POWER IN THE DEVELOPMENT OF CIRCULAR BUSINESS MODELS –AN ACTOR NETWORK THEORY APPROACH

Babri, M., Orebro University School of Business, Sweden,
maira.babri@umu.se; maira.babri@oru.se
Corvellec, H., Department of Service Management and Service Studies, Lund University, Sweden
herve.corvellec@ism.lu.se
Stål, H.I., Umea School of Business and Economics, Sweden,
herman.stal@umu.se;

INTRODUCTION

In a few years, the Circular Economy has established itself as an influential model for economic development, for example in the European Union (Kirchherr et al., 2018). Its ambition is to create "circular" material flows that replace the "linear" economic rationale of take, make and dispose (Ghisellini et al., 2018), a transition referred to as a comprehensive "paradigm shift" (EMAF, 2013, p. 78). At the organizational level, the circular economy corresponds to Circular Business Models (CBMs) (Diaz Lopez et al., 2018; Lüdeke-freund et al., 2018). With CBMs, firms employ a circular business logic, for instance utilizing the value that is retained in used products to make new offers (Linder and Williander, 2015) or extend use itself, thereby "slowing" the time it takes for products to become waste (Bocken et al., 2016). CBMs also share many similarities with Product-Service Systems which center, in part, on turning products into use- and results-oriented offers (Tukker, 2015).

While there is yet no agreement on the exact principles that encompass CBMs (Lüdeke-freund et al., 2018; Urbinati et al., 2017), it remains clear that CBMs do entail radically new activities and relationships, both within and across firms (Diaz Lopez et al., 2018; Geissdoerfer et al., 2018). For instance, if producers are to utilize value retained in products, they need to develop both recycling and reverse logistics' capacities to track, collect and make use of embedded materials and components (Stindt et al., 2016). Moreover, new material flows are likely to bring along changes in bargaining powers (ibid.). For example, retailers and households could start charging waste management firms for delivering a valuable resource instead of paying to have their waste collected; and if producers switch to using such inputs, it means that their suppliers as well as waste management firms will see their market shares dwindle. Despite these dynamics within and across firms, the literature has not shown any noticeable interest to the role that power might play to explain drivers and barriers in the development of CBMs (de Jesus and Mendonça, 2018; Diaz Lopez et al., 2018; Kirchherr et al., 2018). Moreover, as our literature review shows, discussions regarding the drivers and barriers of CBMs are decidedly static, simply listing examples of barriers (see also Tukker, 2015) and thus cannot capture the dynamic interactions between drivers and barriers in the development of CBMs. Turning to performative approach to power, where we examine it not as a static property of the powerful but as

something that evolves through the actions and practices of heterogeneous actors (Latour, 1984, 2005), we address these shortcomings in the previous literature.

We posit that the study of CBMs calls for a slightly unusual and specific approach to power. More precisely, we argue that because CBMs revolve around the circulation of products and materials, and draws in the natural environment in various representations, we need an analytics of power, which account for both social and material dimensions. One cannot a 'priori ascribe all agency to persons as oftentimes as technical factors, as well as ideational-, normative- and regulatory ones, have been argued to play a part in CBM development (e.g., Jesus et al., 2018; Stål and Corvellec, 2018). Thus we find organizational approaches to power (Fleming and Spicer, 2014) too limited in their exclusive focus on humans and organizations. Instead, we turn to Actor-Network Theory (ANT) (Callon, 1984; Latour, 1984; Law and Hassard, 1999; Law and Mol, 2008). While the role of power and politics within ANT has been criticized it can also be argued that ANT has always been about explaining how power and agency emerges (Alcadipani and Hassard, 2010), through performative relattions between actors, and as an *effect* rather than a static resource or possession (Latour, 1984). Thus, to summarize, we ask: How can an ANT-based approach to power inform the analysis of CBM development?

LITERATURE REVIEW

Development of CBMs

Researchers have increasingly sought to explore the principles, as well as taxonomies, that describe different types of CBMs (see Lüdeke-freund et al., 2018 for a recent review). For instance, Tukker (2015) and Linder & Williander (2015), use the product-service system literature (e.g., Mont, 2002; Tukker and Tischner, 2006) to differentiate between whether a business model focuses on products, their use, or their results. Bocken et al. (2016) expand on three different principles: narrowing, slowing or closing of resource loops. Lastly, Lüdeke-freund et al. (2018) use morphological analysis to propose six major CBM-patterns: repair and maintenance; reuse and redistribution; refurbishment and remanufacturing; recycling; cascading and repurposing; and organic feedstock.

