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CONCEPTUAL/THEORETICAL PAPER

An expanded and strategic view of discontinuous innovations: deploying a service-dominant logic

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Abstract The service-dominant logic (S-D logic) provides a novel and valuable theoretical perspective that necessitates a rethinking and reevaluation of the conventional literature on innovation. This literature is built upon a goods-dominant logic and has resulted in a restricted and out-moded perspective that overlooks many major discontinuous innovations. In this article, we show how many innovations can be better understood by deploying a S-D logic perspective. We present six S-D logic categories of discontinuous innovation positing that they can help scholars and managers analyze, design and implement breakthrough advances in resource use. We argue that discontinuous innovation can arise by changing any of the customers' roles of users, buyers and payers on the first dimension. On the second dimension, the firm changes its value creation by embedding operant resources into objects, by changing the integrators of resources, and by reconfiguring value constellations. Finally, we offer some managerial and research implications of this expanded and strategic view of discontinuous innovation.

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Introduction

The relevance of discontinuous innovation for marketing managers, researchers, and policymakers cannot be overestimated. In the modern economy, markets, industries, firms, and jobs are being created and destroyed by discontinuous innovations. The Marketing Science Institute has designated discontinuous innovation tied to growth as a top research priority [see also "MSI Research Priorities 2004–2006" (MSI 2004) and "MSI Research Priorities 2006–2008" (MSI 2006)]. More specifically, research is encouraged to address several relevant questions, including: What are the patterns of discontinuous growth strategies that reshape industries? And, what new tools are needed for a proactive understanding of customers?

Unfortunately, with its roots in technological product inventions, the traditional goods-dominant logic (G-D logic) paradigm of breakthrough innovations falls short in answering these and other contemporary questions. For example, the G-D logic perspective has difficulty explaining how a company like Google, just 7 years after its founding, is valued at billions of dollars and enjoys a market capitalization surpassing a long list of business giants such as Coca-Cola Co., Honda Motor Company, and British Airways. Similarly, using the traditional G-D logic paradigm, it is challenging to explain how a movie rental company like Netflix could nearly drive the long-standing market leader Blockbuster out of business, or how the Swedish furniture retailer IKEA could earn high profit margins by selling contemporary furniture for low prices.

With this article, we attempt to demonstrate that many discontinuous innovations can be understood better within a S-D logic (Vargo and Lusch 2004). Our definition of what constitutes a discontinuous innovation reflects both G-D logic and S-D logic perspectives. G-D logic defines value as value-in-exchange. With the S-D logic perspective, however, it is the customer who perceives and defines value based on "value-in-use" (Vargo and Lusch 2004, p. 7). Yet, S-D logic does not neglect the importance of "value-in-exchange", as Vargo and Lusch (2006, p. 49) explicate. Value-in-exchange exists only if and when value-in-use occurs for the customer. Consequently, we term an innovation discontinuous if it (1) significantly changes how customers co-create value (value-in-use criterion) and (2) significantly affects market size, prices, revenues, or market shares (value-in-exchange criterion).

We discuss the following two dimensions of discontinuous innovation that inhere to S-D logic and posit that understanding these categories can help scholars to understand and managers to analyze, design, and implement discontinuous innovation.

Discontinuous innovation changes the role of the customer

The three categories we propose here are changing the customer's role as users, buyers or payers. In a S-D logic, the customer does not receive value created by the firm but is a co-creator of that value, and discontinuous innovations change the way customers do so. Furthermore, S-D logic distinguishes between "value-in-use" and "value-in-exchange," which relate to the three different customer roles.

Discontinuous innovation changes the firm's value creation

The firm's value creation is also altered through innovation. First, discontinuous innovation is composed of embedded operant resources. According to S-D logic, the basic unit of exchange is operant resources, such as skills, knowledge, and competencies, which can be exchanged directly, through education, or by embedding them into objects. Most G-D logic inventions fall into the last option. We argue that S-D logic does not exclude G-D logic innovations but rather perceives them as a special case of S-D logic innovation.

Second, discontinuous innovation is caused by a change of value integration, specifically, by changing the firm's and customer's integrating roles. Markets exist because of specialization and division of labor; therefore, the integration of operant resources is part of any customer value co-creation (CVC). Third, discontinuous innovation often includes reconfiguring the value constellation. A value constellation describes the interplay between actors and resources to co-create value (Lusch and Vargo 2006, p. 285; Michel et al. 2008). Many innovations are triggered by a change of a value constellation (Normann and Ramirez 1993), which extends beyond a new product exchanged in a dyadic relationship.

We present our argument by first summarizing the G-D logic view on innovation. Then, we discuss in some depth the various categories of innovation from a S-D logic perspective using examples for illustration. We show how S-D logic innovations can be applied to a global context, review some managerial implications, and highlight how our approach can improve decisions made by policy makers. Finally, we discuss some research implications.

