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'Reconceptualising Resources: A Critique of Service-dominant Logic'

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Abstract

This paper examines the interactive relationship between intangible, human capabilities (operant resources) and tangible, physical assets (operand resources) in an era of global interconnectedness. It does so within the context of service-dominant logic and the challenge of sustainability in a world of resource scarcity. It challenges conventional ideas about the *superiority* of certain kinds of resources and it confronts a pervasive culture of dematerialiy both in marketing and contemporary post-industrial theory – the idea that 'stuff' does not count. Building on calls for a revised theory of economics and society, this paper offers a parsimonious model of a more holistic conceptualization of resources. It demonstrates the complex *entanglement* of operant and operand resources, finding that this entanglement is a precondition to marketing-related issues of natural resource selection, globalization, sustainability, and distributive justice.

Keywords: marketing theory, dematerialiy, operand resources, entanglement.

Resources, Marketing and Society

The concept of resources in service-dominant logic has been shaped by the resource-based (RBV) view of the firm, which conceives of the firm as a unique bundle of asymmetric resources to be stewarded wisely towards competitive advantage by management (Prahalad and Hamel 1990, Wernerfelt 1984). The RBV has been driven largely by the discipline of strategic management, given its early focus on issues of strategy and general resource management. Initially, marketing scholars were hesitant in their embrace of RBV theory and its focus on resources, with a limited number of exceptions (e.g. Srivastava et al. 2001, Hooley et al. 2001, Vorhies 1998, Day 1994). While some scholars have questioned the longer-term potential contribution of RBV to marketing (e.g. Kraaijenbrink et al. 2010, Day and Wensley 2002), a steady stream of literature exploring the importance of resources has continued (e.g. Arnould 2008, Hooley et al. 2005, Hunt and Arnett 2004, Hunt and Morgan 2004, Lambe et al. 2002). Originally, the resource-based view of the firm was viewed as uplifting in the sense that a savvy management could direct a firm to positional superiority even in difficult market circumstances or in an apparently unattractive industry. Dynamic capabilities encouraged a focus on innovation, market orientation, and service or product development (Helfat et al. 2007, Menguc and Auh 2006, Teece et al. 1997). On a more functional level, a resource-based perspective enabled marketers to employ an affirmative language of investment and creation, rather than one of cost and expenditure.

Importantly, such theorizing about resources has moved beyond the providential domain of the firm, its boundaries, and its immediate market to embrace wider issues of the economy, society, and planetary ecology. Resource advantage scholars have used resources

to forward a general theory of competition (e.g. Hunt, 2000a, 2000b, Hunt and Morgan 2004). In marketing, service-dominant (S-D) logic has now set out a larger ambition, explicitly posited as a "revised theory of economics and society" (Vargo and Lusch 2008a, 30). With the focus of resources firmly positioned as a central issue for society in general, S-D logic makes an important contribution with multiple foundational propositions to explain resources across different types of firms, countries, and societies. Others continue to build usefully on S-D logic by seeking to broaden it to a wider marketing system within which service-dominant exchange is embedded (Layton 2008), one that is able to account for resource concerns as diverse as property rights design (Hasse and Kleinaltenkamp 2011), and distributive justice (Laczniak and Santos 2011). Indeed, the need for a holistic conceptualization of resources has moved beyond a strategic challenge for the firm to the most globally significant issue of today (Kilbourne et al. 1997). Determining resource allocations and setting out parameters for resource use have demanded global inter-governmental and non-governmental forms of organization (Kilbourne 2010).

All conceptions of resources in marketing theory have in various ways described a delineation between material, 'raw' resources and immaterial, dynamic resources. Such a distinction is an established typology in resource-based thinking (Day 1994, Sanchez and Heene 1997, Wernerfelt 1995); resources are made up of assets – tangible, inert entities with the potential to be exploited to advantage (for example, a quarry) and with capabilities which are more intangible, cerebral, skills that activate and direct the assets (for example, the ability of a management to run the quarry profitably). In this traditional schema of resources–assets–capabilities, the dynamic, proactive role of capabilities catalyzes the fixed, tangible assets. This distinction is further refined in the service-dominant conception of

resources whereby intangible operant-type are conceived as hierarchically superior and extensively theorized (e.g. Madhavaram and Hunt, 2008), while the operand is underexplored. This paper seeks to re-instate the importance of the operand resource, and to demonstrate that, far from a hierarchical, separable concept, the *mutual entanglement* of the two types of resource is fundamental. Moreover, recognizing the enmeshment of operant and operand resources becomes more urgent as resource conceptualization moves beyond the firm and is called to address issues of globalization, natural resource selection, sustainability, and distributive justice.

The paper is structured in two parts. In the first, we set out a number of arguments about how conventional thinking in the domain of resources and marketing constrains resource theory development. In the second part of the paper, we discuss how these concerns might be mitigated through embracing a number of novel ideas about resource theory. The discussion is framed within a parsimonious model (Leonard-Barton 1992) that will contribute to a more inclusive and holistic theory of resources, and will be of interest to theorists, practitioners, and public policy makers.

Resource Theory in Marketing

Operant and Operand Resources

The terms 'operant' and 'operand' conceive resources as composing two fundamentally dichotomous types (Constantin and Lusch 1994, 143–153). Operand resources (for example, raw materials and land) are those which wait until an act is performed on them to produce an effect; operant resources (for example, technologies, knowledge, skill) are those which are employed to act on operand resources. A goods-centered logic recognizes the primary importance of operand resources, where the history of humanity has largely been concerned with acting on the land, plant life, animal life, and minerals (Vargo and Lusch 2004a, 2, Vargo and Morgan 2005). In contrast, "[t]he relative role of operant resources began to shift in the late twentieth century as humans began to realize that skills and knowledge were the most important types of resources" (Vargo and Lusch 2004a, 2). In this distinction between operant and operand, one type of resource (skills, knowledge, human ingenuity) is perceived as more important, indeed privileged, over another (raw, inert, stuff).

