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Actor-network theory and the dilemma of the resource concept in strategic management

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Summary Despite the pervasiveness of discussion on resources and strategy within the management literature, there is considerable ambiguity surrounding the core construct of organisational resources. Approaches informed by theoretical developments within the sociology of technology, broadly known as actor-network theory, can provide different ways of conceptualising the formation of resources as contingently stabilised relationships of people, documents and technologies. This research note theorizes the dynamic link between resources and strategy and concludes with future directions for empirical research.

Introduction

The notion of organisational resources is a keystone of contemporary theory in strategic management. In the early 1980s, strategy authors rediscovered Penrose's (1959) thesis on the theory of the growth of the firm and the central concept of resources (Foss, 1999; Teece, 1982; Wernerfelt, 1984). However, while resources are held to be building blocks that explain growth and competitive advantage, there is little agreement in the literature as to what they really are or how they should be studied (Foss, 1997; Priem & Butler, 2001; Steen, Coopmans, & Whyte, 2006; Wernerfelt, 1995).

In view of this theoretical ambiguity, the primary objective of this research note is to show how a branch of sociology called actor-network theory can generate a different way of thinking about the relationships within organisations that configure resources. The central actor-network process of sociotechnical engineering is partly consistent with Penrose's (1959) original ideas of firm growth as a process of learning and finding new ways to recombine and use resources to create different capabilities (or 'services' in Penrose's original text) (Foss, 1999; Steen & Liesch, 2007). However, despite this initial similarity with traditional thinking on resources, actor-network theory presents significant conceptual challenges to the conventional strategy literature.

One of these is that resources cannot be assumed to be fixed entities. Changes may occur in the structuring of connections between people, technologies and documents that result in different resources. Following from this notion, actor-network theory undermines the methodological assumption that resources can be conceptualised as discrete variables, since there are always interdependencies with other elements of organisation.

Furthermore, the theorisation of managerial strategic choice cannot be separated from the resources that these managers supposedly control. Addressing the interdependency between the ability of strategists to choose and implement strategy, and the resources that underpin growth and competitive advantage would be an important step forward for a dynamic theory of resources and strategy.

This essay starts with an overview of the literature on resources within strategic management. While much has been written on this topic, there are still persistent theoretical

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problems surrounding the definition of resources. Some of this confusion is a result of a selective reading of Penrose's (1959) original insights into resources and the growth of firms.

Also, because the translation of Penrose (1959) into the resource-based view (e.g. Barney, 1991; Wernerfelt, 1984) gives a static picture of organisation, there has been a need to explain how resources change over time. Much more needs to be done to understand the inherent instability of resources within the firm without appealing to extrinsic mechanisms such as 'dynamic capabilities' (Feldman, 2004; Steen et al., 2006).

During the past several years, there has been a move by some scholars within the strategy community to think about strategy as a form of practice (Whittington, 2004). In other words, rather than strategy being a 'production function' or set of mechanistic processes, it is an activity that is performed by people (Whittington, 2003). This is a perspective that is very similar to Penrose's original work and offers a way to reengage with some of the original insights on growth through the development and administration of resources. However, while the practice turn in strategy offers an advance, it still needs development to encompass explanations of resource change and stability. In other words, why do some practices result in the creation of durable resources? Also, how do these resources become dependable enough to form the basis for strategic actions and plans?

To address these questions, the paper turns to a literature known as actor-network theory, which emerged from the practice turn in science and technology studies, with two new directions for a theory of organisational resources. The first of these is the conceptualisation of resources as heterogeneous networks of people and technologies (Law, 1992). Specifically, part of the work of strategists is to bring these networks together and hold them in place within the firm so that they may be counted as resources. In addition to questioning assumptions about stability, actor-network theory also treats the boundary of the firm as an open empirical question (Tryggestad, 2005). The second direction extends from this to consider that the strategists themselves are dependent on resources that allow strategies to be developed and implemented (Best & Garnsey, 1999; Steen & Liesch, 2007).

While some actor-network studies of organization have already shown how resources can be described as contingently stabilised actions, much more can be done to apply this area of theory to return to Penrose's original insights into the practices and interactions within organisation that shape resources and strategy.