Moreover, the literature has also started to explore the drivers and barriers that affect CBM-development (see Table 1). Here some studies focus on certain types of barriers, for instance those concerning consumers (Hazen et al., 2016), investment risk (Linder and Williander, 2015b) or the lock-in to pre-existing linear business models (Stål and Corvellec, 2018). Yet others have a more holistic focus, trying to engage with the totality of drivers and barriers. For instance, Diaz Lopez et al. (2018) undertake an extensive review of 143 cases and display patterns of five different types of barriers that differ depending on the type of CBM that is developed.

Table 1: Review of identified drivers and barriers to CBM development

Authors	Type of CBMs	Identified drivers	Identified barriers	Conceptual framework

(Linder and Williander, 2015)	Use-oriented product service (lease)	Search for new market niche	Investment risk	N/A
(Tukker, 2015)	Product-oriented systems	New market opportunities Environmental aspirations Higher consumer loyalty	Consumer disapproval due to loss of intangible value of ownership Major changes in production networks Investment needs/risks High-speed innovation makes reuse difficult	N/A
(Stindt et al., 2016)	Product recovery and remanufacturing	Access to recoverable products Remarketing opportunities	Rivalry for recoverable products Threat of new competition Adverse effects on core business	Porter's Five Forces
(Hazen et al., 2016)	Remanufacturing for Original Equipment Manufacturers	Perceived environmental benefits (consumers)	Consumer attitudes to remanufactured goods	Push-Pull-Mooring Theory of migration
(Kirchherr et al., 2018)	Reducing, reusing and recycling	Support from policy (e.g., EU) and business circles	In order of importance: Cultural (consumers, within and across firms) Market (investment needs/risk, no cost savings) Regulatory (laws and procurement) Technological (design, lack of demonstration projects, lack of data, quality issues)	Cultural, regulatory, market and technological dimensions
(Stål and Corvellec, 2018)	Product recovery and reuse	Regulatory activities, emerging industry norms and circulating ideas	Pre-existing linear business model	Organizational institutionalism
(Diaz Lopez et al., 2018)	Focused on: Life cycle, Supply side, or Demand side	N/A	Pattern depends on *type* of business model but general barriers are: Institutional (regulation), organizational (firm strategy etc.), behavioral interest/uncertainties), market (cost structure etc.), and technological (tools, equipment and their costs)	Framework of implementation barriers
(de Jesus and Mendonça, 2018)	N/A	Technical factors (hard): new technologies trigger Market/financial (hard): increasing resource prices, "green" investment capital, "environment as a market opportunity" Institution/regulation (soft): taxes, subsidies, education Social/cultural (soft): attitudes, customer preferences.	Technical factors (hard): gap/lock-ins in technology. Market/financial (hard): market uncertainty, investment needs/risks, Institution/regulation (soft): Lock-ins, lack of enforcement, (other) taxes/subsidies Social/cultural (soft): slow change in attitudes/preferences	"Hard" and "soft" factors

While there is emerging work seeking to systematize the different types of barriers to CBM development, particularly around the idea of technical, market, regulatory and social/cultural ones, our review points to some clear gaps in the previous literature. First, *drivers* of CBM development have

been awarded considerably less attention, either considered to be of the same type (de Jesus and Mendonça, 2018) or assumed to be the perceived environmental benefits of CBMs (Hazen et al., 2016). However, Stål and Corvellec (2018) argue that drivers are mainly socio-political and revolve around the emergence of Circular Economy as a socio-political institution *within* multiple industries. Second, while there is systematization there is a lack of links to conceptual frameworks and pre-existing theory to explain *why* barriers emerge when and where they do. Thirdly, and most important to our purposes here, there is lack of studies that focus on the *dynamics* of how barriers and drivers interact in CBM development. Instead, accounts are decidedly static, listing barriers as the previous literature reports them or as they appear in the data. Thus, we do not know how barriers or drivers, characterized as technical, market, regulatory or cultural, interact and change over time, as CBMs develop. Ultimately, we also know little about which actors are prominent in the interactions, which hinder or drive CBM development. Thus, in the next section we develop our approach to power, an approach that we argue makes it possible to address these shortcomings of the previous literature. Analyzing power makes it possible to understand how e.g. technical, market, financial and regulatory factors potentially *together* drive and/or hinder CBM development, and our focus on power as performatively emerging through actions makes it possible for us to address the issue of dynamics between different actors.