This conceptual separation between operant and operand follows a long line of similar distinctions. In fact, such a way of thinking is so deeply rooted in Western thought that it is easy to think of it as entirely natural. It is a mindset which is much older than management theory; its roots are in Greek philosophy. Plato saw material embodiment as a distraction to true knowledge, and this thinking reached its zenith during the Enlightenment through Descartes' privileging of mental life over physical matter (Plato 1997, Jackson 1983, Dobscha and Ozanne 2000). This paradigm is prevalent in our current era, one that has been

variously called the “Information Age”, the “post-industrial era”, and “the knowledge society”. What unites these terms is a shared belief that wealth and value creation are based not on material things, but on the accumulation and timely use of immaterial flows, skills, and information. It is a way of thinking that endorses the pre-eminence of the immaterial and disembodied (mind, skill, mental life) over all things material and embodied (brute matter, physicality). In this Information Age, we tend to celebrate a *culture of dematerialiy*, where the non-material world is viewed as more important, more fundamental, than the material; where information, global financial services, electronic capabilities, virtuality, and the post-industrial knowledge economy are privileged terms in contemporary Western society (Hayles 1999).

Operant resources, like its predecessor terms of dynamic capabilities and immaterial competencies, are described in marketing literature using the terms “human”, “sophisticated”, “cultural”, “strategic”, “active”, “dynamic”, “agentic”, “immaterial”, “specialized”, “intelligent”, “relational”, “primary”, and “infinite”. In fact, the words used to describe operant resources are directly linked with our notions of progress and achievement in contemporary society. On the other hand, operand, or material resources, are characterized in the literature by less desirable qualities – “inhuman”, “machine-like”, “basic”, “functional”, “physical”, “inanimate”, “raw”, “inert”, “less important”, “secondary”, “lesser”, “tangible”, “subordinate” and “finite” (e.g., Laczniak and Santos 2011, Madhavaram and Hunt 2008, Hunt and Madhavaram 2006, Vargo and Lusch 2006a, Arnould et al. 2006, Brodie et al. 2006, Vargo and Lusch 2004b, Constantin and Lusch 1994). Service-dominant logic views the relationship between these two types of resources as hierarchical and one-way. Operant resources will take these sluggish, raw, inherently secondary

materials, and act on them to whisk them into something valuable. However, in this paper we argue that operant, intangible resources do not act alone; they are indissolubly entangled with operand, material resources. There is a danger, in elevating the operant to a position of hierarchical superiority, that the mutual interrelationship between the two types of resource will be under-valued, and underdeveloped as a result.

The Logic of the Operant: Action versus Inertia

Conventional management thought views physical, tangible resources as inert. Operand resources are those "resources which *require action* to create benefit" (Vargo and Lusch 2008b, 31, emphasis added). If operand and operant resources were not regarded as separate in this way, we could broaden a theory of resources to encompass those crucial scenarios where operand resources require the opposite of action in order to create or maintain value. That is, there are times when operand resources must remain un-acted upon or unused/underused (conserved) in order to maintain their inherent value. "Value", Vargo and Lusch argue, "is perceived and determined by the consumer on the basis of 'value-in-use'" (Vargo and Lusch 2006a, 11). However, if value-in-use means that something is assessed according to the use a consumer has for it, certain resources clearly must remain unused or underused, in order to retain long-term viability as resources – forests, sea beds, and topsoil are all resources which need to be unused or underused in order to preserve their value. Tourism markets often promote resources – deserted beaches, unspoilt countryside, uninhabited ruins – which all work on the principle of value-in-underuse. Ecological tourism, for example, recognizes the value-in-underuse of natural resources. Importantly, it is not just in the area of environmental sustainability where the concept of

value-in-underuse is an important corollary to value-in-use. Brand management implicitly leverages the concept of value-in-underuse. Brands are often valuable for the very fact that they are underused – that is, when their use is confined to small communities, enabling them to maintain their cultural capital, exclusivity or authenticity (Holt 2005, Muniz and O'Guinn 2001, Schouten and McAlexander 1995). Service-dominant logic's theory of value-in-use as a way of conceptualizing and assessing the worth of resources might be expanded usefully to incorporate this alternative source of value.

This line of inquiry is further illuminated when the concept of value creation is addressed. In the discipline of marketing, the role of consumers in the value creation process is now explicitly recognized, articulated through compelling concepts such as cocreation, coproduction, and prosumerism (Laczniak and Santos 2011, Prahalad and Ramaswarmy 2004, Prahalad and Ramaswarmy 2000, Holbrook 1999, Kotler 1986). While the resource-based view of the firm has been criticized for largely ignoring issues of value and the consumer in its discourse (Barney et al. 2001, Hooley et al. 2001, Sanchez and Heene 1997), service-dominant logic rightly incorporates the consumer into its theory of value creation. Research on co-created value has been fundamental to marketing theory; it remedies the inaccurate description of production as a solely value-creating activity, and of consumption as a uniquely value-depleting one. This was a revolutionary change in marketing philosophy, and it transformed marketing by shifting a balance of power from production towards consumption, recognizing the ways in which consumers and consumption are both productive and value-adding. It allowed marketing scholars to explore new vistas of research into consumption as a value-creating activity, the range of

which is most recently articulated by the Consumer Culture Theory (CCT) movement within consumer research (Schau, Muñiz and Arnould 2009, Arnould and Thompson 2005).

While recognizing the role of consumption in the value creation process, consumption must not be viewed *solely* as a value-creating activity. Importantly, consumption also remains a value-depleting activity. Recent contributions in service-dominant logic have begun to address this issue, most notably Gummesson's (2006) concept of balanced-centricity and Ballantyne and Varey's (2006) exploration of reciprocal value propositions; these concepts reflect how value is not localizable in one source, but rather emerges as a reciprocal negotiation influenced by and impacting on diverse market and non-market actors. New ways to model this concept of how activities can be both value-adding *and* value-depleting are required for a broadened theory of resources is to advance.

The Infinity and Intangibility of the Operant

Operant resources are conceived in marketing literature as intangible and infinite. They are often conceived as competencies or processes that differ from operand resources because they are "dynamic" and "infinite" rather than "static" and "finite" (Vargo and Lusch 2006a, p. 8). This view brings many advantages. As service-dominant logic in its various contributions has shown, this more closely reflects consumer experience which is itself subjective and immaterial (Hirschman and Holbrook 1982). Further, it focuses attention on marketing's processes and performances, rather than the physical outputs of commodities (Pine and Gilmore 1999). It permits strategic and analytical inquiry into the dynamic aspects

of marketing as opposed to the static models of equilibria, matrices and exchange (Normann and Ramirez 1993).

