

Hybrid business models in the sharing economy: The role of business model design for managing the environmental paradox

Emmanuelle Reuter

Institute of Management, University of
Neuchâtel, Neuchâtel, Switzerland

Correspondence

Emmanuelle Reuter, Institute of Management,
University of Neuchâtel, Rue A.-L. Breguet
2, CH-2000 Neuchâtel, Switzerland.
Email: emmanuelle.reuter@unine.ch

Abstract

With the primary emphasis on the tensions *that* platform organizations face between both for-profit and environmental value-creation goals, we know very little about the managerial drivers and mechanisms through which they realize multiple goals. Based on a qualitative, inductive case study of a UK-based digital platform's business model, we uncover the role of business model design. We find that the emphasis managers put on either the *redistribution* or the *accessibility* design theme shapes the environmental and financial value-creation, respectively and that a hybrid business model (i.e., realizing *both* for-profit and for-purpose value-creation) hinges on their *integration*. Two managerial drivers—*strategic synergies* and *dynamic coupling*—enable platform organizations to increase integration. We contribute to the literatures on hybrid business models, paradox, and business models for sustainability, suggesting that digital platforms not only create, but can actively manage *the environmental paradox* by integrating multiple design themes within hybrid business models.

KEYWORDS

accessibility, business model design, decarbonization, digital economy, digital platform, energy transition, environmental paradox, flexibility, hybrid business model, hybrid organizing, platform management, platform organization, redistribution, responsible innovation, sharing economy, sustainable technology

1 | INTRODUCTION

The *sharing economy*—“a socio-economic ecosystem that commonly uses information technology [digital platforms] to connect different stakeholders [...] in order to make value by sharing their excess capacities for products and services” (Laamanen et al., 2016, p. 218)—has become a central mode of organizing. The global sharing economy is

forecasted to reach US \$335 billion by 2025, compared with \$15 billion in 2014 (Mazareanu, 2019). The sharing economy spans various industries, including vehicle rides, accommodation, tools, labor, expertise, food, or electricity. *Digital platforms*, which we define as match-making technologies between providers and consumers to facilitate the sharing of excess product and service capacities, have facilitated and spurred the sharing economy and have fundamentally altered

Abbreviations: CEO, Chief Executive Office; CO₂, carbon dioxide; DERs, distributed energy resources; DNO, distribution network operator; EV, electric vehicle; GW, gigawatt; IT, information technology; Kg, kilogram; MW, megawatt; PV, photovoltaics; UK, United Kingdom; US, United States; USD, United States Dollar; V2G, vehicle-to-gri.

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how we consume products and services (cf. Laamanen et al., 2018; Muñoz & Cohen, 2017). Digital platforms are operated by *platform organizations* and *platform managers*, that is, the organizations and decision-makers that do business with digital platforms in the sharing economy (cf. Mair & Reischauer, 2017).

While the research has recognized the sharing economy's potentials to help solve society's grand challenges, it also points to the *environmental paradox*—the tensions that platform organizations may face between for-purpose environmental and for-profit financial value-creation goals (cf. Acquier et al., 2017). Digital platforms reduce consumption, realizing environmental value (see Botsman & Rogers, 2010; Frenken & Schor, 2017), and promote consumption, realizing financial value (see Murillo et al., 2017; Parguel et al., 2017).

Hybrid organizing is a mechanism through which organizations manage the tensions between multiple and potentially conflicting value-creation goals (see Battilana & Dorado, 2010; Pache & Santos, 2013; Smith et al., 2013). While the literature has advanced the role of hybrid organizing in different phenomena (see Battilana & Lee, 2014), it has only recently begun to focus on *hybrid business models*, that is, business models that pursue both for-profit and for-purpose value-creation goals. It has recognized that organizations face tensions between multiple goals in hybrid business models (Davies & Doherty, 2019). Yet we know very little about the managerial drivers and mechanisms through which managers realize multiple goals when they design business models. This focus is critical, because it suggests that platform managers may have agency for shaping platform organizations' management of the environmental paradox and their resulting environmental impact. We ask: Under which conditions and how do platform organizations realize both for-purpose and for-profit value-creation with their business model?

Based on a qualitative, inductive case study of the business model of Piclo Flex, a UK-based digital platform facilitating a sharing economy for flexibility services in the electricity industry, we find the roles of two *business model design themes* (Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Zott & Amit, 2010)—*redistribution* and *accessibility*—for platform organizations' management of the environmental paradox. We develop propositions that link these two design themes to environmental and financial value-creation, respectively, and argue that hybrid business models hinge on their integration. We find that two managerial drivers—strategic synergies and dynamic coupling—increase these design themes' integration.

We show that digital platforms not only create paradox by focusing on one or the other design theme, but they can actively manage the environmental paradox. By advancing the crucial role of digital platforms' business model design for realizing both for-purpose and for-profit value-creation goals, we contribute to the research into hybrid business models (see Boyd et al., 2017; Davies & Chambers, 2018; Davies & Doherty, 2019; Haigh & Hoffman, 2011; Stubbs, 2018), paradox in the sharing economy (see Acquier et al., 2017; Mair & Reischauer, 2017; Murillo et al., 2017; Parguel et al., 2017), paradox more broadly (see Schad et al., 2016), and business models toward sustainability (see Schaltegger et al., 2016; Stubbs & Cocklin, 2008). We will now review the literatures on hybrid business models and the sharing economy.

2 | HYBRID BUSINESS MODELS IN THE SHARING ECONOMY

2.1 | Hybrid business models and the environmental paradox

Hybrid business models pursue both for-profit and for-purpose value-creation goals. They have been addressed in various literatures and contexts, that is, settings of social enterprises (see Davies & Doherty, 2019; Grassl, 2012; Kolk & Lenfant, 2016; Santos et al., 2015; Stubbs, 2018; Wilson & Post, 2013), sustainability (see Davies & Chambers, 2018; Dreyer et al., 2017; Hahn & Spieth, 2014; Schaltegger et al., 2016; Stubbs & Cocklin, 2008), and open innovation (see Bonaccorsi et al., 2006; Deodhar et al., 2012). The literature advances hybrid business models as a means through which organizations may help solve society's grand challenges. For instance, shared-value business models, such as Grameen Bank's microfinance business model, seek to realize both social and financial value (Khavul, 2010). Also, business models for sustainable technologies seek to promote sustainable consumption and contribute revenues to the organization, realizing both environmental and financial value (see Bohnsack et al., 2014; Davies & Chambers, 2018; Rogers et al., 2012).

Because hybrid business models seek to simultaneously deliver multiple forms of value, straddling different for-profit and for-purpose value-creation paradigms, they are subject to tensions, owing to the competition between the organizational activities relating to each value-creation type (see Jay, 2013; Pache & Santos, 2013; Smith et al., 2013). Addressing one domain may result in insufficiently addressing another one. Also, the sharing economy literature suggests that tensions arise between for-purpose and for-profit value goals (see Acquier et al., 2017; Dreyer et al., 2017; Kornberger et al., 2018). Specifically, platform organizations face an *environmental paradox*—persistent contradictions between interdependent forces on the environment (cf. Schad et al., 2016, p. 10). Because they can both reduce and promote consumption, they face tensions between serving for-purpose environmental and for-profit value-creation goals (Acquier et al., 2017; Murillo et al., 2017).