Organizational approaches to power

When it comes to the study of power in the context of firms, and their interrelations, Fleming and Spicer (2014) in a thorough review suggested that four distinct forms, or faces, of power exist: namely coercion, manipulation, domination, and subjectification. Evident from Fleming and Spicer's (2014) review is an exclusive focus on power as something that happens in the social realm, confined to humans.While organizational theorists do not necessarily view power as a static resource or possession of the powerful, but rather something relational, this power relation is still pictured as being between people. Below we argue that this omission of material dimensions of power, and thereby the role of non-humans, is particularly problematic when it comes to understanding power linked to CBM development:

As indicated above, the challenge of developing CBMs is both framed in material and socio-cultural terms (Table 1). More precisely there is the challenge of how to get products, components and materials back *after* they have been sold and used (Corvellec and Stål, 2017; Stindt et al., 2016). Some materials and products dissipate, or tear, others diffuse, for instance micro-plastics that end up even in the far-reaches of the oceans (Reike et al., 2017). Yet again, other materials are so valuable that they fuel corporate competition in recovery markets (Stindt et al., 2016). Other materials are not valuable enough to justify the costly process of recycling them, e.g., cotton (Stål and Corvellec, 2018), and in other cases thermodynamics limits the possibility for value retention (Georgescu-Roegen, 1975). In addition, the natural environment, in different representations (e.g., CO_2-emissions, chemical

measurements, waste levels) is potentially present in the justification, or what we will later call, enactments and enrollments for CBM development (Corvellec and Stål, 2017). Thus to account for the potential of heterogeneous actors and actions, we now turn to ANT for an analytics of power.

An ANT-based analytics of power

To aid the reader and structure our analytics of power, we proceed in the following order: First, we present some of the ontological and epistemological principles that are relevant for our interests in power, more precisely the notions of symmetry, heterogeneity and performativity. Then we elaborate some foundational concepts that set the scene for an ANT-based approach, followed by concepts which inform an analysis of how and by whom power is both generated and exercised in organizational practice. Still, it must be stressed that the idea of beforehand establishing what analytical concepts that one is going to use goes against the foundational principles of ANT. Rather it is the unfolding empirical material, in combination with the aims of the researcher, that ultimately decide which concepts that are relevant. As our interest is in power and CBM development, we have let that aim guide our preliminary selection and discussion of concepts. Thus, we argue that it is likely that we will need some, but perhaps not other, concepts, from the rich and varied vocabulary of ANT.

Ontological and epistemological principles. ANT emerged as a critique against the asymmetry found in most social science approaches where phenomena are understood as belonging exclusively to a predefined social realm. Thus, while ANT can be seen as an analytical perspective upon the social world, it has also been applied as an ontology and an epistemological stance (Babri, 2016). For organizational theory, ANT has proved itself to be a versatile approach and especially variations of "translation", a central concept, have been much applied (See e.g. Czarniawska and Sévon, 2005; Sahlin and Wedlin, 2008; Zilber, 2006) but also been criticized, particularly for being unable to address power and politics (Alcadipani and Hassard, 2010; Whittle and Spicer, 2008). Perhaps due to the heavy critique, less applied in the organization theory literature, is ANT's potential as an analytical approach to power. Our purpose here is not to enter the debate on ANT's critical potential, but rather to show how ANT can inform a dynamic approach to power. While ANT agrees with much of the contemporary power literature on power not being a stable property of the powerful, but rather arising in complex interplays between actors (Fleming and Spicer, 2014), we posit that an ANT has a further potential through the principles of *symmetry* and *heterogeneity*.

Applying symmetry as an epistemological principle, means to avoid a priori impositions of an asymmetry between human intentional actions on the one hand, and a non-intentional material world on the other (Latour, 1998: 2005). As humans and nonhumans are constantly interacting in the realization of the social, they cannot a priori be distinguished with reference to their capacity to influence their surroundings. To understand organizational phenomena, one should therefore assume beforehand that there is *equal, potential* agency among all actors. Thus, the actions involved in

generating as well as exerting power in any particular setting may just as well stem from humans, , as from materials, products, components or other inanimate things.