However, by conceiving operant resources as dynamic and infinite, we neglect to see that for every immaterial competence, for every numinous skill and dynamic operant resource to come into existence, a huge architecture of *material* formations must already be in place. For every email that is sent, for every market intelligence system that is created, for every service innovation, a host of material actors have to pre-exist in order to bring the supposedly invisible and intangible organizational resources into being.

The sociologist John Urry characterizes very well how information, mobility, skill, and dynamism are critically dependent on the operand. He argues that the contemporary era of the West is characterized by "mobilities and moorings" (Urry 2005, 125). In fact, the greater the increase in mobility in society, the greater the *immobility* that is needed. Thus, the so-far most powerful and ubiquitous form of mobility – the airplane – needs the largest and most extensive immobility – the airport city – a vast, static, material construction employing tens of thousands of workers in hundreds of occupations. "Overall", writes Urry, "it is these *moorings* that enable movement" (Urry 2005, 126, emphasis added). We can discern this mobility and mooring in marketing practice in every respect. For example, the phenomenon of e-commerce has come about only with the concomitant rise in the global shipping industry and the physical transportation of goods. In the year 2000, for example, the carrying capacity of merchant ships was estimated at 553 million gross registered tons, compared to 227 million in 1970 (Edgeton 2006, 73–74). The advent of an information service-dominant economy heralded the end of the paper-based office, but estimates

suggest that computerization produces an eightfold increase in paper use (e.g. Thackara, 2005).

The era of service dominance does not generate infinite capacity or, for that matter, less materiality. On the contrary, we argue that dynamic competency is premised on a concomitant rise in material, finite capacity. Service-based economies are premised on the production and consumption of significant amounts of material goods, as much if not more than a goods-dominant era. Global resource extraction along all major material groups – fossil fuels, metals, industrial minerals, and biomass – increased by over one third between 1980 and 2002 (WWF 2008, Behrens et al. 2007, Dobers and Strannegård 2005). Service dominance is founded on vast amounts of material goods, embodied in people, nature, technologies, appliances, and material infrastructures. While service-dominance is often proposed as a more sustainable market logic, identified as a transition that has occurred over the past 50 years (Vargo and Lusch, 2004a, 2, 2006a, 20, see also Aitken et al. 2006, Vargo and Lusch 2008b, Lusch and Webster 2011), this shift has in fact coincided with unprecedented rises in material consumption. A century ago, 161 million metric tons of materials flowed through the U.S. economy, excluding fuel and food; in 2006 the figure was well over 7.3 billion metric tons, an equivalent of nearly 25 tons of raw materials per person per year (Matos 2009, Geiser 2002, Matos and Wagner 1998). At present, the 'service' of service-dominant logic is too all-embracing to be able to give meaningful insight into the extent of its dependence on materiality (Stauss 2005); some services are highly materially intensive, while some are not. What is important, we argue, is that the shift towards service dominance has coincided with the exponential rise in consumer material consumption. This is, we argue, because marketing has become better at articulating value propositions and

facilitating "the efficient alignment of production and consumption through its resource integration role" (Ballantyne and Varey 2006, 345) with the attendant rapid response between consumer demand and its supply (Lusch, Vargo and O'Brien 2007,10, Vargo and Lusch 2004a, 13). Efficient alignment of production and consumption might decrease waste at the level of production, but it increases the levels, range, and quality of resource availability at the level of consumption.

The Materiality of Information

In current conceptualizations of resources, information is seen as something invisible, immaterial and disembodied; as something that can exist independent of any sort of material in which to embed it. For instance, Vargo and Lusch argue that the operant resources which dominate service economies center on "the knowledge and skills about information and the exchange of pure, unembedded knowledge" (Vargo and Lusch 2006a, 17). "What is changing today", they state, "is not the sudden emergence of service, but, rather, the [] increasing ability to separate, transport, and exchange information, *apart from embodiment in goods and people*" (Vargo and Lusch 2008a, 4, emphasis added).

Information is such a common term and used with such ease that we should have no difficulty in defining what it means. Even though the term has been in use in the English language since the fifteenth century (Terranova 2005, Terranova 2004), it only began to assume an important place in the social life and the political economy of the West in the second half of the twentieth century. It is interesting to explain why this has happened. During the 1940s and 1950s a new paradigm of knowledge – cybernetics – swept the world

at a time when computers were becoming increasingly important in the scale and scope of the tasks they were carrying out. Cybernetics was the first discipline to use the term "information" as the fundamental component of *any* system. What united bodies, whether they were organic or technological, was their ability to process information. Information was thus valorized as the most important property of any system; materiality began to be seen as an inconsequential subordinate (Hayles 1999, Heims 1993, Bateson 1987). The notion that information, or knowledge, is unembedded, implies that the body (materiality) is merely brute matter, while the mind or mental life is seen as, transportable, omnipresent, and separate from embedded things.

A central argument of this paper is that all information is highly contingent on the material stratum that contains it – that is, the nature of information is *always* dependent on the material it is embedded in. The context in which information is gathered and transmitted actively shapes the information itself; it changes what the information is. For example, a university's digital library might give the appearance of "direct" access to pure, unembedded information, but to think this way forgets the "publishers, editors, referees, authors, the computer and infrastructure designers, cataloguers and library collections managers, right down to the students making their way through college by shelving and unshelving books..." (Brown and Duguid 2002, 5–6). Theorizing such processes as "the exchange of pure, unembedded knowledge" and "pure information" (Vargo and Lusch 2006a, 17 Lusch, Vargo and O'Brien 2007, 10), does not consider this central thesis that we propose – the type and quality of the operant resource is dependent on the type and quality of its material architecture and substrate.