2.1.1 | Reduction of resource consumption

On the one hand, by facilitating a sharing economy, digital platforms can reduce the overall net consumption of resources (see Botsman & Rogers, 2010; Frenken & Schor, 2017), realizing *environmental value*, defined as a positive net impact on the environment (Schaltegger et al., 2016). A key argument has been that the sharing economy reduces the need for consumers to own resources, because it enables a collaborative use of resources rather than a transfer in ownership (see Botsman & Rogers, 2010; Frenken & Schor, 2017). Environmental economics research has empirically demonstrated the positive environmental effects of digital platforms in the sharing economy by facilitating the sharing of resources. These studies have shown that shared mobility models, such as carsharing and ridesharing, likely lead to net

decreases in car use (e.g., Martin & Shaheen, 2011; Nijland et al., 2015) and to decreases in consumers' de facto or planned car ownership (e.g., Becker et al., 2018; BundesverbundCarsharing, 2010; Firnkorn & Müller, 2011; Giesel & Nobis, 2016; Litman, 2000; Martin et al., 2010).

2.1.2 | Promotion of resource consumption

On the other hand, digital platforms can promote the overall net resource consumption (see Murillo et al., 2017; Parguel et al., 2017), realizing *financial value*, defined as the creation of revenue streams and profit pools. A key argument has been that, rather than transferring ownership of resources, digital platforms create and capture financial value through matchmaking and service provision (see Scholz, 2016; Stephany, 2015). For consumers, they provide temporary access to resources (Bardhi & Eckhardt, 2012), which may be cheaper and more practical than ownership of these same resources (Acquier et al., 2017). For providers, they enable private persons to assume the role of sellers (Kotler, 1986) or prosumers (Belk, 2014) who generate income (Muñoz & Cohen, 2017). Economists have reported important rebound effects in the sharing economy (e.g., Demailly & Novel, 2014; Denegri-Knott, 2011; Denegri-Knott & Molesworth, 2009; Martin, 2016; Martin & Shaheen, 2011; Phipps et al., 2013; Thomas, 2003, 2011; Verboven & Vanherck, 2016). For instance, the use of shared mobility services relates positively to an increased demand for car use (Clark et al., 2014; Martin & Shaheen, 2011). Evidence from Denmark and Norway suggests that the rebound effect could amount to 3 tons and 814 kg of CO₂ emissions per carsharing member per year (Skjelvik et al., 2017).

2.2 | Hybrid organizing and business models

The broader literature suggests that organizations manage tensions between multiple value-creation goals through *hybrid organizing*—the activities, structures, processes, and meanings with which organizations manage the tensions associated with multiple goals (see Battilana & Lee, 2014; Pache & Santos, 2013; Smith et al., 2013). Studies have scrutinized hybrid organizing in different phenomena, such as organizational identity (see Battilana & Dorado, 2010) or forms (see Tracey et al., 2011). These studies suggest that the failure to integrate the two competing paradigms has negative consequences for the organization, sometimes even its failure (Tracey et al., 2011). A failure to integrate the competing paradigms may exacerbate the inherent tensions, foster conflict (Battilana & Dorado, 2010; Tracey et al., 2011), tradeoffs, and competition (Arradon, 2007), and may lead to insufficiently addressing one paradigm at the expense of another (Jay, 2013). In turn, organizations that integrate competing paradigms are more likely to succeed. They are more likely to simultaneously address multiple audiences so as to be recognized as legitimate (Battilana & Lee, 2014) and to limit conflict (Besharov, 2014; Waldman & Bowen, 2016).

Despite the key role of hybrid organizing in managing organizations' multiple value-creation goals, there has been little research into its role in hybrid business models (except Smith et al., 2010, on the role of leadership practices). Most research into hybrid business models has advanced *that* organizations face tensions between competing goals, and that a failure to manage these tensions may have negative consequences (Davies & Doherty, 2019). Further, it has focused primarily on social enterprises, and the tensions between for-profit and social goals. While some research has emphasized *that* organizations face tensions between for-profit and environmental goals (see Davies & Chambers, 2018; Hahn & Spieth, 2014; Haigh et al., 2015; Haigh & Hoffman, 2011; Schaltegger et al., 2016; Stubbs & Cocklin, 2008), we know very little about the drivers and mechanisms through which these goals are realized.

These shortcomings merit further attention. Tensions may not only be given, but organizations' pursuit of multiple goals are managed more or less effectively, and managers play a key role therein (see Smith et al., 2010). Such a focus may help uncover the role of managers in shaping how organizations manage the environmental paradox. We ask: *Under which conditions and how do platform organizations realize for-profit and environmental value-creation goals with their business model?*

2.3 | Hybrid business models: The role of business model design

To address this research question, we adopt a business model design lens, which advances managers' central role in *business model design*, defined as the configuration of the system of interdependent activities through which the organization creates and appropriates value (see Amit & Zott, 2001; Demil & Lecocq, 2010; Zott & Amit, 2010). We distinguish between design themes and design elements of business models, in our case, of digital platforms. *Design themes* are the “source of the activity system's value creation” (Zott & Amit, 2010, p. 216), that is, the overarching value-creation *logics* for the stakeholders (Casadesus-Masanell & Ricart, 2010, p. 198), while *design elements* are “the architecture of an activity system” (Zott & Amit, 2010, p. 216), that is, an organization's specific choices (see Casadesus-Masanell & Ricart, 2010; Porter, 1985, 1991). In the sharing economy, platform organizations operate business models for digital platforms to exploit the value of two-sided markets (Evans & Schmalensee, 2016; Rochet & Tirole, 2003). A critical aspect of their design is their use of “information technology (IT systems), available via web-based platforms, such as mobile ‘apps’ on Internet-enabled devices” (Cockayne, 2016; Telles, 2016, p. 1), which enables digital platforms to connect consumers and providers of resources and facilitates all processes between them (see Hagiú, 2009; Laamanen et al., 2018; Muñoz & Cohen, 2017). Despite the recognition that digital platforms facilitate the sharing economy (Cockayne, 2016, p. 73; Mair & Reischauer, 2017, p. 12), we know very little about the role of the design of digital platforms' business models for platform organizations' realization of multiple goals.

3 | METHODOLOGY

The lack of prior theorizing on the drivers and mechanisms through which multiple value-creation goals are realized justified a qualitative and inductive case study (Eisenhardt, 1989; Yin, 2002). We selected a particularly “revelatory” case (Siggelkow, 2007; Yin, 2002, p. 42) in the electricity industry, where the phenomenon of interest was “transparently observable.” (Eisenhardt, 1989, p. 537). We could directly trace how multiple goals were realized through the platform's business model design—our unit of analysis—between 2016 and 2021.

We collected data that trace managers' design of the digital platform's business model. We sourced archival data (523 pages), including media releases and reports, nine public presentations and nine interviews (six with public sources and three with senior managers who provided informed consent). Interviews were transcribed. To develop generalizable knowledge on digital platforms' business model designs, we focused on the sources of value-creation of the activity system (business model design *themes*) and on the architecture of the digital platform's activity system (business model design *elements*) (see Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Porter, 1985, 1991; Zott & Amit, 2007).

Concerning data analysis, we first coded observations of the platform's business model design elements, focusing on the *content*, *structure*, and *governance* of the platform's activity system. The content refers to *which* activities the organization chooses to perform; the structure refers to *how* the activities are linked; and the governance refers to *who* performs the activities (see Zott & Amit, 2010). Second, we then derived the overarching design themes or logics through which the design elements create environmental or financial value, or both. Thus, we searched for patterns in our data by gradually moving from first-order to second-order concepts and to aggregate themes (see Table 1). We continually circulated among the empirical data, emerging themes, and literature to refine the emerging categories until theoretical saturation was achieved (Eisenhardt, 1989). At this point, we derived the two design themes, redistribution and accessibility, which we found pertained to environmental and financial value-creation, respectively. We inductively developed these themes, as we realized that the design elements shaped the degree of use of otherwise underutilized flexibility, the degree of market access granted to consumers and providers, or their impacts on both. Third, to uncover the drivers of hybrid business model designs, we specifically searched for the aspects in our data that enabled managers to pursue both design themes. We then engaged in a similar procedure as in the previous step to derive the two concepts of *dynamic coupling* and *strategic synergies*. To lend further substance to our theoretical propositions' generalizability beyond our case, we compared our results to the literature (Eisenhardt, 1989, p. 544).