Heterogeneity entails variations in character, form and substance, and according to Latour (2005), the ingredients making up social ties are of a heterogeneous nature. Any ANT actor is seen as entangled in a heterogeneous materiality consisting of different kinds of actors, human and non-human (Latour, 2005), material or discursive (Babri, 2016). Furthermore, actors are entangled with one another in this heterogeneous materiality. As De Laet and Mol note, "[e]ffective actors need not stand out as solid statues but may fluidly dissolve into whatever it is they help achieve" (2000: 227).

Moreover, power is *performative*, meaning it is gathered and exercised through practice. In the words of Latour (1984: 264-265) power only makes sense in practice:

> The problem of power may be encapsulated in the following paradox: when you simply have power – in potentia – nothing happens and you are powerless: when you exert power – in actu – others are performing the action and not you. To take an example, Amin Gemayel in his palace officially has power over the Lebanon, but since very few people act when he orders things, he is powerless in practice. Power is not something you may possess and hoard. Either you have it in practice and you do not have it – others have – or you simply have it in theory and you do not have it." Latour (1984: 264-265)

Furthermore:

> What makes a difference between power 'in potentia' and power 'in actu'? The actions of others. Power over something or someone is a compositions made by many people. […] The amount of power exercised varies not according to the power someone has, but to the number of other people who enter into the composition. Latour (1984: 265)

Expressed in other words, and informed by later works on ANT, a 'composition made by many people' can be explained as networks of heterogeneous actors. When approached performatively, power can only be understood in practice. However, if we wish to speak about power in the present, it can only be explained as the result of a performative process, which has already taken place.

> …power, like society, is the final result of a process and not a reservoir, a stock, or a capital that will automatically provide an explanation. Power and dominance have to be produced, made up, composed. Asymmetries exist, yes, but where do they come from and what are they made out of? (Latour, 2005:64)

Applying an ANT approach to understanding power *underscores* a performative understanding of phenomena. For example, Mol (2002) approaches arteriosclerosis as a phenomenon that takes its

shape in various medical practices. The different practices show differing but not discrete versions of the disease. The realities in different practices overlap, but they are not the same. Approaching the phenomenon in practices where it takes shape rather than as a phenomenon with one reality necessitates an "is" that "is situated" in its relation to others. Any actor involved in a particular reality, is also involved in contributing to the production of that reality. This argument can perhaps also be explained as the inseparability of actors from actions.

Who generates or exercises power in a particular setting? To actualize the above-mentioned foundational principles, ANT provides a vocabulary for different units of analysis and their interactions. These concepts set the baseline for our analytics of power: *translations, actors, actor-networks* and *actions*. These concepts are best understood as intertwined, and certainly best elaborated through empirical work, which is the hallmark of ANT. However, in an attempt to introduce these in relation to our purpose; translation refers to the process of something happening to someone or something, so the analyst can deduce that translation has taken place if some change has occurred through a move in time/space: Translation includes both transformation in the things *around* actors, and the transformation of actors *themselves* (Latour, 2005). Thus, the signs of translations are what alert the analyst to the fact that something relevant has taken place. However, it is also relevant to note what translations take place, and if certain translations fail, i.e. if certain actors may be silenced or hijacked in the process of accomplishing a particular translation. Translation arises through the connection between actors that allows or follows with the interaction and transportation of actors in time and/or space.

The *actor* is any entity or object with the *potential* to act, and this entity could be human or non-human (Latour 2005), as well as material or discursive (Babri, 2016). Actors associate with one another, and these associations, or connections, are called networks. When the associational ties or relations in the network hold together, this constellation is called an actor-network (Latour, 2005). This means that order and stability over time is an "*effect generated by heterogeneous means*" (Law, 1992: 383, emphasis original) rather than an inherent quality or characteristic attributable to a thing, person, or organization. Moreover, stable ideas and definitions, things as we see them, are only seen as stable because they have been so positioned and upheld in heterogeneous actor-networks. Thus, collective action allows actor-networks to hold together.

A key aspect to understanding actors and their relation to one another is *agency*, which means the potential to act. According to Latour's (2005) argument, actors are everything that act or are acted upon. If things change, if observable traces (Latour, 2005:53) or marks of bodies (Barad, 2003) are noted, agency has been exercised. However, the interesting thing is not that actors act. Interesting is rather the question of *who* acts and the *possibilities* that these acts condition (Law and Mol, 2008).