In other academic disciplines, there is a growing acknowledgement that information is emphatically not an un-embedded, free-floating, invisible thing – the fields of anthropology, sociology, and science and technology studies have witnessed an important "materialist turn", or a shift in focus to the fundamental importance of materiality and material objects (Thrift 2008, Watson 2008, Latour 2005, Lash and Lury 2007, Scott 2006). This materialist turn is now a central tenet of the physical sciences. Research in Artificial Life science – the discipline that must think most closely about information – now acknowledges that the information/intelligence of an entity cannot be removed from its material stratum; to do so changes the fundamental nature of the information/intelligence itself (Bonabeau and Théraulaz 2000, Penrose 1989). In fact, it is impossible to think of any exchange that is purely informational. The issue of embodiment in the operand resource is vital to any in-depth conversation about resource integration, because all knowledge is embodied in material life and nothing can exist without some sort of body – carbon-based or silicon-based – to support it.

We thus come to a critical realization; the operant (knowledge, skills, mental life, information) is only available *within* and *through* the operand (material life), and the type and quality of operant is dependent on the type and quality of operand resource in which it is embedded. Service dominant logic's fundamental proposition is that value derives from the service that goods render, a proposition we do not dispute. However, such an orientation places the material stuff as a secondary effect, and privileges the primacy of a dematerialized service. In contrast, we argue that while value derives from the service that goods render, this service is always materially embodied, thus materiality *precedes* service. Furthermore, the nature of this material embodiment of the operant resource will

determine the nature of the service that it provides. The operand therefore sets the possibilities and the limits of the operant. Thus, any theory of service must theorize the bodies that perform service work, the material objects used to deliver it, and the material that it generates, three areas on which we elaborate.

Resources beyond Human Service

Scholars writing about resources today understandably celebrate the key role of human agency. We suggest that this has led to a framing of resources in marketing where humans alone are thought to be agentic, while non-human entities are excluded from the frame. As we will detail in this section, operand resources can often provide design solutions that are more ingenious and sustainable than ideas and knowledge that have originated from humans. Further, we will show that non-human and non-living things are critical co-creators of goods and service in the world. At present, non-human objects are under-theorized in service-dominant logic: "[i]n their role as distribution mechanisms for service provision… goods may be instrumental in relationships, but they are not parties to the relationship; inanimate items of exchange cannot have relationships" (Lusch, Vargo and O'Brien 2007, Vargo and Lusch 2004, 10). Further, Ballantyne and Varey (2006, 344) remark that "things (objects of the conditions produced by actions) cannot have an embedded value. Things only have value insofar as they serve needs."

However, there is an extensive body of work in anthropology, sociology, human geography, and science and technology studies which demonstrates that objects are far from inert lumps; they are social actors who co-create reality with human actors (Haraway

2008, Turkle 2007, Latour 2005, Mazlish 1993, Appadurai 1986). Moreover, nothing can exist – animate or inanimate – without it having some sort of relationship to something else; nothing precedes a relationship (Haraway 2008, 17–19, Holbrook 2006, 212). Relationships "are the smallest possible patterns for analysis": an observation that is "extremely prosaic, relentlessly mundane, and exactly how worlds come into being" (Haraway 2008, 26).

The framing effect of service-dominant logic centers the human agent as the privileged and unique determiner of action and value, demoting the status of objects as not innately useful or beneficial. The absence of marketing theory on the material object is a feature of the wider relationship marketing literature (Fournier et al. 1998). If the non-human world is not considered important enough to have a relationship with, or does not possess sufficient parity to enter into a relationship with the human world, then ethical and ecological dilemmas arise. We will explore these in due course.

The relationship between operant and operand is currently conceptualized as a one-way street, where the operant works on the operand. Operand resources are seen as "neutral stuff" until the operant acts on them (Constantin and Lusch 1994). As we have already demonstrated, in such a conceptualization a line is drawn between operand as inert and non-agentic, and operant which possesses dynamism and agency: "Over the last fifty years, resources have come to be viewed not only as stuff but also as intangible and dynamic functions of human ingenuity and appraisal, and thus not static or fixed" (Vargo and Lusch 2006a, 7). *Stuff* therefore, becomes intangible and dynamic as a consequence of human creativity and evaluation.

This, however, is only one conception of the human's relationship towards the natural world. While it correctly theorizes that humans "work on" operand resources, operand resources also "work on" humans in many ways. While service-dominant logic views the relationship between operant and operand as unidirectional, we argue that – far from a unidirectional hierarchy – the relationship is a two-way street. Just as man changes nature, nature changes man. The world of the operand has a symbiotic, reciprocal relation to the human; the operand acts on the operant as much as the reverse is the case. The philosopher Pierre Bonhiem encapsulated this mutual co-constitution well in the aphorism "Created creates Creator" (Bonhiem 1935, in Berthon, et al. 2005, 110). This aphorism explains how the operand actively works on the operant, shaping its possibilities and limiting its actions. Thus, no operand resource is simply "neutral stuff"; operand resources can be just as ingenious as "human ingenuity". The new science of biomimicry is a case in point. Biomimicry recognizes that the operand resources of the world have a material embededdness developed over 3.8 billion years, and often provide more sustainable design and engineering solutions than human ingenuity has thus far devised, whether it is the self-cleaning properties of lotus leaves, the self-assembly of seashells or the shape of a whale fin (Benyus 2002). The unidirectional conception of man, applying his abilities to the non-human resource is one part of a theory of resources. A holistic theory of resources will expand this conception to account for the importance of non-human resources.

Resources and Ex-resources

A central premise in current theories of resources in service-dominant logic is that resources do not exist until people have found a use or purpose for them. An inspiration for

this premise is the work of economist Erich Zimmermann, who, in an influential book called *World Resources and Industries* (1951), discussed the role of resources in the coming post-industrial age. Zimmermann argued, contrary to popular opinion at the time, that resources were not fixed, permanent, knowable realities or quantities in the world; rather they came to be resources when people's culture, technology, and other conditions summoned them into being:

> MAN'S resources, to an overwhelming extent, are *not* natural resources. It is true that nature provides the opportunity for MAN to display his skill and apply his ever-expanding knowledge. But nature offers freely only an infinitesimal fraction of her treasure; she not only withholds the rest, but also seems to place immeasurable obstacles in the way of resource-seeking and resource-creating MAN. "The bulk of MAN'S resources are the result of human ingenuity aided by slowly, patiently, painfully acquired knowledge and experience" (Zimmerman 1951, 7, emphasis in original).

