2019, p. 14).

Platforms' success stems from value co-creation, i.e., the development of an international network and/or multiple local networks of users and complementors³ that perform core business model activities (Chen et al., 2019; Li et al., 2019; Nambisan et al., 2019; Stallkamp and Schotter, 2019) (see Fig. 1). The involvement of many actors also offers opportunities for disruption, and thus for emerging SO-DPMs to reshape existing transition patterns. For example, the supply-side users of QuiCargo and TooGoodToGo (Table 1) are incumbent firms and changing their behaviors is key given their dominance (Ciulli and Kolk, 2019) (in these cases, in respectively logistics and food); Getaround enlarges citizens' mobility choices.

In addition to "firms-in-industries" (Geels, 2014), the SO-DPM lens allows for an exploration of "firms-across-industries". SO-DPMs bridge ICT with other industries (e.g. agro-food, equipment) and the users and complementors are also likely to be already embedded in, or can easily enter, a variety of additional industries. Moreover, platforms fulfil multiple 'brokerage' roles to promote sustainability (Ciulli et al., 2019), which are widely applicable with some context-specific finetuning where needed. Finally, besides enabling the study of "multi-actor processes", the focus on SO-DPMs and their networks precisely follows a suggestion by Köhler et al. (2019, p. 11) to connect transition studies and management research. We integrate insights from business fields about individuals and organizations with STR's systemic perspective.

3. Suggested areas for further research

Our proposed directions for research (summarized in Table 2) focus on the *SO-DPMs*, *users* and *complementors*, and how they affect—and are affected by—sustainability transitions. Transitions have been shown to differ across countries (e.g. Dahlmann et al., 2017; Geels et al., 2016), a reality that SO-DPMs also encounter in the locations of (future) activity. Embeddedness (or lack thereof) in various institutional settings—home/host countries, local/supranational levels—has been a key area of investigation in IB, also from a sustainability perspective (Kolk and Fortanier, 2013; Pinkse and Kolk, 2012). An IB perspective to STR enables the explicit inclusion of different locational characteristics, and how they influence the ways in which digital technology is leveraged within and across borders to further sustainability transitions.

³ We define complementors as individuals or organizations offering users of a SO-DPM products or services that are complementary to the SO-DPM's.

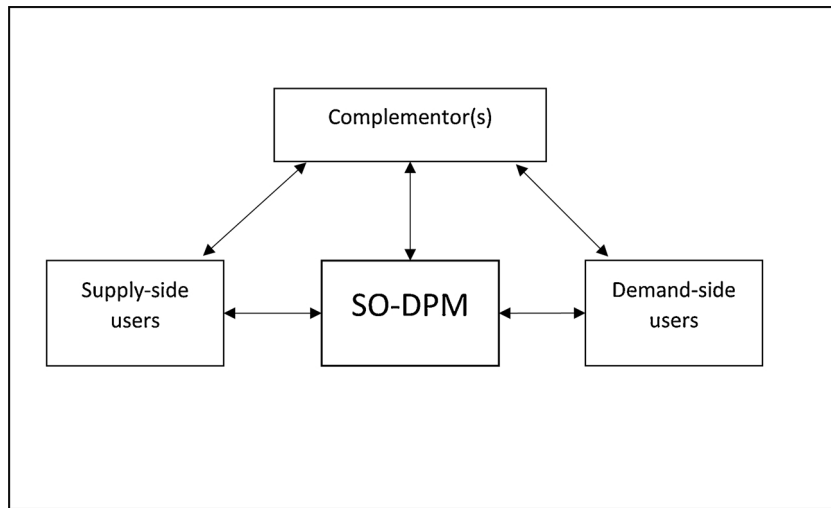


Fig. 1. Focal actors in the SO-DPM network. (Adapted from Parente et al. (2018).

Table 2
Suggested areas for further research.