The GDL view on innovation

Virtually all of the discussion about innovation in marketing is based on a G-D logic perspective, even when the offering itself is a service. In this section, we discuss how G-D logic has limitations when compared to a S-D logic perspective in clarifying patterns of discontinuous innovation. We do this by examining the following areas of research: models of innovation diffusion, firm- and marketing-level effects of innovation, and management of innovation in services.[1] This section is not intended to be an exhaustive review of literature, but rather an illustration of the shortcomings of applying a G-D logic rather than a S-D logic as a means to understand categories of discontinuous innovation.

Models of innovation diffusion

Substantial work has focused on predicting the timing of adoption and diffusion of new consumer products. Foundational to such models is consumer behavior theory (Lilien et al. 1992), such as Arndt's (1967) work on the role of product-focused word of mouth in the diffusion of a new product. Rogers (1962) establishes a conceptual foundation in which innovators independently adopt an innovation and imitators follow; Bass (1969) builds on this foundation by modeling the timing and magnitude of the sales peak of consumer durables as a function of the number of previous buyers. Early consumer behavior work (Arndt 1967) failed to even define a new product, thereby sidestepping any evaluation of altered consumer use. Subsequent work in the area has focused on durable products with high interpurchase times. Thus, a strong goods focus has guided this research stream.

[1] As suggested by Lusch and Vargo (2006, p. 282), we use the plural term "services" in a GDL context and the singular "service" in the SDL context.

Although we acknowledge the immense contributions of this line of work and the relatively recent emergence of S-D logic, we also note that even contemporary models continue to be steeped in the G-D logic, as models of innovation diffusion tend to assume that offerings are tangible products. A S-D logic perspective would counter that offerings are not the end product of the process of production but that "goods are best viewed as distribution mechanisms for service provision" (Vargo and Lusch 2004, p. 9).

A review of work in this area reveals the propensity of this line of research to include model parameters that solely represent the value created by the firm, in marked contrast with the S-D logic concepts of value propositions and the customer's co-creation of value. A meta-analysis of diffusion models reveals that a vast majority focuses on consumer durables (Sultan et al. 1990). This trend may have emerged because a firm perspective, rather than a consumer perspective, has structured the field. Even Rogers (1976) laments that "perhaps 'diffusion' research would have been called something like 'innovation-seeking' or the 'evaluation of innovations' had the receivers been in control" (p. 294).

This distinction is central to our argument in favor of S-D logic, in that "a service-centered dominant logic implies that value is defined by and co-created with the consumer rather than embedded in output" (Vargo and Lusch 2004, p. 6). Overall, consumer models emphasize value added to operand resources, whereas an SDL perspective focuses on the value added when consumers improve their own co-creation of value.

Even in organizational settings, research has assumed that firms' decisions to adopt innovations are "influenced by the compatibility between the innovation's characteristics and those of the potential adopting unit" (Robertson and Gatignon 1986, pp. 2–3). Even when Robertson and Gatignon (1986) investigate discontinuous innovations (e.g., products, services, and systems, including e-mail and microcomputers), they focus on attributes, which presupposes the G-D logic conceptualization of a separation of producer and user. Subsequent work by the same authors (Gatignon and Robertson 1989) includes both traditional characteristics (e.g., centralization, task complexity) and the information-processing level of adopters, but the G-D logic perspective still ignores the ongoing co-creation of value by the customer.

Furthermore, innovation diffusion literature has focused on value-in-exchange, or the operand resources placed into products by a production process, rather than value-in-use. Existing research demonstrates this through its focus on differentiated product attributes (Kim et al. 2000) instead of differentiated consumer uses. Finally, a G-D logic perceives the possible behavioral change demanded by innovations as an obstacle, as Gourville (2005) calls it, 'the curse of innovation.' In this sense, because customers generally are reluctant to change their behavior, adoption rates and market success get overestimated.

In summary, the diffusion of innovation literature, which centers on the context of tangible products, focuses on firm operand resources, such as manufacturing, inventory, and distribution (Golder and Tellis 1997), instead of operant resources, such as knowledge, competences and the co-creation of value by customers.

Firm-level effects of innovation

Literature on the firm-level effects of innovation addresses many considerations, including strategic marketing planning, financial returns, firm characteristics and their impacts on innovation, organizational characteristics that facilitate innovation development, and the role of strategic orientation. This broad area often includes product development, which we explore next.

In general, this literature stream emerges from competitive advantage theory, which is compatible with the SDL's emphasis on core competences, value propositions, and operant resources. However, work in this area has not gone far enough; that is, it focuses on *firm* resources and the satisfaction of *firm* value rather than customer-centric views, such as value co-creation and the reconfiguration of value constellations.

In showing that a firm's willingness to cannibalize its own investments relates positively to radical product innovation success, Chandy and Tellis (1998) develop a typology of product innovations: incremental innovation, technological breakthrough, market breakthrough, and radical innovation. However, their customer benefits dimension contains "the extent to which the technology involved in a new product is different from prior technologies" (Chandy and Tellis 1998, p. 476), which refers to the G-D logic perspective of utility embedded during the production and distribution processes and thereby reflects a G-D logic perspective. Related research implies that a firm must manipulate resources to "make their innovations more financially valuable" if it wants to extract maximum value from an innovation (Sorescu et al. 2003, p. 84). This view assumes that operand resources instill value during the manufacturing process, whereas an S-D logic approach would emphasize the active co-creation of value outside the manufacturing process, that is, value-in-use over value-in-exchange.