So what are resources... really?

Resources, in the strategy literature, have been variously defined over time. Penrose (1959) used the term to describe categories of physical and human resources, but was careful to point out that "... it is never *resources* themselves that are 'inputs' in the production process, but only the *services* that the resources can render... exactly the same resource can be used for different purposes or in different ways" (Penrose, 1959, p. 25). In other words Penrose was reluctant to place exact definitions on resources and order them into definitive categories because she understood that resources can change in conjunction with other resources.

However, this important difference between resources and services, and the chameleon-like nature of resources was lost in subsequent translations of Penrose's theory of firm growth. A reading of heavily cited articles in strategy indicates that resources are theorised as immutable inputs in the production process (e.g. Barney, 1991; Conner, 1991; Wernerfelt, 1984). Despite this theory of resources as building blocks, surprisingly little progress has been made in the past quarter of a century in defining what these things are. Wernerfelt captured the dilemma of the resources concept upon receiving the *Strategic Management Journal* decade award for his original 1984 paper on resources and corporate strategy.

> We have a rich taxonomy of markets and empirical knowledge about market structures. In contrast, 'resources' remain an amorphous heap to most of us. (Wernerfelt, 1995, p. 172)

In a recent essay on the development of the resource-based view, Lockett et al. (2008, p. 1134) indicate that little progress has been made since that time.

> ...there is an urgent need to think about the resource space and to think about trying to get a better understanding of what we mean by resources.

So, definitions remain a problem but another legacy of the partial translation of Penrose's (1959) theory of resources is the difficulty of explaining change in the resource base within organisations (Barney, Wright, & Ketchen, 2001; Foss, 2003). If resources are like bricks then how do these bricks get altered? Changing the resource-base of the firm has been conceptualised through access to resource factor markets where firms may accumulate factors from beyond the firm to construct new resources (Black & Boal, 1994; Dierickx & Cool, 1989). The possibility of resources having their own internal dynamics has not been given the equivalent attention (Feldman, 2004; Lebleci, Salancik, Kopay, & King, 1991). Without an understanding of the intrinsic dynamics of resources, concepts such as 'dynamic capabilities', which are capabilities that change resources within an organisation, must be deployed to explain change (Eisenhardt & Martin, 2000; Makadok, 2001; Teece, Pisano, & Shuen, 1997; Wang & Ahmed, 2007).

Resources in action: extending the practice turn in strategy

Despite this impasse within the theory of resources and the arguable misreading of Penrose's work there is a growing literature in the strategy field that is trying to address the problem of a silence surrounding what strategists actually do (Whittington, 1996, 2003). Penrose intuitively understood that the growth of the firm and creation of resources was quite literally *work* in progress but the literature has since become disengaged with strategy as a form of professional work. In fact, Whittington (2003) has framed this problem as something of a crisis:

> When called in some small way to help with others' strategy and organization making, I have hardly anything to say about how they should carry out the actual work of

> producing new plans and designing new structures. If looking for advice on how best to do this work, I turn not to the leading journals of strategy and organization — I can find little there — but to my wiser and more experienced colleagues.

The strategy-as-practice literature has made significant contributions towards understanding the actions and work undertaken by strategists in formulating and implementing strategy (Jarzabkowski, 2005; Johnson, Melin, & Whittington, 2003; Whittington, 2006). Rather than using regression models and large datasets that tend to dominate strategy research, the strategy-as-practice literature has engaged with practice-friendly theories and methods such as structuration, institutional theory, case-studies and ethnography (Whittington, 2006). However, the study of practice in the social sciences has a long tradition and undoubtedly there are many more avenues for exploring strategy by looking at the 'practice turn' in other fields.

Resources pose a particular challenge to practice research because they often appear to be solid, durable and independent from the strategy process. Managers may appear to use a resource, such as a sales team, in their strategic plan but little consideration is given to how the sales team becomes a resource. Unpacking the construction of 'facts' and 'objects' is a challenge, but the practice-turn in science and technology studies has given us a lens to do this. Actor-network theory has opened up technology and the production of scientific facts to sociological analysis, and it may provide the same opportunity for the investigation of resources.