Paraphrasing Zimmermann, Vargo and Lusch (2006a, 7) state that "[e]verything is neutral (or perhaps even a resistance) until humankind learns what to do with it", and that "'[r]esource' is a term of appraisal… It reflects human judgment as to want-satisfying capacity, utility". Thus resources seem not to exist until people have found a use or purpose for them. However, this paper argues that any holistic theory of resources must account for the cases where humans no longer find a use or purpose for them. In Zimmermann's work, we can see a partial recognition of the existence of resources that are no longer effective within the system – a phenomenon he terms the ex-resource: "Thus with the advent of

modern iron and steel processes, thousands of ore deposits became uneconomical, ceased to be resources, and reverted back to whence they had come – 'neutral stuff'. One might be tempted to speak of ex-resources." (Zimmermann 1951, 13).

This conceptualization of resources as a means to a given end encourages a narrowly linear mentality towards the materials economy. When iron ore, for example, ceases to be of human economic importance, its status is relegated to an "ex-resource". However, "ex-resources" are by no means "neutral stuff". On the one hand, if we consider something an "ex-resource", we are in danger of eschewing the responsibility we have for its stewardship after its value-in-use has been depleted. On the other hand, some "ex-resources" are extremely hazardous. This importantly includes the current status of those resources in the world that no entity wants (including carbon, but also a host of carcinogenic, toxic and radioactive waste types). This makes it imperative to include a whole complex of externalized *unresources* in the search to advance a holistic theory of resources in contemporary society.

Discussion: Towards a Holistic Theory of Resources

Resource management and allocation constitute the largest challenges facing humankind today. The study of resources in marketing has tended to concentrate on the firm, its assets, and their management. Further, this enquiry continues to focus on human, intangible, operant-type resources and assets to the exclusion of non-human, physical, operand-type ones. But as a service-dominant view of the firm broadens to take account of issues of society, ecology and international governance, so this approach reveals serious

shortcoming. We contend that conventional thinking about resources as it is framed in service-dominant logic needs to be supplemented to build a more holistic and interdependent concept of what constitutes resource for business and society. This is important because service-dominant logic theory is no longer posited as an organizational strategy; rather it has been proposed as a theory for society itself (Lusch and Webster 2011, Vargo and Lusch 2008a, 2006a, 2004a, 2004b). Figure 1 sets out a parsimonious model (Leonard-Barton 1992), where the left column accounts for the current contribution of resource theory thinking; the central column indicates aspects of resources that are under-theorized or not theorized as yet. The right column seeks to integrate the previous two, and highlights how a holistic theory of resources opens up previously taken-for-granted concepts such as materiality or value, revealing how, within them, are complex, dynamic, and often conflicting processes.

Figure 1: Towards a Holistic Theory of Resources about here

From Operant and Operand to Co-evolving Interdependencies

It is paramount to view resources – whether tangible or intangible, operant or operand – not separately, but in a web of inextricable entanglement. Scholars have comprehensively developed theory on both the nature and operation of operant resources (Arnould 2008, Madhavaram and Hunt 2008, Hunt and Madhavaram 2006, Vargo and Lusch 2004a, Constantin and Lusch 1994). However, no work in the literature addresses the need for a theory of operand resources. The privileging of the operant resource leads to an underestimation of the operand resource and to a lessened ability to comprehend this

interconnection. A theory that elevates operand resources to the same status as operant resources would conceptually foreground materiality, serving as a reminder of the physical embededdness, immediacy and our dependence on the material world around us**.** If operant resources are thought to be intangible and infinite, we may presume that operand resources are those which are tangible and finite. The infinity and intangibility of the operant resource poses great challenges in its entanglement with the finiteness and materiality of the operand resource. To illustrate: governments all over the world have in the past decade set out resource security (water, oil, land, gas, mineral) as a primary strategic objective (Klare 2002). The past decade the world has witnessed a "landgrab" situation where rich countries purchase massive amounts of land in poorer countries in order to farm their own crops, grow biofuels and displace their own people in the event of an ecological disaster (Borger 2008, MacKenzie 2008). Internationally, the trend of "landgrabs" has resulted in the acquisition of 80 million hectares (an area larger than France) since 2001. This is an example of where governments compete for material resources in order to extract service from them. Service might be infinite, but materiality is not. The complex interrelationship among sometimes competing stakeholders – who compete for the use of the operand resource – has not been clearly articulated and a theorization of the operand resource might better account for the contemporary global political economy.

We make the case that the direction of value between these two types of resource is often conceived as a *one-way street*, where value arises from the work that the operant does on the operand. However, there are many instances when the operand works on the operant. As an example, we turned our attention to the new science of biomimicry, where

the *physical* properties of bacteria, animals, plant species and minerals are not regarded as raw, operand material to be worked on. Rather, many organizations have found a new perspective helpful, one that recognizes that these physical properties of living and non-living things are the result of millions, even billions of years of evolutionary processes. The Biomimicry Institute, based in Missoula, Montana, works with organizations to show how operand resources – mineral, animal, and plant – over 3.8 billion years of trial and error, have often already devised solutions to a great number of human problems, as opposed to human ingenuity. For instance, while many detergents are used to clean buildings, the leaf of a lotus plant has already developed a solution to keeping clean. Its surface is designed in a special way so that dirt rests just above it. When it rains, the dirt washes away. Lotusan Inc., based in Atlanta, markets paint based on this principle. DeGussa Building Systems in Shakopee, Minnesota, has patented self-cleaning cement in the same way. Other companies have used the same principle in the manufacture of fabrics and glass. In these instances, is not so much the case that humans "work on" operand resources, as service-dominant logic proposes, but rather operand resources "working on" the human – providing inspiration, advice and direction towards sustainable design solutions previously unimagined by humans, be they managers or consumers.

The indivisibility, and interdependence, of operant and operand are highlighted by Achrol and Kotler (2006, p. 329), who argue that "the distinction between operand and operant resources is not important ontologically. In theory no resource is inherently operand or operant; it is only a function of the level of explanation and the role (*explananda* or *explanandum*) that the variable (resource) plays in the theoretical scheme. Labor and capital are both operand and operant resources. So are knowledge and information. When

resources are created or acquired, they are operands. When they are applied to a problem, they are operants". For this reason, we advocate that managers, organizations and scholars re-consider the relationship between operand and operant resources. By viewing them not in a unidirectional hierarchy, but rather as *co-evolving interdependents*, organizations will re-visit operand resources in a new light, not merely as static stuff, but as intelligent entities whose properties are not always "worked on", but rather followed by, humans. In viewing resources this way, organizations gain a more realistic view of the complex material and immaterial networks within which they operate, particularly regarding resource opportunities and constraints.