The application of the concept of symmetry, and thus potential agency to all actors beforehand, works well in theory. However, once any empirical study begins, one will start noticing that some actors act and others' do not. That is some are acted upon or enacted, and while some accept this, others may resist, retaliate or try to create counter-actions. In practice, it is likely that both activity and passivity contribute to the production of particular realities. Thus, for an analysis based on ANT, a distinction between passive and active actors, in a given setting, is key. Latour (2005) uses the terms *mediator* and *intermediary* to make this distinction:

> An intermediary, in my vocabulary, is what transports meaning or force without transformation: defining its inputs is enough to define its outputs. For all practical purposes, an intermediary can be taken not only as a black box, but also as a black box counting for one, even if it is internally made of many parts. Mediators, on the other hand, cannot be counted as just one; they might count for one, for nothing, for several, or for infinity. Their input is never a good predictor of their output; their specificity has to be taken into account every time. Mediators transform, translate, distort, and modify the meaning of the elements they are supposed to carry". (Latour, 2005:39)

Thus, an analytics of power will necessarily take an interest in whether and when actors function as mediators or intermediaries.

Lastly, the concept of *action* plays a foundational role. Actors act only in relation to other actors. It is actions that link actors together and create networks. Still, even if actors act this does not necessarily make them powerful. Rather, ANT describes different *forms* of actions, *enrollment* and *enactment*, which both refers to different ways of interacting with others and generating networks:

How is power generated or exercised in a particular setting? *Enrollment* is the act of convincing, adhering, conforming and creating goals and visions so that several actors come together. Note, however, that the act itself does not explain who controls the enrollment. Still, key to enrollment is that other actors are active, they have to do something for enrollment to take place. Yet, enrollment can include the use of force and coercion, but also more subtle means to bring others together. Enrollment may fail if there is active resistance, if actors take actions to successfully refuse the enrollment.

For *enactment*, on the other hand, an actors does not need others to be active but instead *passive*. Enactment means to silence others, to call upon or use them in a specific way without their consent. Thus, non-humans are often the ones enacted as they are used by human actors in specific ways. For instance, the natural environment is enacted in a specific way be scientists and other, via the measurements of CO_2-emissions, biodiversity or eco-system services. As indicated, enactment occurs through actions that can entail both discursive and non-discursive elements. For non-humans it can be

difficult to resist enactments, but they still can. Animals can refuse the interpretations of scientists (Callon, 1984) and the climate can behave in unexpected ways.

What does stabilized power and its exercise look like? Despite the performative aspects related to understanding power, in light of ANT, there is acknowledgement of the seemingly powerful actor, the so-called macro-actor. However, ANT would insist that this is a conglomerate of many actors, enrolled and enacted, seemingly acting as one. A powerful entity is thus one that has managed to enroll actors or silence actors and make them representations of one goal, mission, and voice (Callon, 1984). When such an actor is a figure or diagram, in organizational settings this may also relate to e.g. Key Performance Indicators, Balance Sheets, and Sustainability Reports etc., these powerful actors are called *inscription devices*. Latour and Woolgar define them as "any item or apparatus or particular configuration of such items which can transform a material substance into a figure or a diagram which is directly usable" (1986:51).

A *punctualized* actor is a cohesive unit, its parts no longer visible, as they are working silently to uphold the successful new unit. But this is possible only as long as the network is stable and this is always a matter of time. A punctualized actor, is just like the inscription device, the result of a lot of work, and holds as such unless the network is destabilized. In Law's words,

> This, then, is the core of the actor-network approach: a concern with how actors and organizations mobilize, juxtapose, and hold together the bits and pieces of which they are composed; how they are sometimes able to prevent those bits and pieces from following their own inclinations and making off; and how they manage, as a result, to conceal for a time the process of translation itself and so turn a network from a heterogeneous set of bits and pieces each with its own inclinations, into something that passes as a punctualized actor. (1992: 386)

A *center of calculation*, similarly, is a site where the production of certain knowledge occurs thorough the accumulation of resources through circulatory movements to other places (Latour, 1987). Examples include scientific and economic centers of calculation.