4 | RESEARCH SETTING

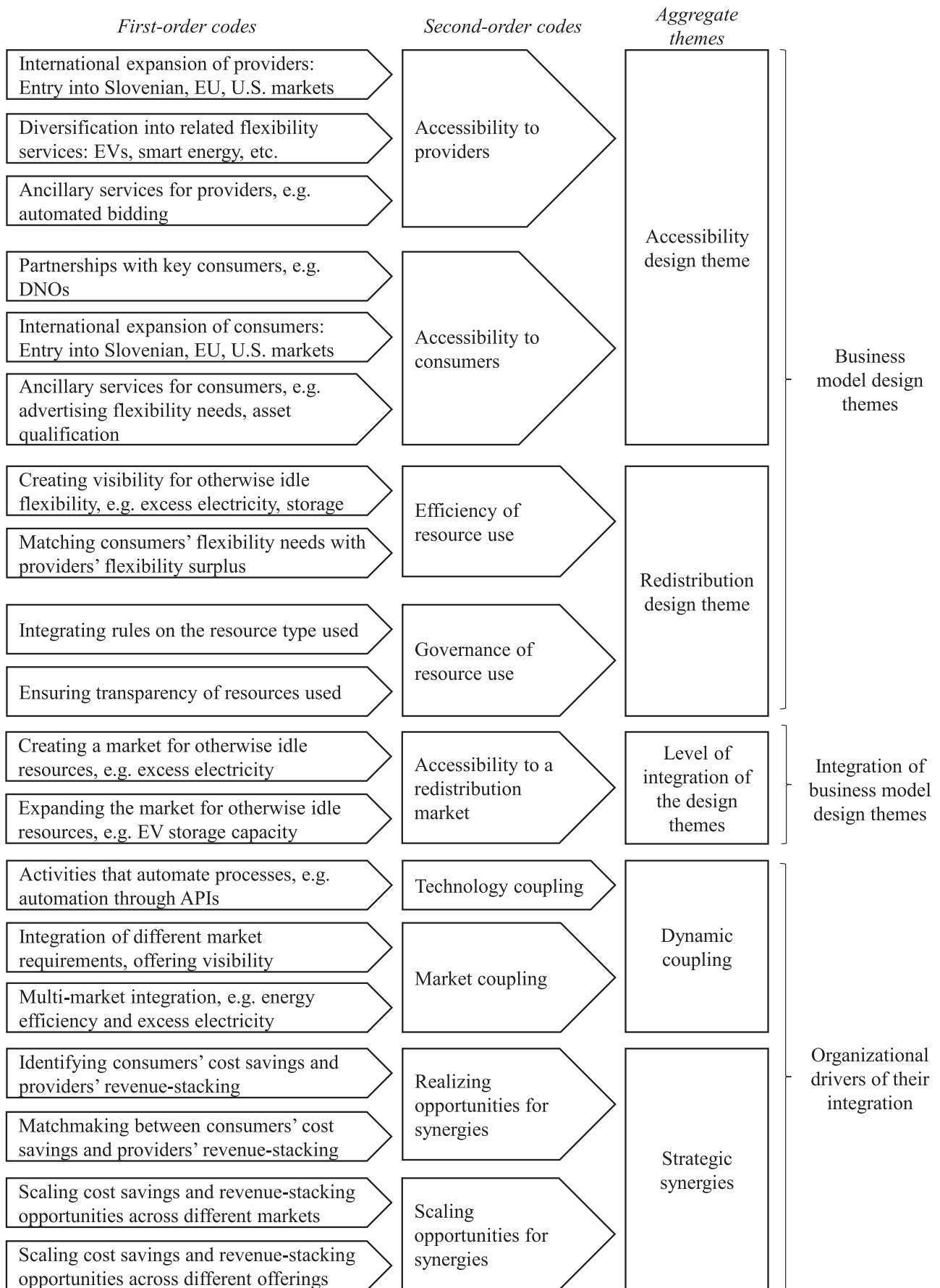
By committing to a decarbonization of the carbon energy system, the electricity industry faces an environmental paradox. On the one hand,

to meet the net-zero target, it is required to integrate greater shares of low-carbon sources into the grid. On the other hand, these assets may not always be the most economically efficient ones and imply new issues, such as ensuring electricity supply security, which is due to the inherent variability of electricity production from low-carbon sources (see Verzijlbergh et al., 2017). It therefore requires additional resource investments (e.g., into grid infrastructure) to ensure supply security.

Piclo—a UK-based platform organization named Startup of the Year at the European Utility Week and one of Bloomberg's 50 Business Innovators in 2015—is addressing this challenge. In June 2018, Piclo launched Piclo Flex—a digital platform that facilitates a sharing economy for flexibility services by matching consumers and providers of flexibility, that is, a flexibility marketplace (L20; PB19). *Flexibility* adapts electricity demand or supply to the variability resulting from low-carbon sources (IEA, 2011). Flexibility reduces peaks by adding or reducing the volume of electricity in specific locations or by timing supply and demand (see Helms et al., 2016; Kubli et al., 2018; Reuter et al., 2019). For flexibility consumers like electricity grid operators, the platform provides a digital service for procuring flexibility (see also Xu et al., 2018). It enables consumers to defer otherwise necessary infrastructure investments, thereby saving on costs. To illustrate, for the United Kingdom's energy system to transition to a net-zero carbon system by 2050, flexibility can reduce the whole-system cost by £4.55 billion per year by 2050 or reduce network investments by 50% (P20a). For providers, the holders of excess flexibility (e.g., the owners of solar PV, batteries, electric vehicles, [smart] consumption devices, etc.), flexible provision enables them to connect their assets to the grid and to seize revenue-stacking opportunities via the platform, thereby improving their assets' economic efficiency (P20b). For instance, as solar panels generate excess electricity or EV batteries have excess storage capacity, their owners may create revenues from offering flexibility services via the platform.

With its flexibility marketplace, Piclo Flex offers a solution to the challenges in the decarbonization of the energy system. It seeks to contribute “a democratized and decentralized net-zero energy system” (P20c) that renders “electricity networks smart, flexible, and clean.” (I4). With its business model of the flexibility marketplace, it pursues both environmental and financial value-creation goals and turns what could be an environmental paradox into a virtuous circle between both goals. First, Piclo Flex pursues the environmental decarbonization goal by increasing the amount of flexibility that is connected to the grid, enabling consumers to forego otherwise necessary investments into the grid, and enabling providers to connect greater shares of low-carbon sources. It reports on the MW of flexibility procured and on the asset types. Second, Piclo Flex pursues the financial value-creation goal, generating revenues from the fee paid by consumers in exchange for advertising their needs and for participating in the online auctions of flexibility. The fees vary with the level of services offered. Providers can freely access the platform to incentivize their participation. Piclo engages in typical platform activities, including maintenance, demand–supply matching, auctions, handling payments, and supporting IT services such as online registration, solution

TABLE 1 Code structure



codification, online visibility, and automatic e-mail notifications (I3). By February 2021, the platform hosted six distribution network operators (DNOs) in the United Kingdom and started to expand to other European countries (P20); Piclo Flex counted more than 12.5 GW of flexible capacity across 24,000 assets from flexibility providers in the United Kingdom (L20; P19; P20f) and ran more than 1000 competitions (PW).

5 | THE ROLE OF BUSINESS MODEL DESIGN THEMES FOR MANAGING THE ENVIRONMENTAL PARADOX

We will now provide a summary narrative of our key findings on the mechanisms and enablers of platform organizations' designs of hybrid business models in the sharing economy based on the Piclo Flex case. We will then develop theoretical propositions. Table 1 illustrates our code structure. Table A1 provides further exemplary evidence.