From Value-in-use and Value-in-underuse to Consuming and Conserving Resources

We propose the concept of value-in-underuse as an important supplement to value-in-use. Value-in-underuse opens the way to thinking about what we actually mean when we employ the term "use" as an activity. As Gummesson (2008) remarks, "use" might not be the best concept to describe what a consumer is doing when he or she is interacting with a product or service. As we have shown, resources – brands, antiques, ecological sites, soil – often require the opposite of use in order to maintain their value. Future models of resource management in the face of global climate change will be fundamentally different from previous thinking in the area. In this context, the importance of value-in-underuse cannot be ignored. Take, for example, the ice resources of the region of the North Pole. With its 12,000 square miles of permafrost, it sequesters methane and carbon dioxide gases. It keeps ambient temperatures low and it is the largest reflective heat surface on the planet. It acts as a habitat to some of the varied plant and animal ecosystems of Earth - one that is

also the cleanest. In these ways, it acts a resource through its underuse (Keskitalo 2008). Climate change experts estimate that by 2029, the Arctic Ocean will be frost-free – that is non-existent – during summer (Holland, Bitz and Tremblay 2006). The Arctic could potentially become a different resource, in this scenario deriving its viability from its value-in-use. To be specific, when sea ice is lost, the Arctic's massive oil and gas resources could be more easily exploited; it could become an important, navigable trade route for shipping vessels; it could become a desirable tourist destination as a result of more habitable climate conditions. However, it is almost universally considered that the value-in-underuse of the Arctic far outweighs its potential value-in-use, because the latter value is both global and long-term.

A corollary to value-in-use in service-dominant logic offers another fundamental proposition about resources – value is always and uniquely determined by the beneficiary (e.g. Lusch and Vargo 2011, Vargo and Lusch 2008a, Grönroos 2006). Where a beneficiary is the unique determinator of value, and value is determined by value-in-use, unethical and unsustainable practices can arise. Let us take the value placed on shark fins in Asian cuisine across the world as an exponent of this logic. Shark fin soup is a delicacy in Asian cuisine. Its beneficiaries value it variously as a source of nutrition, a status symbol and a traditional emblem of good fortune. Shark fins are the constitutive ingredient in shark fin soup, and a single shark fin fetches anywhere between $75 and $300. In contrast, the wholesale value of shark meat is much less, because this resource is not as valued by its beneficiaries. But the fin trade leads to the deaths of between 26 and 73 million sharks per year, and has resulted in a 90 percent decline in the global shark population over the last three decades (Clarke et al. 2007, Clarke et al. 2006). Thus, the value placed on shark fin has directly led to the near

global collapse of a genetic line. Where a beneficiary is the unique determiner of value, and value is defined as value-in-use, the complex interrelationship of stakeholders is not represented, and the issue of the non-perception of value is left out of the frame. Gummesson (2008) has called for more advanced thinking about stakeholders in any discussion of resources, while Lusch and Webster (2011) set out a direction for a stakeholder-unifying cocreation philosophy for marketing. In the case outlined above, shark stock must remain underused in order to preserve its long-term viability, and its beneficiaries should not uniquely and phenomenologically determine its value. With the concept of value-in-underuse, we argue that marketing will in the future play a pivotal role in encouraging the underuse, preservation or conservation of resources.

From Ideas and Materials to the By-Products of Service

Service provision normally entails a large material resource use, but such material is seldom visible in the final manifestation of service delivery – this is an under-theorized, structural, feature of service. We introduce the concept *the by-products of service* to account for this paradox of marketing management. Despite the emphasis on immaterial flows, intangible benefits, and the virtual consumption experience, at no other point in time has there been a greater pressure of demand on the materials economy. Although service depends on goods for its realization, it is often difficult for buyers, and sometimes for sellers, to recognize the material resources that are intrinsic to the realization of the service. For example, while Internet search engines offer the consumer an effortless guide through cyberspace, the efficacy and ease of this service is powered by huge energy-intensive data centers which store billions of web pages and locate information, where a 15-minute

information search produces 7-10g of carbon (Leake and Woods 2009). In the service-dominant logic literature, operant resources are described as invisible and intangible, the microprocessor being a key emblem of service-dominant logic (Lusch and Webster 2011, Vargo and Lusch 2004a). For example:

> Human ingenuity and skills took one of the more plentiful natural resources on Earth (silica) and embedded it with knowledge… in the end the microprocessor is pure idea.
>
> (Vargo and Lusch 2004a, p. 3)

What the microprocessor example illustrates, however, is that even the manufacture of pure ideas has moorings in the material world of things. Microprocessor manufacture is a complex task involving more than 300 separate processes. It entails not just the simple construction of a casing from silica; more than 60 acids, solvents, caustics, and gases are used to make microprocessors, some of which are the most toxic chemicals in any industry, linked to carcinogenic and reproductive illnesses (Murzerek 2003). Microchip manufacture takes place in factory-laboratories ("fabs") of about one million square feet, and each fab deploys huge amounts of water for the purification process (Murzerek 2003). In fact, to successfully manufacture one 6-inch wafer, which yields about 200 chips, 20 pounds of chemicals and more than 3,200 cubic feet of gases are required. The material used to produce a microchip is 630 times the mass of the final product the consumer purchases (Grossman 2006). Because most of the materials used to manufacture the microprocessor are absent from the final product (i.e. all we get is silica), it is difficult to recognize and account for the resources that are intrinsic to the realization of this service. We are in

danger of *invisibilizing* the material processes that lead to seemingly immaterial capabilities. Indeed, we argue, it is a structural characteristic of service that the materials which go into its realization may often be absent or backgrounded in its final or delivery.