To summarize, ANT does not see stable distributions of asymmetric power as a norm, but rather something that may be achieved through a lot of hard work. Furthermore, the generation and exercise of power may be intertwined in this work. This work very likely involves entangled enrollments and enactments, whereby both humans and non-humans are potentially mobilized, acted upon, silenced, represented, but they may also resist and counter-act.

DISCUSSION

We now return to the question of CBM development, and how drivers and barriers have been described in the CBM literature. More precisely, we seek to address how an ANT approach can help us inform analyses of CBM development.

First, assuming symmetry means that any analysis must necessarily focus both on human and non-human actors. Our reading of the CBM literature suggests that a range of actors previously accounted for through managerial (human) access to them, might come to play different roles. E.g. Various technologies (de Jesus & Mendonça, 2018), materials (Corvellec, 2018), the natural environment (Manninen et al., 2018), consumers (Kirchherr et al., 2018), suppliers (Geissdoerfer, Morioka, de Carvalho, & Evans, 2018), economic factors and calculations (Linder and Williander, 2015), ideas and policy texts (Stål and Corvellec, 2018) etc. These actors' potential agency, and thereby their ability to link to others through actions and build up and stabilize networks, cannot however be determined beforehand. It is entirely an empirical question. It is through an analysis of the actors' practices that we can understand their roles in CBM development. We argue that an ANT approach to power allows us to shift focus and open up an analytical venue in a way that changes the questions that can be asked. Instead of asking what barriers and drivers CBM development faces, we can now ask how such barriers and drivers are created, enacted, related to, or addressed. We can ask which actors' interests are aligned with so-called barriers and so-called drivers to CBM development. We can ask which actors are enrolled and enacted in order to move towards CBMs. We can ask which actors are involved in and how power is gathered and exercised in the development of CBM. Ultimately, we could talk about the effects or outcomes of particular CBM developments for different actors.

Third, as mentioned, when actors act and thereby link to each other, they potentially engage in enrollment and enactment. Thus, these concepts should inform our analysis of *how* actors form networks in CBM development. For instance, while the natural environment may play an active role for some translations, it is also possible that it becomes enacted in others, and thereby called upon and locked into a specific, limited, meaning. And while materials may be actively engaged in enrolling technologies and human actors, it is also likely that humans enact them in specific ways. Following enactments and enrollments thus enables us to see just *how* actors act and with what effects. Moreover, it also enables us to discern whether an actor, at a certain time/space location, functions as a mediator or an intermediator. Thus, it enables us to detect practices of power generation and exercise, potentially explaining when, how, why and by whom. Ultimately leading us to explore different outcomes of CBM development, and the effects on various actors e.g. the environment, or suppliers.

Lastly, an ANT-approach opens a potential for us to explore the practices involved as CBMs develop, moving away from static representations of drivers and barriers. Our analysis thus makes it possible to

see when different actors are drivers and when they are barriers, how barriers and drivers interact when particular actors aid in the forming of an Actor-Network, and when they resist.

While our contributions are tentative, awaiting the application of our analytics upon empirical material, we suggest the following: First, through our reading of the ANT literature we are able to show its potential for an analysis of power (Alcadipani & Hassard, 2010), in general as well as in CBM development in particular. The versatile concepts that ANT has deployed to understand how actors, in practice, negotiate and generate stability, are well equipped to reveal the practices of power, both when it comes to its generation and exercise.

Second, while ANT resists proposing generalizable explanations for how power will appear *across* different empirical situations, we see the potential to contribute to the organizational power literature (Fleming & Spicer, 2014). For instance, ANT can offer a focus on socio-material aspects of power, which addresses gaps in previous writings on power.

Lastly, while we argue that there are clear benefits of drawing on ANT for analyzing the generation and exercise of power within practices revolving around CBM development, we also acknowledge some limitations: As mentioned, an ANT approach rarely seeks to generalize its specific findings into theory. Thus, we cannot propose to find patterns that will hold for CBM development *in general*. While we may observe certain actors taking on salient roles in the forming of a specific Actor-Network, these actors will not *always* perform these roles, or even in similar ways. However, the ANT analysis does provide insights and provocations for further analysis of CBM development, and in particular point to the limits of dismissing non-human agencies as well as the static representations of drivers and barriers. The knowledge gained could also have the potential to inform organizational theory at large in terms of providing insights on the different ways in which non-human actors are resisting and retaliating against humans' access to and control over them. CMB development could thus be seen as one of many organizational attempts to renegotiate human terms with the non-human environment.

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