Focal actors	Possible research questions
SO-DPMs	<ul style="list-style-type: none"> • How does a SO-DPM's business model impact different transition patterns across countries? • What kind of business model adaptations do SO-DPMs undertake to respond to national idiosyncrasies of the techno-social regime, in order to attract a critical mass of users? • How does the interaction between the SO-DPM's value creation strategies and location-specific factors unfold and affect the evolution of local sustainability transitions?
Users	<ul style="list-style-type: none"> • How does the SO-DPM's local user networks interact and co-evolve with sustainability transition processes within the various countries in which the SO-DPM operates? • Which dynamics unfold in the interactions between user networks and socio-technical regimes at multiple levels (neighborhood, city, regional, national, international)? • To what extent do incumbent firms that become users of the SO-DPM reconsider their position as regime actors and undertake sustainability-oriented business model innovations? • How can SO-DPMs trigger national sustainability transition patterns to interact and cross-fertilize each other through connections and exchanges between users across countries? • How do national socio-technical regime factors affect whether and how users engage in the international network of SO-DPMs?
Complementors	<ul style="list-style-type: none"> • How do the SO-DPM's complementors interact with and influence the sustainability transitions in the countries it enters? • How are the SO-DPM's complementors affected by transition patterns unfolding in host-country locations, and what does this mean for transferability across countries and adaptation to specific local settings? • To what extent do different types of SO-DPMs' complementors (incumbents vs. new entrants, local firms vs. multinationals) affect sustainability transitions, or are they affected by them?

In-depth studies of SO-DPMs can uncover multi-sector transitions across and within geographies. Linked to the middle row of Table 2, future research needs to account for within-country network effects, where SO-DPMs' value lies in creating independent local user bases in countries where they become active. To illustrate, the success of Hello Tractor (see Table 1) depends on matching owners of tractors and farmers active in the same location. Notably, networks sometimes have a very limited geographic scope, even as small as a neighborhood. For example, the demand-side users of TooGoodToGo request food close to where they live, work or study. Other platforms instead “experience significant network externalities that transcend country borders” (Stallkamp and Schotter, 2019, p. 7). This means that their value for a potential user either does not depend on the location of the platform's existing user base or increases the more the user base is international. For example, WeFarm aims to create a global network of smallholder farmers and uses machine learning to solve language-related barriers.

Further fruitful areas for STR relate to SO-DPMs' complementors (see Table 2, bottom row). It is interesting to investigate both how SO-DPMs may change behaviors amongst complementors (cf. section 2) and how incumbents themselves facilitate SO-DPMs' expansion. Hello Tractor, for example, relies on IBM's blockchain to give all its users timely and up-to-date information for optimizing their resource utilization and incomes, and partners with John Deere, which offers training and technology to tractor contractors and thereby help more smallholder farmers. Collaboration with incumbent multinationals facilitates easy replication elsewhere and can support the spread and acceleration of sustainability transitions, also in/to developing countries where needs are greatest.

These are just illustrative examples to highlight how SO-DPMs offer ample opportunities for further STR, and related to multiple themes of Köhler et al.'s (2019) agenda. Given SO-DPMs' transformative potential, more insight is also highly relevant for policy-

makers and society more broadly. We conclude by suggesting types of research that seem most helpful in relation to the focal areas of interest.

Given the novelty of the phenomenon, qualitative, exploratory studies are particularly suitable. To start with, “process research methods” (Gehman et al., 2018) enable an exploration of how the interaction between SO-DPMs’ value creation strategies and location-specific factors unfold and affect the evolution of local sustainability transitions. An interpretive, inductive theory-building approach, with a maximum variation sampling (Ciulli et al., 2019), can uncover the mechanisms through which SO-DPMs’ complementors interact with and influence the sustainability transitions in the countries entered. A multiple case study design (Eisenhardt, 1989) would be appropriate to help shed light on the business model adaptations undertaken by SO-DPMs to respond to national idiosyncrasies. Finally, one might also think of a survey to better understand the users, for example by examining how national socio-technical regime factors affect whether and how users engage in the international network of SO-DPMs.

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