Further, the embodied labor that goes into creating the microprocessor, or indeed a host of other resources that have high levels of operant capacity, should be accounted for in a holistic theory of resources. The hazardous, high-tech work of manufacturing printed circuit boards and semiconductor wafers in Silicon Valley is carried out mostly by immigrants, women and people of color, often on insecure and temporary work contracts (Pellow, Smith and Sonnenfeld 2006, Pellow and Park 2002). As one commentator puts it, "In the public consciousness, high-tech is the antithesis of that old-fashioned, fossil fuel-driven industry. The news media normally discuss the new technologies as digitally clean, trafficking in information rather than goods, thriving on creativity rather than muscle, but that's a mirage" (Cook and Thompson 2000, in Pellow and Park 2002, 1).

What effect does it have to say that the microprocessor is "pure idea"? We argue that it elevates the microprocessor above the world of materiality and abstracts it from its context. The specifity of origins and by-products which are not infinite, nor embedded in the finished service, is omitted. These materials are not separate to the dynamic capability that is produced through micro-processing power; they are an essential constitutive part of it. A microprocessor is not an immaterial idea produced from disembodied labor. This suggests that the notion of "pure ideas" in the context of economic behavior is itself problematic, which has profound implications for the notion of the independent existence of operant

resources. More research and theory development is required on the "invisible hand" of materiality in services from a resource input, supply chain and technology perspective.

From Information and Materiality to Embodied Information

The concept of information has become a defining way of being in the late 20th and early 21st centuries (Castells and Himanen 2002, Hayles 1999). It is commonly thought that information is like an invisible ether that rises above the constraints of material grounding. Earlier in this paper, we traced this separation to the 1950s when cybernetics as an interdisciplinary force began to theorize the importance of information (Wiener 1961). Current thinking about resources in marketing similarly argues that information has become "unbundled" and "disembodied", removed from material structure. A central argument of this paper is that information is critically dependent on the material in which it is embedded; the material substrate that embodies the service will determine the type and quality of service offered. It is this dynamic that we wish to reflect in the concept *embodied information*.

First, as the examples of the airplane and the library illustrated, information is often supported by a complex material architecture, and it is the quality of this material structure which affects the resulting quality of information. Thus, materiality or the operand resource will pre-determine the type of service offered. Second, information is often embodied in other people, and trying to decouple the two affects the quality of the information. In management literature the human resource – consumers and employees alike – has over time moved from one extreme perspective where it was seen to be a purely physical asset,

to the other, where the human is viewed as a purely operant resource (see Snell et al. 2006). A more inclusive approach would acknowledge that operant resources – intelligence, skillfulness, and sociality – are embodied in (human) physical architecture, and changes in this architecture will profoundly affect the nature and quality of information. An exclusive focus on the operant dimensions of workers means that the mental skills and knowledge of the human are often conceived as disembodied resources and the separation of the human's operant and operand natures is not a holistic account. This is reflected, for example, in Constantin and Lusch's (1994) view of the accountant:

> In the following discussions, we separate people from their skills, invested capital from working capital, and, in general, operand from operant resources… We can consider the accountant to be a physical resource – almost as if she were a machine – and her professional skills as a cultural resource that drives the human machine. In an organization of almost any size from the very large to the one- or two-person organization, this split of resources has already been made… Her skills may be used repetitively without being depleted… the human being is an "operand resource" who depreciates with age, while the skills are the "operant resource", which appreciate with age (Constantin and Lusch 1994, 146–148).

In this account, operand and operant are separated. The result is that the accountant is seen to have two tiers of value to the organization – one as a cognitive entity that can work without tiring, the other as an inconvenient body that becomes increasingly useless to the organization. This shifts the conceptualization from one extreme, viewing the human as a purely physical operand, to another extreme, where the human is conceived as a solely

operant entity. If the previous era of human resource management disregarded both human cognitive and physical capabilities and needs, the current era, we argue, is in danger of failing to recognize the physical (i) needs and (ii) assets of the human body while privileging its cognitive functions. The conceptualization of the human resource must include the physical presence and necessity of the whole body. Workers' knowledge, skill and competence might be predominately framed as *cognitive*, but these cognitive capabilities are inextricably embodied in physical architectures, namely technological systems, organizational processes, and also the human body. The accountant may be aging, but it is this very process that nurtures her operant worth.

From the Inanimate Nature of Products and the Animate Nature of Things to the Non-Human Resource

In current conceptualizations about resources in service-dominant logic, human beings are treated as the exclusive agents of value creation. "Human ingenuity", "human appraisal", "human knowledge and skills", "human and mental skills" are terms that are used to describe value creation and innovation. For example, "all economic actors" are characterized as "individuals, households, firms, nations, families, societies" (Vargo and Lusch 2008a, 3). This list needs to be expanded to include other economic actors who are integral to resource creation and integration, because those who turn the operand resource into service are not always human. For example, as the most important pollinators of agricultural crops, the monetary value of honeybees is estimated at $15 billion annually to the U.S. economy (US National Academy 2007). When we think of ourselves as the only things to render something serviceable, we begin at best to ignore and at worst to abuse the

relationship we have with those non-human others that render “stuff” serviceable. The logic of marketing needs to expand to include these non-human others who are indispensible to service provision (Kajzer-Mitchell and Saren 2008).

All operand resources – those “raw” materials such as wood, oil and water – possess unique constellations of properties, materiality, embedded knowledge, adaptive processes and survival instincts which have evolved over billions of years. So, ironically, an operand resource possesses exactly those qualities as described as operant by Madhavaram and Hunt (2008, 76), who define “a masterfully developed operant resource [as that which] (1) has a very high degree of tacit knowledge, (2) is a result of purposely planned learning systems, (3) has taken a long time to develop, (4) enables firms to consistently produce efficiently and/or effectively, valued market offerings”. To conclude, there is a necessity to recognize the often animate nature of non-living things and the importance of non-human resources.