An overview of actor-network theory

Although actor-network theory originally emerged as a way to study the process of producing scientific knowledge (Shapin, 1995) and the sociological dimensions of technology (Callon & Latour, 1981), it has been translated in various ways to other fields such as organisation studies, accounting and economic sociology (e.g. Bloomfield & Best, 1992; Callon, 1998; Czarniawska & Hernes, 2005; White & Bradshaw, 2004; Woolgar, Coopmans, & Neyland, 2009). The appeal that actor-network theory has, for many researchers, is its refusal to acknowledge any *a priori* nature of actors or forces of organisation. As Law (1992, p. 380) suggests, "...if we want to understand the mechanics of organisation it is important not to start out *assuming* whatever we wish to explain".

Actor-network theory emerged from ethnographic studies of scientific laboratories during the 1970s (Latour & Woolgar, 1979). Following from Kuhn's seminal book *The Structure of Scientific Revolutions*, sociologists became interested in the construction of scientific facts and the process of resolving controversies (See Shapin, 1995 for an excellent review of this field of sociology). A provocative suggestion from Kuhn's thesis was that scientists working in different paradigms really were living in different worlds and this invited efforts to explain scientific communities as socially constructed institutions.

However, accepting scientific knowledge as a social construction encounters the difficulty of explaining how scientific disputes are resolved and also how scientific knowledge can be durable when it is separated from the laboratories and scientists who originally produced it (Callon, 1995). Purely social explanations are insufficient to support the macro-structuring of 'facts' unless we begin to think of scientific knowledge as a form of 'mob psychology' (Kuhn, 1996; Latour, 1999). The actor-network proposition is that knowledge is constructed, but the construction is an outcome of a heterogeneous network of people, devices and texts, which create a form of stability. This brings into play two important ideas from actor-network theory in the forms of *translation* and *punctuation* (Callon, 1995; Law, 1992).

Actor-network theory is concerned with the processes that bring about things that are not usually thought of as constructed (Latour, 2005; Law, 1992), such as incontestable facts (e.g. rabies is caused by a virus), working technologies (e.g. military aircraft) or powerful people (e.g. Louis Pasteur). Translation is central to the actor-network explanation for the construction of such 'solid outcomes'. Translation describes the way that one thing might stand for something else in conjunction with other objects. So, for example, a knife can be a weapon for assault or something for eating dinner—depending on the context and relations with other materials. Translation chains describe the processes of joining together technical devices, statements and humans to produce the result of a temporarily stabilised series of interactions where something can represent something else (Callon, 1995). An ATM machine represents the end point of a long series of social and technical translations that have been brought together. Note particularly that this stabilisation means that the user does not need to be aware of the chain of interactions that enable the ATM to dispense money.

Powerful macro-actors such as 'the British government' (Law, 1992) are not analytically different from hotel-key return systems (Latour, 1992) in the sense that they are the result of a few, or very many, stabilised translations. This principle is behind the name of actor-network theory. Actors in this sense are not only connected through interpersonal networks as in social network analysis, they are effects made possible through the processes of bringing a heterogeneous network together through translation (Callon & Law, 1995; Czarniawska & Hernes, 2005). This also means that actors are always combinations of the social and technical. Thus it is possible to speak of machines as being actors because they mediate relationships and stabilise associations between other people, devices and texts (Latour, 1992).

The next issue is that of stabilising these networks so that some materials (actors) take on the characteristic of durability. Law (1992, p. 387) explains why durability is such an important property that emerges through translation:

> Thoughts are cheap but they don't last long and speech lasts very little longer. But when we start to *perform* relations — and in particular when we embody them in inanimate materials such as texts and buildings — they may last longer. Thus a good ordering strategy is to embody a set of relations in durable materials. Consequently, a relatively stable network is one embodied in and performed by a range of durable materials.