5.1 | The case of Piclo Flex

Concerning the activity system's content, Piclo operates a digital platform. Piclo Flex is a marketplace for flexibility services, matching flexibility consumers to flexibility providers. It enables providers to exploit revenue-stacking opportunities on the platform when they offer their flexibility. In turn, it offers consumers the opportunity to display their flexibility needs on the platform and grants them access to flexibility volumes via a single, integrated access point. To illustrate, Piclo Flex enables DNOs to signal where and when they need flexibility, then enables online auctions, in which providers can bid for defined capacities (L20).

As a fairly young venture, Piclo has sought to grow its consumer and provider bases. An interviewee stated that “[O]ur value ... is all about growing the base of buyers and growing the base of sellers and the actual megawatts of flexibility procured.” (I4). Piclo targeted consumers and providers when it had identified opportunities for synergies between both parties. For consumers, it started with DNOs. Having access to flexibility services enables consumers to defer otherwise necessary investments into network reinforcement. They could complement their own flexibility business, reduce network congestion, and greatly reduce costs. Providers could sign up for free to participate in the auctions and to access revenue-stacking opportunities.

By continually creating visibility for providers' flexibility surplus and electricity distributors' flexibility needs and by linking the two parties, Piclo Flex is enhancing the extent to which otherwise non-utilized resources are used. An interviewee stated: “[I]t's just a much more efficient way you're using an asset, which is being used in multiple different ways to serve the energy system to avoid unnecessary reinforcement.” (I3). With “... a flexible energy system, more assets are able to connect to the grids in our decarbonization journey. More EVs are able to be connected, more renewables, heat pumps. It's all part of that journey toward having more low-carbon technologies and

not only being able to manage them on the grid, but actually being able to connect them in the first place.” (I4).

Importantly, Piclo enables matchmaking between flexibility surplus and needs by assuming a *market operator* role. It creates new markets and expands markets for flexibility. It creates “a flexibility market that is accessible to DERs [distributed energy resources], providers – industry, communities, and other market participants.” (PW). “Renewables will be enabled to (...) provide grid capacity, paving the way for new low-carbon generation to be brought online at lower cost.” (S20). While Piclo Flex originally focused only on a market for DNO flexibility services (P20c), it is further expanding the market into an “online exchange for buying or selling any type of flexibility product” and, further, into “a single access point for various energy services.” (S20). For instance, Piclo has recognized opportunities to broaden the provider base. Vehicle-to-grid (V2G) technology may enable flexibility services, since EVs can temporarily store electricity. It enables EV owners to benefit from revenue-stacking opportunities in the flexibility market (P20a). Piclo further sees opportunities not only in providing a primary market, but also a secondary one for flexibility services with the secondary trading of flexibility obligations and curtailment obligations (P20c). It may further expand the range of otherwise untapped flexibility surplus (P20c).

Together, Pico integrates multiple otherwise unconnected markets into one overall marketplace, where users “will be able to search for and bid into a variety of different products – including DNO flexibility services, secondary trading of obligations, ancillary services, and flexible-power purchase agreements,” as its CEO stated (P20c). By coupling all these different services, Piclo also creates competition between services that otherwise would not have competed, for instance, between energy efficiency services and batteries. It thereby seeks to increase the efficiency of the prices that reflect the “true value signal,” proposing the “most efficient solution,” for instance for a problem of network congestion (I3).

Concerning the activity structure, from 2019, Piclo has further expanded into international markets, where consumers and providers would similarly benefit from flexibility services and where Piclo could scale its business model. In Scotland, it collaborated with the network operator to develop the flexibility market with local providers. The network operator sees opportunities to reduce network constraints in the Western Isles and Skye (S20). Piclo has joined the Slovenian Green Transformation Consortium to drive the country's 2050 net-zero goals. The entry into the Slovenian market, a central location in Europe (L20), has allowed Piclo to further test its model's scalability (PW). It sees opportunities to scale its model across Europe following the implementation of the Clean Energy Package (I3; I4).

Concerning activity system governance, an important question for Piclo was the decision who assesses providers. Because “the rules of the system are going to be basically in favor of decarbonization,” Piclo decided to not set the rules and to not give preferential treatment to particular technologies, remaining “technology-neutral.” (I4). An interviewee noted that “It is the consumers who set the rules. (...) Distributors must follow public procurement rules ... we would just have to adopt what the local rules are and integrate them into the

marketplace.” (I3). The platform sees its roles as implementing the rules and ensuring the transparency of the traded electricity types (I4).

5.2 | Propositions on the role of business model design themes

Our findings uncovered the roles of two design themes—*accessibility* and *redistribution*—for the digital platform's business model financial and environmental value-creation, respectively. We further found that the digital platform's hybrid business model hinges on the level of integration of the two design themes. Further, two managerial drivers—*strategic synergies* and *dynamic coupling*—enable the platform organization's design of a hybrid business model, since they enable the integration of the two design themes. We will now develop propositions. Figure 1 illustrates the proposed relationships between the design themes, their level of integration, and the business model's value-creation. Figure A1 further illustrates the design elements that underpin the design themes.

5.2.1 | The accessibility design theme

First, we find the critical role of what we conceptualize as the *accessibility design theme* of the digital platform's business model, defined as the degree to which the digital platform's activity system grants consumers, providers, or prosumers access to resource markets. It is the

key driver of the platform's financial value creation. In our case, by granting access to consumers and to providers, Piclo Flex creates a market for resources (i.e., flexibility), in which it earns revenues from connecting the two (e.g., via access fees) and from facilitating the marketplace (e.g., auctions, payments). The accessibility design theme exploits the forces of two-sided markets (see Evans & Schmalensee, 2016; Hagiu, 2009; Rochet & Tirole, 2003) where the financial value rests in the size of the groups that are connected via the platform (Armstrong, 2006). As wider consumer and provider bases are granted access, a new market is created and expanded, with the platform's design for accessibility likely driving the digital platform's financial value-creation by increasing the overall net demand for resources (increasing consumption). It has two dimensions.

First, we found that it entails activities that foster *accessibility to consumers*, that is, the extent to which the consumers of resources gain market access. In our case, the platform organization promoted resource consumption with activities that expanded access to consumers (i.e., the number and types of consumers) and to services (i.e., buying flexibility and ancillary services that facilitate transactions) consumers otherwise would have lacked access to. Piclo Flex facilitated, first, DNOs' and then other consumers' access to different flexibility service types (e.g., adapting electricity supply or demand). Being granted access to flexibility services, electricity distributors access flexibility when they need it (i.e., on demand), accessing the most efficient available flexibility service at a given point, overall, foregoing otherwise necessary infrastructure investments, thus, saving costs. With design elements that enhance consumers' accessibility,