From Resources and Unresources to Re-sources

A holistic theory of resources must take seriously the concept of “unresources” or “ex-resources” (Zimmermann 1951). As Zimmermann stated, no resource simply exists, but rather it *becomes* a resource when technological and human conditions are aligned in a certain way. The corollary is that every resource contains potential to become an unresource. This can happen in three ways. First, there resources do not possess intrinsic assets and liabilities; what is a resource for an organization or an individual at one moment in time can be an unresource the next. For example, the valley of the River Kemijoki in

northern Finland has been positively affected by climate change, where milder weather offers more opportunities for food foraging and pasturing, and thus increases in meat and fur production. However in years to come, reindeer, which are the source of this food and fur, will not survive in such a habitat as it becomes prone to flooding as a result of the same climate change conditions (Keskitalo 2008). Second, what appears as a resource for one entity can emerge as an unresource for another. For example, automobility is a resource that is linked to most other industrial and service sectors of the global economy. It has provided people in many parts of the world with unprecedented access to destinations and the pleasure and comfort of private travel. However, automobility also accounts for one third of global CO_2 emissions. World car travel is expected to triple between 1990 and 2050, with the attendant increases in noise pollution, traffic congestion, and public road projects. 1.2 million people are killed globally in road crashes each year, and 20 to 50 million injured (Featherstone 2004, WHO 2004). Thus automobility, while a resource for certain parts of the world's population, is a long-term unresource for others. Third, if a resource becomes an unresource, or ex-resource, we must acknowledge that it seldom reverts back to "neutral stuff", and that stewardship of it continues despite its un-resourcefulness to humanity (e.g. thermonuclear waste, see Mundt and Houston 2010). The term "resource" derives from the Latin *resurgere*, meaning to rise again. This reminds us of the waxing and waning of resources during different times, places and stakeholders. Translating this concept, we propose the term "re-source" to emphasize that there is no separate entity called a resource. Rather it is better to think of re-source not as a noun, but as a verb – an activity to describe historically contingent, forming and unforming relationships between materials and stakeholders.

Conclusion and Recommendations

In the first part of this paper, we set out a number of concerns about how service-dominant logic at present constrains resource theory development. We discuss how a culture of demateriality – an underestimation, even a denial, of the importance of physical tangible entities – leads to the ascendancy of one type of resource, the operant resource, masking the importance of the interconnections *between* types of resources. We point out how failure to explore fully the interrelationship between resources blindsides a consideration of value-in-underuse, and of consumption as both a value-adding *and* value-depleting activity. We highlight that the evolution towards a service economy means little, if any, reduction in materiality (i.e. the use of stuff). This has profound implications for any theory of resources and planetary ecology. We do not dispute service-dominant logic's fundamental proposition; service arises from material goods. We argue in this paper that without goods, no service can exist. Everything has a material substrate, and this material substrate therefore precedes service. Thus no service can arise without materiality; goods are more than support mechanisms for service – they are fundamental and prior to service; the type and quality of the materiality will determine the type and quality of the service. We question the assumption that information, or knowledge, is un-embedded in the sense of being independent of goods and people. Instead we argue that all resources have both material origins and consequences. Further, we argue that viewing non-human and non-living things as inert non-agentic entities – "neutral stuff" – downplays their importance and fails to account for how such resources can co-create service offerings, value and social

reality. Finally we highlight the usefulness of expanding resource theory to include unresources as an important area of investigation.

In the second part of the paper, we discuss how these concerns might be mitigated by embracing a number of novel ideas about resource theory. The discussion is framed within a parsimonious model that, we hope, will contribute to a more inclusive and holistic theory of resources. The model is developed across *six dimensions*. In the first, rather than privileging the operant resource and stressing separateness, we contend that the operant and operand are co-evolving interdependencies where either type of resource can catalyze and give value to the other in many instances. In the second, we propose the concept of value-in-underuse as an important supplement to value-in-use. This enables us to explore the tensions between value-adding and value-depleting consumption, to identify the beneficiaries of value outcomes and to shed new insight into externalities. In the third, we introduce the concept of the by-products of service. This recognizes that service provision can entail large material resource use – the "invisible hand" of materiality. A microprocessor, for example, often presented as close to "pure idea", has deep moorings in the material world of things, which should not be ignored in managing and theorizing resources. Similarly, the fourth dimension of the framework uses the term "embodied information" to highlight that information is often preceded by a complex material architecture, implying, for instance, that managing human resources involves an astute balance of cognitive and physical capabilities and needs. The fifth dimension acknowledges the animate nature of non-living things, as well as stressing the importance of non-human resources, and argues that marketing theory needs to account for these non-human others and their contribution. The sixth dimension is mindful of the waxing and waning of

resources during different times, places and stakeholders and suggests that it is better to think of a re-source as an activity rather than an entity, which better explains how something can become “an unresource” or an “ex-resource” over time, a dynamic that poses challenges for its stewardship.

This framework, and the ideas contained within it, provide a contribution to the conceptualization of resources in marketing as service-dominant logic seeks to embrace wider societal, ethical and ecological challenges. We propose an agenda for further research in several areas. A fuller theory of operand resources must complement an already well-developed theory of operant resources. The entanglement between these two types of resource and the serial and complex interrelationship highlighted in this paper require deeper study. A culture of dematerialiy in resource thinking – the subordination of ‘stuff’ – must be addressed, similar to the knowledge advanced by the materialist turn in the areas of Artificial Life research, anthropology, sociology and science and technology studies. Further, service marketing scholars will acknowledge the paradox that more service provision involves more, not fewer, goods, has important implications for services research, resources and their management. Issues of value, value-in-use, value-in-underuse, value-addition and value-depletion in a holistic theory of resources are complex. Compounded by concern about ownership, stakeholding, beneficiary outcomes, and externalities these issues become even more contentious.

Service-dominant logic, with its insights about value, value cocreation, and the consumer, has much to offer resource theory. Viewing markets, consumers, organizations, technology, society, and the planet through the lens of a holistic theory of resources

explains much about marketing activity, consumption behavior, competitive modes, human and non-human endeavor. We endorse Vargo and Lusch's call (2008a, 9) for a broader service science approach that has "the potential of taking the perspective of value cocreation and exchange beyond the market by providing a systems-orientation that takes the issues out of the economic arena and re-contextualizing them". Bringing resource thinking into a broader societal domain continues this transformative agenda. It highlights that, as well as consumers and markets, resources matter.

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Figure 1: Towards a Holistic Theory of Resources

Current conceptualization of resources	Other conceptualization of resources	A holistic theory of resources
Operant is paramount	Operand is also important	Co-evolving interdependencies
Value-in-use	Value-in-underuse	Consuming and conserving resources
Ideas	Materials	The by-products of service
Information	Materiality	Embodied information
Inanimate nature of products	Animate nature of things	The non-human resource