Ordering can be conditionally achieved through time to create durability but it can also be used through space to allow action at a distance (Latour, 1987). The important point here is that temporal or spatial stability is a network outcome rather than a natural order. So, for example, in Law and Callon's (1994) analysis of a military aircraft project they

show that the ordering process and the formation of stronger actor-networks create the outcome of a successful aircraft design. However, the ordering process is also reversible and a destabilisation of the network brings about the effect of a failed project in this case. The ongoing process of ordering, and the struggle to hold actor-networks in place makes organizational stability the exception, rather than an inevitable outcome of organization (Steen et al., 2006).

Conceptualising resources as actor-networks

Tracing the construction of sociotechnical networks can give an actor-network theory understanding of processes that create technologies such as aircraft and vaccines, and macro-actors such as governments and organisations. But how can we connect this idea to the concept of organisational resources? Law, while not referring to resources in the strategic management sense (1992, p. 385) begins to discuss actor-networks in very familiar terms.

> ... network packages... can, if precariously, be more or less taken for granted in the process of heterogeneous engineering. In other words they can be counted as resources, resources which may come in a variety of forms: agents, devices, texts, relatively standardised sets of organisational relations, social technologies, boundary protocols, organisational forms—any or all of these.

This conceptualisation of resources as stabilised actor-networks closely shadows the Penrosian (Penrose, 1959) view of the firm as a complex bundle of heterogeneous resources that includes interactions between material and human resources (Black & Boal, 1994; Penrose, 1959; Steen & Liesch, 2007). The most oblique message from actor-network theory that complexity and connections are the essence of organization could be a catalyst to theorising resources as relational outcomes of processes (Feldman & Pentland 2005; Saxton, Saxton, Steen, & Verrynne, 2010).

Indeed, a recent interview with Wernerfelt suggests that understanding the web of interactions that constitutes organisations is an underexplored area within the theory of the firm that may be a pivotal move for resolving some dilemmas within the resource construct (Lockett, O'Shea, & Wright, 2008). Wernerfelt points to considerations of power in the theory of the firm, where employees belong to a firm because of the transformative possibilities that they can achieve through accessing resources (material, intangible and human) within a firm (Rajan & Zingales, 1998). This view closely aligns with the actor-network principle of agents-as-networks, where agency arises through the mobilisation of a range of entities (Callon & Law, 1995). Wernerfelt goes further to be more explicit about resources as network effects—though his emphasis is purely upon social networks.

> I suspect that there are a lot of these resources that form social network effects within firms. This means that there is a group of people who work very well together, but when they have to figure out exactly why they work well together, there's probably a web of all sorts of little stuff. (Lockett et al., 2008, p. 1134)

But here is where an actor-network interpretation of resources is different from conventional network analysis or systems thinking. Instead of trying to anchor an explanation of resources in smaller 'sub-resources' (e.g. Black & Boal, 1994), actor-network accounts of organisation examine processes of translation where resources are contingent achievements, rather than atoms of organisation (Chia, 1995; Law, 1992). If resources are actor-networks where the stability of interactions and translations cannot be assumed then resources have their own capacity to change through the translating and ordering process. This is not an argument for isolating individuals and their choices as the microfoundation of organizations (e.g. Felin & Foss, 2009). Actor-network theory does not force us to choose between the collective and the individual, as explained by Steen et al. (2006, p. 307).

> ...a perspective informed by actor-network theory takes the actions of individuals seriously, yet it does not consider their actions in isolation from the relations and connections that make them purposeful.

The problem of endogenous mechanisms of change in resources is thus a question of being able to think of the performative aspects of processes that form resources (Feldman, 2004). All organizational resources such as logistics networks, culture and even buildings, have performative aspects that include the possibility of new connections and translations. These must be constructed and held in place to count as resources (Callon, 1980; Saxton et al., 2010). In the strategy literature, the discussion of trustworthiness and culture as resources that can sustain competitive advantage (Barney, 1986: Barney & Hansen, 1994) points to the shortcomings of a field that has largely neglected agency as an endogenous force for change within resources.