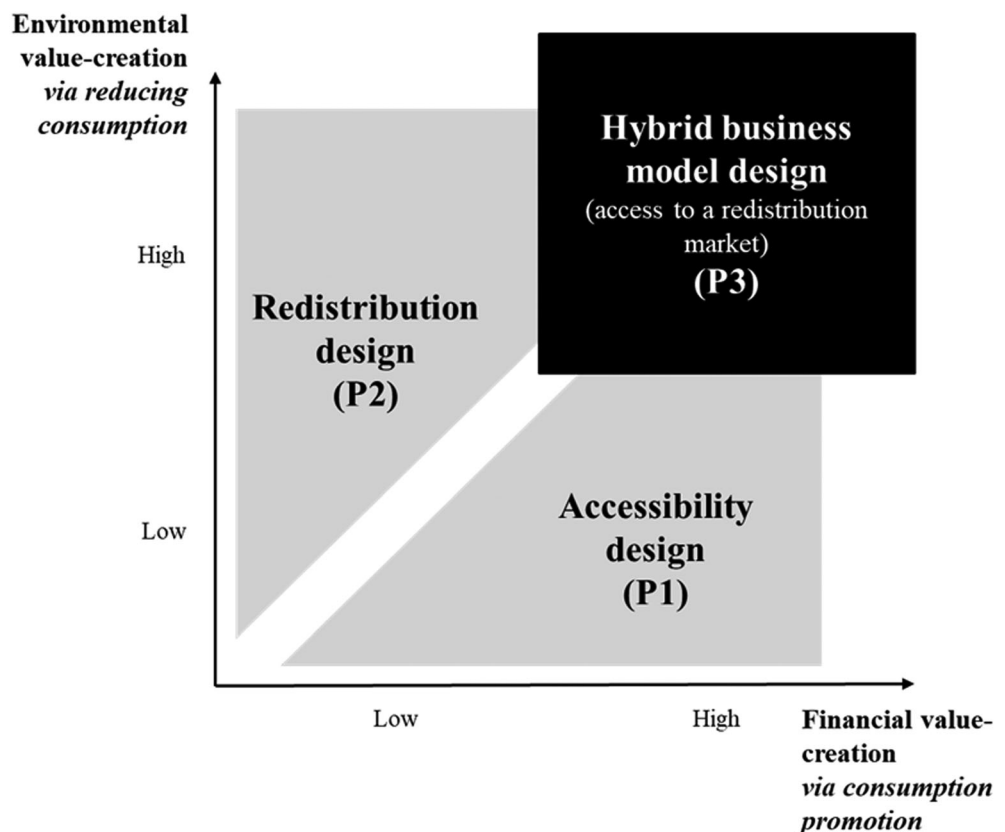


FIGURE 1 Business model design and the environmental paradox in the digital sharing economy

platforms may drive financial value-creation by promoting resource consumption.

Second, we found that the accessibility design theme entails activities that increase the *accessibility to providers*, that is, the extent to which market access is granted to resource providers. In our case, the platform organization promoted resource consumption with activities that expanded access to a wide provider base (i.e., a larger number and different types of providers) and to services (i.e., offering flexibility services and ancillary services that facilitate transactions) they otherwise would have lacked access to. Piclo Flex gives providers opportunities to stack revenues, improving their assets' economic efficiency. With design elements that expand providers' accessibility, digital platforms may drive financial value-creation by promoting the consumption of resources. We propose:

Proposition 1. The accessibility design theme of the digital platform's business model is the most likely to enable financial value-creation via its consumption promotion effect.

5.2.2 | The redistribution design theme

Second, our findings revealed the critical role of what we refer to as the *redistribution design theme* of the digital platform's business model, defined as the degree to which the digital platform's activity system leverages resource use. It drives the platform's environmental value-creation. We found that by increasing the use of otherwise underutilized resources (in our case, otherwise idle or excess flexibility), the digital platform reduces the overall demand for resources (in our case, otherwise necessary infrastructure investments to ensure supply security). It thereby creates dematerialization savings on natural resources (Pouri & Hilty, 2018) and reduces the environmental impact that would be created with production (Botsman & Rogers, 2010). Our data revealed that the redistribution design theme has two aspects.

First, it comprises activities that increase the *efficiency of resource use*, that is, the extent of resource use. In our case, the platform organization increased the extent of resource use by creating visibility for electricity distributors' flexibility needs at a given point in time and by matching them with otherwise non-utilized flexibility (e.g., excess electricity, storage, and demand regulation capacities) on the platform through a bidding process and auctions. Thus, it enabled underutilized flexibility capacity to be used further. Further, Piclo created new uses for otherwise idle resources. To illustrate, Piclo included the use of energy efficiency or of EVs' otherwise idle storage capacity, which could now also act as a flexibility service. With design elements that increase the efficiency of resource use, digital platforms may drive environmental value-creation by reducing the overall resources consumption.

Second, we found that the redistribution design theme comprises activities that increase the *governance of resource use*, that is, the extent of control over the type of resources that are used.

Although Piclo's marketplace is limited to flexibility, it does not directly control whether or not it stems from low-carbon sources. Instead, the regulators exert control by defining the electricity procurement rules for consumers. Piclo sees its mandate as providing only a technology-neutral marketplace and increasing the transparency of the traded resources (e.g., via public reporting of the amount of procured flexibility and from which asset types). Counterfactually, platform organizations could also exert closer governance, for instance, by integrating rules on the traded resource type, for instance, restricting platform access to flexibility issued from specific sources only or, in the mobility context, only to licensed drivers so as to limit potential rebound effects. With design elements that increase the resource use governance, digital platforms may drive environmental value-creation by reducing the overall consumption of resources. We propose:

Proposition 2. The redistribution design theme of the digital platform's business model is the most likely to enable environmental value-creation via its consumption reduction effect.

5.2.3 | The level of integration of design themes

Third, we found the critical role of what we refer to as the *level of integration of design themes*, defined as the extent to which organizations embrace the complementarities between multiple design themes. The platform's business model exploited strong complementarities between accessibility and redistribution, which enabled it to realize both financial and environmental value, in our case, by emphasizing consumers' and providers' *accessibility* to a *redistribution* market for otherwise idle resources (in our case, flexibility). It thereby turned consumers' and providers' accessibility to a flexibility market into a driving force to accelerate the decarbonization of the electricity industry in a financially viable way.

This finding resonates with the paradox literature. The redistribution and the accessibility design themes form a duality. They may be both contradictory and complementary (cf. Farjoun, 2010) for a digital platform's value-creation. It is by seizing the complementarities between the two, rather than their opposition, that organizations may realize the combined environmental and financial value. Instead of segregating competing yet co-existing forces, Poole and Van de Ven (1989) advanced *synthesis* as a strategy to manage paradoxes. Organizations may fruitfully integrate competing forces by identifying a novel solution—in our case, *accessibility to a redistribution market*—that embraces the competing forces' complementarities. They are “two sides of the same coin.” (Lewis, 2000, p. 761).

Similarly, scholars have suggested that organizations may seize the virtuous cycles between the opposing forces that underpin sustainability strategies (Smith et al., 2011). They may foster their integration, for instance, into a business case for sustainability (Hahn et al., 2010, 2014, 2018). The more general research into paradox has demonstrated that organizations' integration of competing forces may positively affect organizational success (e.g., Schmitt & Raisch, 2013).

We propose the level of integration of the design themes as an alternative to the focus either on accessibility or redistribution for digital platforms' management of the environmental paradox. We argue that hybrid business models—the extent to which they realize both environmental and financial value—hinges on the level of integration of (rather than opposition between) the design themes. We propose:

Proposition 3. The higher the level of the integration of design themes (of the accessibility and the redistribution design themes), the more likely digital platforms are to realize hybrid business models (i.e., for-profit financial and for-purpose environmental value).

5.3 | Propositions on the role of managerial drivers for integration

We will now uncover the managerial drivers of the design themes' level of integration—in our case, of the accessibility and the redistribution design themes.

5.3.1 | Strategic synergies

First, we found that platform managers engaged in continual integration through what we refer to as *strategic synergies*, defined as the activities through which managers exploit the complementarities or mutual advantages between multiple design themes. In our case, platform managers realized strategic synergies between redistribution and accessibility. It is by seizing the “synergistic relationship” of otherwise “distinct” design themes to “create a unified whole” or “a unified synergy between alternatives” (Schad et al., 2016, pp. 11–12) that they manage the integration of design themes. This concept has two dimensions.

First, we found that the platform managers continually *realized opportunities for synergies*. They identified that flexibility services presented cost-saving opportunities for consumers (i.e., distributors could save >50% in costs), while giving the providers revenue-stacking opportunities (i.e., sell excess flexibility to increase their assets' economic efficiency). Piclo managers recognized that linking the two into fostering *accessibility to a redistribution market* could create mutual advantages for both parties. Piclo Flex thereby integrated both environmental value-creation (i.e., increasing the redistribution of otherwise underutilized flexibility) and financial value-creation (i.e., earning revenues from providers' and consumers' increased accessibility).