Resources, strategic choice and actor-networks

Another underexplored area of the resource-based view of strategy is the link between resources and strategic decision making. In her thesis on resources and firm growth, Penrose (1959) acknowledged a connection between organization and strategic decision making that pointed to a clear connection between resources and strategic choice.

> ... the problem of entrepreneurial judgement involves more than a combination of imagination, 'good sense', self-confidence, and other personal qualities. It is closely related to the organization of information gathering and consulting facilities within a firm... (Penrose, 1959, p. 41)

In other words, managerial strategic choice is dependent upon the organizational resources that allow judgements to be made. Penrose's insight stands in contrast to the dominant view on resources in the strategy literature where managerial decision making is either presumed to be based on an individual manager's economically rational motivations or not discussed at all (Conner, 1991; Oliver, 1998). Even though planning processes can be categorised as a strategically important resource (Powell, 1992) and Oliver (1998) has advocated a variation on the resource-based view informed by institutional theory, there has been virtually no consideration of the role that resources play in the process of strategic choice.

Actor-network theory starts with no assumptions about the 'nature' of decision makers. Instead, what needs to be explained is: how did the actor-network of strategic manager come into being with its capacity to calculate and form judgements? Arranging people, documents and devices into a stabilised network enables strategists to act as what Latour (1987) calls 'centres of calculation' where information is mobilised, translated and brought together so that judgements can be made (Callon & Muniesa, 2005; Jones, McClean, & Quattrone, 2004).

In the strategy context this information may include transformations made by managerial technologies such as reporting on market share, EBITDA and inventory turnover (Hansen & Mouritsen, 1999). However, calculating is only one part of strategic choice (and Czarniawska, 2004 has suggested that there can be many centres of dispersed calculation within an organisation). The ability to engineer complex networks of people, documents and technologies to act at a distance and execute strategy in the organization is the other essential component of strategizing (Callon & Law, 1995; Hansen & Mouritsen, 1999). For example, strategies on paper become transformed into performance management systems and other managerial technologies that endeavour to enrol many actors across the organisation into the actor-network (Hansen & Mouritsen, 1999). As Law (1992) reminds us, stabilising this network and making it reliable involves creating punctualised networks, or resources, which enable strategists to act at a distance without having to be everywhere in the organisation at the same time. The implication of this is that not only do resources create strategists, but also that strategists create resources (Mouritsen & Deschow, 2001). Law (1994) from his study of strategy and organising in a large UK biotechnology laboratory and 'Andrew', the director, exemplifies this idea as follows:

> ... Andrew-the-strategist is a heterogeneous network: Andrew + fax + fellow managers + secretary + head office + trains to London + his PC + the work of scientists and engineers + time slips filled in by employees—it is this combination that creates the possibility of strategic action.... It is possible to point to Andrew and say that "this is where the action is located". And to point to all the other materials and insist that they are part of a passive support system. It is possible to distinguish in this way. But it is misleading. It misleads because the capacity for strategy is an effect of a more or less stable arrangement of materials. Not something that grows, as it were out of one alone. (Callon and Law, 1997, p. 177)

Actor-network theory and the engineering of culture as a resource

A study by White and Bradshaw (2004), deals explicitly with the emergence of strategists and resources within a logistics consortium. The original intention of this study was to contribute to a better understanding of the sociology of economic actors but a closer reading reveals that it is also an actor-network study of strategy from a practice perspective that demonstrates the engineering of resources to create centres of calculation. Following from Callon's (1998, 1999) essays on markets White and Bradshaw (2004) investigate the emergence of managerial calculative agency that underpins strategic action.

Like Callon (1999), White and Bradshaw (2004) distinguish between the *a priori* assumptions of humans as economic or social entities and the empirical study of these emergent phenomena, which characterises the actor-network approach. Furthermore, they maintain that the presence or absence of strategic actors as rational economic agents or for that matter, as socially motivated agents, is an empirical problem rather than a theoretical problem. In their study of the formation of a strategic alliance between a firm and a logistics consortium (called RockCorp and TransConsort as pseudonyms), White and Bradshaw (2004) examine the 'engineering' of actor-networks that allow the translation of the formally articulated strategy of RockCorp into practice. Although the authors do not use the language of the strategy literature, the case describes the negotiation and stabilisation that enables entities to be framed as a resource. Their example of the emergence of culture as a resource is of particular interest.