Second, the platform managers *scaled opportunities for synergies*. The mutual advantage Piclo Flex created for both consumers and providers of flexibility through fostering *accessibility to a redistribution market* could be expanded into new international markets (e.g., Slovenia, Ireland, Scotland), and to different flexibility provider

types (e.g., of low-carbon electricity, energy efficiency, demand regulation, storage capacity).

We argue that the more platform managers seize strategic synergies across design themes, the more likely they are to realize high levels of integration between multiple design themes.

Proposition 4. The more the platform managers seize strategic synergies, the more likely the digital platform is to realize high levels of integration between both for-profit financial and for-purpose environmental value.

5.3.2 | Dynamic coupling

Second, the platform managers continually integrate design themes through what we refer to as *dynamic coupling*, defined here as the activities through which the platform managers adapt the platform's market and technology design to the multiple design themes' requirements. We found that this concept has two dimensions.

First, the platform managers engaged in what we refer to as *market coupling*, that is, the continual adaptation of the platform's market design to the multiple design themes' requirements. In our case, for Piclo Flex to facilitate *accessibility to a redistribution market* (integration of the redistribution and the accessibility design themes), it needed to fulfill the market and regulatory requirements for procurement, operations, and settlement (e.g., asset, buyer, seller qualification) of the multiple markets that it integrated into one single marketplace. For instance, for a distributor's problem of network congestion, it enabled both EV storage and energy efficiency services to compete to solve the problem. However, as an interviewee noted, “Different types of products have different market rules associated with them, so we need to think about how we bring all of this together in one interface.” (I2).

Second, the platform managers engaged in what we refer to as *technology coupling*, that is, the continual adaptation of the platform's technology design to multiple design themes' requirements. In our case, for Piclo Flex to facilitate *accessibility to a redistribution market*, it faced increasingly multifaceted requirements. Thus, its managers saw a big advantage in the automation of processes through APIs in procurement, operations, and settlement. An interviewee noted: “We could offer a back-office integration between the flex provider's data and the Piclo marketplace. So, it would enable automatic updates of their asset information, automatic qualification, or bidding results, that kind of data transfer.” We argue that the more the platform managers engage in dynamic coupling (market and technology coupling), the more likely they are to realize high levels of integration between multiple design themes.

Proposition 5. The more the platform managers engage in dynamic coupling, the more likely the digital platform is to realize high levels of integration between both for-profit financial and for-purpose environmental value.

6 | DISCUSSION

Based on our qualitative case study of Piclo Flex's business model design, we inductively developed novel propositions on the *conditions under which* and *how* digital platforms realize multiple (i.e., both for-profit financial and for-purpose environmental) value-creation goals with their business model. By adopting a business model design lens (see Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Porter, 1985, 1991; Zott & Amit, 2007), we contribute the roles of business model design themes and their impacts on for-profit financial and for-purpose environmental value-creation goals, respectively. Platform organizations may emphasize the accessibility design theme (realizing financial value), the redistribution design theme (realizing environmental value), or the integration of both into a hybrid business model. Further, we uncovered two managerial drivers—strategic synergies and dynamic coupling—that enable the integration of these design themes. These findings suggest that it is through business model design that platform organizations manage environmental paradoxes (competing financial and environmental goals, in our case, due to the decarbonization of the energy industry) more or less successfully. It shapes their emphasis on any one design theme or on their integration (realizing both financial and environmental value-creation rather than either one alone), thereby realizing hybrid business models. In doing so, we have contributed to the literature.

First, by adding the critical role of business model design in realizing hybrid business models, we have contributed to the literature on hybrid business models, which has suggested *that* organizations face tensions between for-profit and for-purpose goals (see Davies & Chambers, 2018; Dreyer et al., 2017; Hahn & Spieth, 2014; Schaltegger et al., 2016; Stubbs & Cocklin, 2008) and that a failure to manage these tensions may have negative consequences for the organization (Davies & Doherty, 2019). We have added a focus on the drivers and mechanisms through which organizations realize multiple value-creation goals. In particular, and following our business model design lens, we have advanced the roles of the redistribution and the accessibility design themes for digital platforms' business model focus on the environmental and the financial value-creation goals, respectively. Digital platforms have the potential to realize hybrid business models (realizing both environmental and financial value-creation) by integrating multiple design themes. Our findings suggest that organizations may design hybrid business models more or less successfully depending on the degree of emphasis on the integration of the design themes (in our case, *accessibility to a redistribution market*), rather than on any design theme alone, when managers decide on business model elements. Further, distinct managerial activities—strategic synergies and dynamic coupling—may help integrate design themes by enabling organizations to seize the complementarities (see Farjoun, 2010) or mutual advantages rather than the tensions between competing design themes, which—as we argued—is crucial to realizing hybrid business models.

While the research has uncovered the key roles of business model design themes for value-creation (see Casadesus-Masanell & Ricart, 2010), for instance, in the contexts of e-commerce (Amit & Zott, 2001) and new ventures (Zott & Amit, 2007), we have

demonstrated their relevance in hybrid business models, pursuing multiple value-creation goals, and in the specific context of digital platforms in the sharing economy. We argued that accessibility and redistribution shape for-profit financial and for-purpose environmental value-creation, respectively, via the impacts of the design elements (or activities) on consumption promotion and consumption reduction, respectively. In turn, hybrid business models depend on the level of integration of the two design themes (in our case, *accessibility to a redistribution market*). The conceptual vocabulary depicting the business model design, as well as the links between the design themes and impacts on value-creation, may guide future conceptualizations. While we focused on the role of business model design in digital platforms' management of the environmental paradox in the electricity industry, in our view, our findings may be highly generalizable to other settings, for instance, to the mobility industry.

First, the business models of the digital platforms Uber or Lyft may be characteristic of the accessibility design theme, given their emphasis on activities that enhance providers' and consumers' access to a market for ride services. Based on Uber's internal data, the Chairman of President Obama's Council of Economic Advisers, Alan Krueger, argued that “the availability of modern technology, like the Uber app, provides many advantages and lower prices for consumers compared with the traditional taxi cab dispatch system, and this has boosted demand for ride services.” (Hall & Krueger, 2015, p. 25). Uber and Lyft have been found to trigger a 0.7% increase in car ownership in urban areas, with a core reason being drivers' increased access to revenue-stacking opportunities (Liverpool, 2021). Second, the business model of the Swiss Mobility Carsharing digital platform may be particularly exemplary of the redistribution design theme. It seeks to enhance car use efficiency by creating visibility of otherwise idle cars and matching idle cars with consumers. Also, it governs the resource use by only offering the cooperative's own car fleet. A study demonstrated its positive impact on consumption reduction, since it led to 35,500 fewer cars, and to a decrease of 31,000 tons in CO₂ emissions per year (Mobility, 2020). Third, the business model of the Swiss Railways' Mobility Platform may be particularly characteristic of a high level of integration between the accessibility and the redistribution design themes. By offering an integrated intermodal mobility platform (SBB, 2019), it enhances consumers' and providers' access to a redistribution market for different mobility services (e.g., train, tram, bus, carsharing, and bikesharing). Thus, it increases the efficiency of the use of otherwise idle mobility capacity (e.g., train and bikesharing) and governs its use (e.g., controlling the mobility service types offered on the platform). On this basis, future research may validate and expand on the proposed design themes with hybrid business models in other industries in the sharing economy (e.g., apparel platforms). Researchers may also investigate these design themes' contributions not only for managing the environmental paradox, but also the for-profit and social goals (e.g., microfinance), to contribute a perspective on digital platforms' business models in the context of social enterprises—the dominant focus of the research to date (see Davies & Doherty, 2019; Grassl, 2012; Kolk & Lenfant, 2016; Santos et al., 2015; Stubbs, 2018; Wilson & Post, 2013).

Further, our study has implications for research on paradox. The management literature on the sharing economy has largely emphasized that digital platforms create inherent paradoxes, for instance, relating to their stakeholder impacts, information transparency (see Acquier et al., 2017; Dreyer et al., 2017; Heimstädt, 2017), or the environment (Murillo et al., 2017; Parguel et al., 2017). The literature has also begun to uncover how digital platforms handle paradoxes, by emphasizing the key roles of decoupling (Heimstädt, 2017), contextual factors (Dreyer et al., 2017), or value (Pazaitis et al., 2017). We added the critical role of business model design, particularly of the accessibility and the redistribution design themes, and of the level of integration of the design themes, to explain how digital platforms manage the environmental paradox more or less successfully. Our findings suggest that digital platforms can not only create inherent paradoxes, as previous studies suggested (see Acquier et al., 2017; Mair & Reischauer, 2017; Murillo et al., 2017; Parguel et al., 2017), but can also integrate or seize the complementarities between otherwise paradoxical forces (see Farjoun, 2010). In our case, it is through the design of a hybrid business model (integration of the accessibility and the redistribution design themes into *accessibility to a redistribution market*) that the platform managers integrate the otherwise competing environmental and financial value-creation goals of the environmental paradox. Thus, notably, our findings suggest that managers have agency or discretion to design the impacts of the digital platform's business model along environmental and financial value-creation goals. While we have uncovered the specific design elements (efficiency of resource use and governance of resource use vs. accessibility to consumers and accessibility to providers) of the design themes, there are ample opportunities for future research to further elaborate on the role of managers in managing digital platforms' impacts. At a broad level, our research has implications for the literature on 'responsible innovation' (see Voegtlin & Scherer, 2017), since it advances that managers may play a key role in shaping the sustainability impact of digital platforms through the design of the platforms' business models.

We found two drivers—strategic synergies and dynamic coupling—of managers' integration of the redistribution and accessibility design themes when they decide on business model elements. Broadly, these drivers explain the ways in which managers seize the complementarities between otherwise competing forces (see Farjoun, 2010), in our case, fostering their integration. These two distinct managerial activities add to the more general literature on paradox (see Hahn et al., 2010, 2014; Schad et al., 2016).

Finally, our study has implications for the literature on business models for sustainability (see Bohnsack et al., 2014; Boons & Lüdeke-Freund, 2013; Hansen et al., 2009; Schaltegger et al., 2012; Schaltegger et al., 2016; Stubbs & Cocklin, 2008). By uncovering the accessibility and the redistribution design themes and their integration, we have argued that the extent to which technologies' business models contribute financial or environmental value-creation, or both, largely depends on the extent of emphasis on one theme or the other or on their integration. In our case, with its focus on *accessibility to a redistribution market*, the platform organization realized a hybrid

business model—a business case for sustainability (Schaltegger et al., 2012).

Our study opens research avenues to test and further refine the proposed relationships via methodologies based on qualitative and/or quantitative data. First, researchers may validate and add further nuances to the accessibility and the redistribution design themes. While the specific design elements (e.g., international expansion of the customer base) may be idiosyncratic to our case, in our view, the design themes are generalizable across digital platforms' business models in other industries. Further, we see the redistribution theme as characteristic of *circular business models*, in which firms create value by improving the efficiency of resource use (e.g., second-life, long-life repair). It may inspire conceptualizations of the design themes of circular business models.¹ Further, while we uncovered two managerial drivers for platform organizations' management of the environmental paradox, in our view, with some adjustment, these drivers could also apply to other settings of hybrid business models (e.g., of social enterprises).

Second, researchers may investigate the drivers. Through in-depth case studies (e.g., participant observation), they may shed further light on the managerial processes, characteristics, and capabilities through which managers perform dialectical coupling and strategic synergies. For instance, managers with greater cognitive complexity in their sensemaking (see Hahn et al., 2014), with greater tolerance for ambiguity (see Hambrick, 2007) or who engage in more dialectical processes (cf. Farjoun, 2008), for instance, involving broader sets of stakeholders (with potentially conflicting views on the organization's value-creation goals) in the business model design process, may be more likely to integrate multiple design themes. Alternatively, researchers could use larger-sample studies to add the contextual contingencies under which managers may be more or less likely to emphasize one or the other design theme or their integration. For instance, we uncovered that managers had the discretion to integrate competing design themes in a nascent industry with little competition. Yet, their discretion may be constrained under conditions of high competitive intensity or of high industry dynamism. Also, the organizational mission or identity may largely constrain which design theme(s) managers emphasize in business model design. In our case, PicloFlex's environmental mission was given. Future research may further elaborate on whether and how digital platforms that lack this mission manage the environmental paradox. Further organizational characteristics (e.g., a weak board, a board's values, and shareholders' values) may constrain which design theme(s) managers will emphasize. This suggests that manager-, environment-, and organization-level characteristics may shape how much discretion—latitude of action—managers have (see Hambrick, 2007, p. 335) for managing the environmental paradox via business model design.

Together, our findings suggest that platform managers may play a key role in shaping the intended sustainability impacts of digital platforms. Managers can manage the environmental paradox more or less effectively depending on the degree of emphasis they put on the different business model design themes or on their integration. Our study opens new avenues for future in different strands of literature.

ENDNOTE

¹ We thank one of the reviewers for this comment.

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APPENDIX A

TABLE A1 Additional evidence

Codes and quotes

The accessibility design theme

Accessibility to providers

Piclo Flex creates “a single access point for various energy services, including system balancing, stability, and network capacity, with the aim of making it quicker and simpler for operating energy assets to provide these services.” (S20)

“We have providers signed up who operate in multiple countries, and who are keen to use us across multiple geographies ... We may add added-value services that we charge providers for in the future.” (I3)

“... flex providers are able to freely use the platform. So, they can sign up, create an account, take part in these competitions for no cost. That's to lower the barriers to entry and ensure that the various assets are able to take part ... So, we designed the platform to be used by the less experienced users first ... these flex markets were completely new two years ago. So, they needed to be developed for as wide an audience as possible.” (I4)

“[T]he value of the platform ... there is a link with the size of the flex provider community that we have and also with the number of system operators who are using us, for sure.” (I4)

Accessibility to consumers

“So, the business model is derived from this concept of market engagement and consumer engagement to help them effectively get more contracts.” (I3)

“Similar to other online marketplaces like eBay, users on the platform will be able to search for and bid on a variety of different products, including DNO flexibility services, secondary trading of National Grid ESO ancillary services, and flexible-power purchase agreements.” (P20)

Western Power Distribution (WPD), one of the six DNOs, entered into a partnership with Piclo. (C18)

“[W]e have a strong pipeline of opportunities across the EU. I think the key thing is on the EU level.” (I3)

“The value is also related to growing the flexibility market itself. So it's not just the number of system operators, but actually the size of the flexibility competitions they are procuring for.” (I4)

The redistribution design theme

Efficiency of resource use

“There's an uncovering process, providing visibility. What are all the different solutions out there to this? What's the most efficient one?” (I3)

“So, what our platform really needs to unlock is for any given location on the grid where the dynamics are very different: What is the overall most efficient solution?” (I3)

Governance of resource use

“[O]ur position is not as a policy decision-maker. We facilitate other people's policy decisions.” (I3)

“... we need more policy and regulatory strengthening on the carbon intensity of these flexibility markets to move them away from that. At the moment, it's just a technology-neutral approach ... if the platform were to provide restrictions that aren't embedded within the regulatory structure, then the system operators would not be able to procure the assets through us, because they are not the most cost-effective for the consumers... we provide data from the platform and insights as often as we can.” (I4)

The level of integration of the design themes

Accessibility to a redistribution market

“We create a new market. (...) There's no volumes. We're basically helping to create volume from a standing start. They see value in working with us to help them build that volume.” (I3)