RockCorp initially redefined the relationship with their logistics contractors by taking the view that RockCorp itself was a customer of the logistics consortium. This entanglement was largely undertaken by a contractual arrangement, or "distribution deed" that locked-in actors into a stabilised network and rendered the relationship between RockCorp and TransConsort amenable to measurement and control. The deed itself was the result of complex negotiations and included quantifiable targets and benchmarks except for the creation of a 'continuous improvement environment' between the parties in the alliances.

The quantitatively measurable targets allowed RockCorp to act as a centre of strategic calculation through managerial technologies of monitoring and reporting. However, the objective of a 'continuous improvement environment' was not readily measurable and therefore not conducive to being translated through simple measurement and calculation. Culture emerged as management's way of framing complex interactions that were resistant to measurement and calculation, as inferred by White and Bradshaw (2004, p. 13) via an interview with a RockCorp manager.

> Peter Jones [the general manager of TransConsort] is now part of RockCorp's sales group. Today we had a senior manager's meeting at corporate and Peter Jones is part of those meetings, so he knows what we're thinking about doing... He goes with us to the mills, we had a meeting at the mill this afternoon, we have one in NewMill tomorrow so he's actually part of that senior group so he basically knows what's going on within RockCorp. Things like continuous improvement have all been built into the deal, but we're trying to make that also part of the culture of RockCorp and everyone who we deal with.

The first move in calculating and centring the unmeasurable was to recast 'customer focus' as 'culture', but rather than having a shared culture at the outset of the alliance between RockCorp and TransConsort, the construct of 'culture' emerged through actors endeavouring to build networks through negotiation, interaction and accommodation. However, this complex and systemic interlocking of networks does not, in itself produce the resource of 'culture'. In fact, culture

emerged as management's way of 'black-boxing' complex interactions between actors that are both resistant to measurement and difficult to order and hold in place. A typical interview with a RockCorp senior manager would probably elicit discussion of the importance of culture as a unitary resource, but this is the 'black box' that actor-network theory allows us to unpack.

Here, the 'resource' of culture becomes an outcome of strategizing and action rather than an ontologically fixed input to the strategy process, which is the usual starting point for most strategy research (e.g. Barney, 1986; Barney, 1991). Indeed, White and Bradshaw (2004) explicitly recognise the precarious character of this 'culture' by calling it a stable means of accommodating instability. Using Law's (1992) discussion of resources, we could even call this 'culture' a punctuated actor-network that hides other controversies and tensions within the alliance.

Methodological challenges from resources as actor-networks

The actor-network view of resources not only challenges conventional theory but it also carries concomitant implications for methodology. If networks are relational processes rather than discrete variables then the future of research in this field is different from the past that has been dominated by regression models and proxy variables (Armstrong & Katsuhiko, 2007). Applying the standard criteria for 'good theory' to the resource-based view means that resources as variables need to be spatially and temporarily discontinuous to be meaningfully and accurately measured (Bacharach, 1989). Treating resources as dynamic relational phenomena means that process-friendly research methods will be the dominant form of empirical research (Langley, 1999). However, the challenges of processual research methods are significant, as noted by Czarniawska (2007, p. 354): "... we have many factors against us, including the central role of nouns in Indo-European languages, and the successful reification of "organizations"—admittedly a process to which organization researchers have been energetically contributing ever since the 1960s."

While being ontologically different from actor-network theory, new longitudinal methods for analysing social networks by including actor and network-structure variables could be another direction for examining resources (e.g. Snijders, 2001). Although these dynamic methods in social network analysis have the appeal of being quantitative, they lack the capacity to deal with sociotechnical interactions and the contingent character of actors. While the ontologically 'slippery' aspect of actors is hard to capture with conventional network analysis, one possibility here is to develop network methods that are able to include heterogeneous associations of people and technologies. Some advances have been made in this regard, where a range of data on medical research communities can be turned into a map that combines the social network with materials and the content of the interaction (e.g. Bourret, Mogoutov, Julian-Reyneur, & Cambrosio, 2006; Cambrosio, Keating, & Mogoutov, 2004). So, for example, studies of publication data from a field of medical science can indicate a link if two scientists have worked together on a paper. A link can also be demonstrated if materials or equipment was shared between laboratories. Content analysis software allows large quantities of textual information to be analysed for similarities and mapped as connections.