“So we are helping to accelerate. At the moment, distribution system operators procure that flexibility in order to decarbonize that grid. And that's through helping new nascent technologies, such as electric vehicle fleets, gain revenue from being able to bid into these DSO flexibility competitions that might otherwise be hidden, there might be barriers to their entry or they might not be visible to DSOs. So, we help them start those revenues and have a business model for them to exist.” (I4)

“... how do you let potential flex providers or assets know that there are opportunities that they can earn money from? So it's that visibility piece. So the DNOs are able to publish and advertise their flexibility needs on our platform ... after you have made your needs visible, it is enabling the network operators to qualify participants to take part in these competitions... the final activity toward this procurement of flexibility is running online auctions or competitions through the platform. So, qualified companies can then enter bids to win the contracts that have been advertised, and the DSOs are able to accept or reject the flex provider bids.” (I4)

Dynamic coupling

Technology coupling

“Now, if we are adding on different opportunities, like peer-to-peer opportunities or mainstream national ones, there are going to be different types of products ... these are going to have different market rules. So, we just need to think about how do we bring all this together into one interface?” (I3)

With APIs, “you can automate all the different types of processes ... we could offer a back-office integration between the flex provider's data and the Piclo marketplace. So, it would enable automatic updates of their asset information, automatic qualification, or bidding results, that kind of like data transfer.” (I4)

Market coupling

“What we are doing is finally a multi-market exchange. Providing services so they can access multiple different revenue opportunities ... there's going to be multiple markets. You'll register on one platform to essentially join individual markets ... We provide the visibility to all the different solutions on the platform.” (I3)

(Continues)

TABLE A1 (Continued)

“These flexibility technologies are earning money from multiple sources (...) They can add the money from entering different markets and stacking revenues.” (I3)
 “We’re looking at different flexibility markets that we could potentially facilitate in addition to the DSO flexibility markets. One of them is the UK capacity market ... adding more markets such as this on to the platform will be another key value driver for us.” (I4)
 “What we are seeing ... is the regulations that have been put forward in these different European countries translating the Clean Energy Package into their actual policies and laws ... And then, yeah, we put forward the product based on that.” (I4)

Strategic synergies

Realizing opportunities for synergies

“Our auctions drive competitive pressure ... up to eighty percent discounts from the maximum budget [for consumers] ... For providers, at the moment, it's a free service. They're very excited to use the service, because it's an opportunity for them to earn more revenue. [T]he key thing, from a provider perspective, is this concept of revenue stacking. (...) we want to be the place where they can find the full revenue stack on Piclo.” (I3)
 “In the UK, the government studies have shown that if you introduce flexibility, it could save up to £40 billion a year ... Batteries or EV fleets or renewable assets that win flexibility contracts ... that's enabling them to stack revenues and improving the business model for these types of assets.” (I4)
 “As we accelerate toward this decarbonized future, the DNOs are facing issues from connecting low-carbon technologies to the grid without flexibility. And it's this parallel question of, do you massively invest in the infrastructure of the networks – much more expensive to the end consumers. Or do you procure flexibility, and in doing so, allow electric vehicles or heat pumps or other low-carbon technologies to connect to the grid?” (I4)
 Western Power Distribution (WPD) saw an opportunity to “support its own flexible power program, which has been established to procure flexibility throughout its license areas.” (L20)

Scaling opportunities for synergies

“So, in the UK, over the last couple of years, the megawatts of flexibility contracts that system operators are procuring has already risen drastically ... for Piclo, allowing the scalability to take place is key.” (I4)
 Piclo “tests the implementation of the flexibility marketplace in order to expand the knowledge of the changes needed for the platform's success in a different setting.” (PP)
 “We are committed to considering flexible options, where it is more cost-effective than traditional network reinforcement, unlocking new opportunities for local flexibility providers and helping keep costs down for customers. (...) We are not dictating a specific solution and I hope to see services range from embedded generation, energy storage, demand-side management and demand-side response.” (S20)
 “Slovenia is a very strategically placed country in the European electrical system, and it acts as an interconnector between North and South Europe.” (L20)
 “In North America, there are also opportunities. (...) there's the same need for utilities in the U.S. ... The Clean Energy Package is driving the need for pure flexibility. So, there's a good opportunity there.” (I3)
 “... we try to identify a gap in the market for some sort of process that could be streamlined through the platform. So this will often involve looking at what changes have happened in the regulatory context. With the secondary markets, we saw that there was a requirement from the UK regulator Ofgem to enable these secondary markets, and we noticed that all the trades are happening via e-mail or just kind of by chance – a very behind-closed-doors, not very competitive process... we have kind of identified that regulatory need, the gap in the market, who would benefit from it, whether there's an opportunity for it to be commercialized.” (I4)

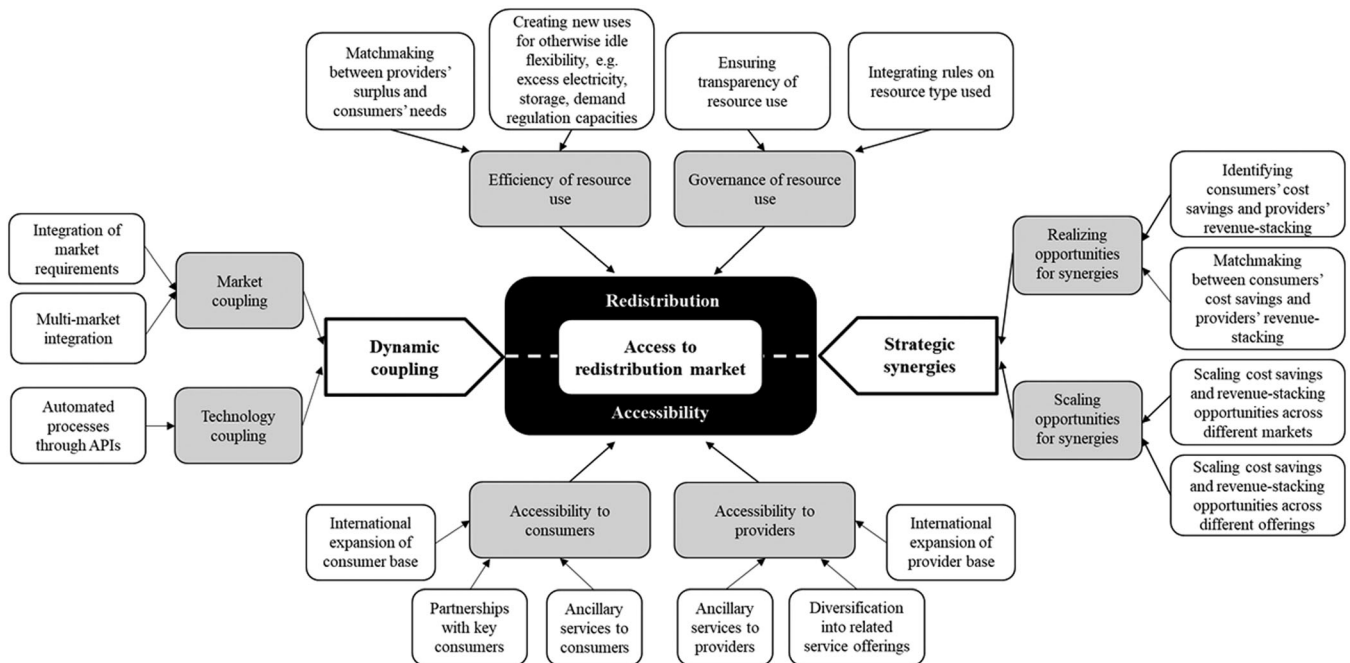


FIGURE A1 Designing hybrid business models in the digital sharing economy: Illustration of a digital platform's activity system