In the organizational context Criscuolo, Salter and Sheehan (2007) have mapped relationships between described expertise within a firm's internal yellow pages, but did not extend this material—material network to include human—human and human—material networks. Heterogeneous network analysis has not yet been applied beyond the arena of science and technology studies, but it may provide a way to map the complexity and heterogeneity of resources within firms. However, the trade-off for being able to visualise such relationships is the loss of the sense of process and contingent stability that can be the most valuable insights from actor-network accounts of organization.

It is possible that the philosophical, strongly reflexive and subversive character of actor-network studies will limit the appeal of this literature to many strategy researchers. While there are some 'true' actor-network studies in the management literature (Woolgar et al., 2009), it is more likely that adaptation and translation of ideas will be the form of influence for this field of sociology on strategy, as Feldman and Pentland explain:

> As newcomers to ANT, we have experienced some difficulties becoming comfortable with the terminology. We may have created (translated?) our own private interpretation of ANT to suit our purposes.... We are hoping that it will help us avoid tortured expressions like "ostensive narrative" and endless conjoining of synonyms for the terms like "translation" and "actant". (Feldman & Pentland, 2005, p. 92)

These efforts to re-interpret actor-network theory and apply it to new fields should not be seen as diminishing its contributions. For example, Garud and Karnoe (2003) focus upon the notion of distributed agency in actor-networks to explain technological development in the Danish windpower industry. In explaining the development of technological paths, the authors suggest that the initiatives of multiple actors result in the accumulation of artefacts, practices, rules and knowledge. Such sociotechnical networks are not only the result of previous actions, but they also become the basis for future technological development. Similarly, Steen et al. (2006) use examples of actor-network duality to argue against reductionist and essentialist assumptions about agents and microfoundations in strategy theory. In a study of technological change in the military aircraft industry, Constant II (2002), uses the contingent stability of actor-networks to suggest that some form of stability is a precondition for technical evolution.

In any case, even within its core circles of authors, actor-network theory is not seen as a "theory" per se but an ongoing challenge to accepted categories and presumptions about the 'nature' of technology and society (Callon, 1999; Latour, 1999). Woolgar (2005) has suggested that the true importance of actor-network theory is its capacity for provocation, which creates new possibilities for reconceptualising disciplines (Woolgar, 1991). Ultimately, this is what may be most useful for inquiry into the resource dilemma.

Conclusions

An actor-network agenda for resources and strategy would be part of a growing desire by scholars to understand the dynamics of economies and organization. Perhaps the biggest obstacle to development of resource theory is not the lack of definitional clarity of core concepts but the intrinsic assumptions about the inherent stability of resources. Foss (2003, p. 139), in an economic-theory critique, labels the resource-based view as a 'patched up equilibrium model of competition' and Barney (2001) has also acknowledged its neoclassical equilibrium assumptions, where resources cannot change. Actor-network theory considers stasis to be a temporary achievement rather than an inevitable state of order. If resources are durable then what needs to be explained is the stabilisation of the translations that resulted in these resources.

It would be wrong to claim that actor-network theory can 'solve' the problems of the resource construct in strategy. Indeed, attempts to use actor-network ideas to create new categories and definitions would be heavily ironic given its aim of showing how such artefacts are produced within organizations and also by the academics who study them (Hardy, Phillips, & Clegg, 2001). Rather than creating a new theory of strategy, we can use actor-network accounts to show how resources, strategy and strategists are outcomes of organizing. Thinking on strategy then becomes characterized by verbs that describe processes, rather than nouns for categories and definitions. Resources will then cease to be abstractions to be operationalized and instead become things that can be observed in action, in the same way that gave Penrose her original insights.

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