Most work in this area, to its credit, is replete with discussions of the development of what SDL would term operant resources. For example, Chandy and Tellis (1998) show that internal competition, learning systems, and new product advocates—concepts compatible with S-D logic's attributes of dynamic capabilities and intangible processes—

play a role in radical product innovation. Lukas and Ferrell (2000) evaluate the role of interfunctional coordination on innovation outcomes and find that "interfunctional coordination is not related to new-to-the-world products" (p. 244). Recently, Atuahene-Gima (2005) has argued that a firm's knowledge and skills are involved in radical innovation performance.

This research area also often includes debates about the role of customer intimacy, such as whether innovation development benefits if the firm stays close to its customers. Sometimes the answer offered is negative and indicates "a strong focus on current customers might cause managers to focus less on future customers" (Chandy and Tellis 1998, p. 484). As Zhou et al. (2005) argue, a market orientation engenders innovations that mostly benefit mainstream customers. However, Lukas and Ferrell (2000) find that a "customer orientation increases the introduction of new-to-the world products" (p. 239), which is consistent with the customer-orientated and relational premise of an S-D logic perspective. Similarly, de Brentani and Ragot (1996) utilize literature on new product development to delineate success factors for new business-to-business professional services. They find "the firms that have an outward-looking, market-oriented approach when developing new services achieve a high degree of success" (p. 522). Customer intimacy may enhance innovation efforts by enabling firms to involve their customers in the coproduction of innovation, which may uncover their latent needs (Lukas and Ferrell 2000). The extent to which a market orientation does not facilitate innovation, as noted in these studies, may be an effect of the firms' goal to serve their best customers (Zhou et al. 2005). However, S-D logic advocates that a consumer-centric view will enable a firm to focus on communications with consumers who increasingly initiate and control this dialogue (Prahalad and Ramaswamy 2000) and assumes that financial performance is a valid measure of marketplace feedback.

Although a customer focus and learning environment are elements of a market orientation and compatible with the development of operant resources, a market orientation is actually "compatible with, if not implied by, the service-centered model" (Vargo and Lusch 2004, p. 6). However, market orientation by itself is an incomplete substitute for a S-D logic perspective for the evaluation of innovation effects. For example, Lukas and Ferrell (2000) evaluate customer, competitor, and interfunctional coordination orientation effects on product innovation and demonstrate that a market orientation can be applied to operand resources. Thus, the separation between a market orientation and S-D logic must center on the separation of value-in-exchange (payer and buyer role) and value-in-use (user role). That is, listening to customers and inculcating a product with specific attributes that meet specific needs differs from involving consumers in the co-creation of offerings that provide value-in-use.

The customer's perspective of how an innovation changes his or her usage often is exogenous to this stream of research, involved only in determining a definition of innovation. In contrast, S-D logic treats the customer perspective as endogenous to the development of innovative offerings. In a recent reevaluation of the long-standing premise of the S-shaped curve in technological evolution, Sood and Tellis (2005) argue that terms such as "discontinuous" and "disruptive" innovations "are intrinsically problematic because they define an innovation in terms of its effects rather than its attributes" (p. 153). However, S-D logic suggests that innovations are discontinuous only to the extent that they challenge the ways consumers create value-in-use; the definition does not rely on attributes or operands. To circumvent the circularity of defining a construct by its effects, S-D logic would argue that a definition based on the level of consumer-based discontinuity in value creation must be distinct from market outcomes, because the enterprise can only offer value propositions. This theorization is compatible with Urban et al. (1996) definition of discontinuous innovation: "Really new products shift market structures, represent new technologies, require customer learning, and induce behavior changes" (p. 47).

In summary, firms rarely can recognize fully or extract total value from discontinuous innovations because "many conventional new product marketing approaches fall short if applied to discontinuous innovations. The familiar admonition to be customer-driven is of little value when it is not clear who the customer is—when the market has never experienced the features created by the new technology" (Lynn et al. 1996, p. 11). This assertion converges with Shostack's (1977) exhortation regarding the failures of a goods-centered view of marketing management in a service-centered world: "The greater the weight of intangible elements in a market entity, the greater will be the divergence from product marketing in priorities and approach" (p. 75). What we aim to highlight through this association is that firm-level effects of innovation may be misevaluated from a G-D logic perspective. The literature cited in this section stems from a product-dominated perspective and therefore may underrepresent the potential a firm could gain were it to focus instead on any offerings and any customer value co-creation activity.

Management of innovation in services

Research pertaining to the management of service innovations generally focuses on topics such as types of service innovations, the design and management of innovation activities, the involvement of customers in the innovation process, and the role of technology. Although some of the

existing literature on services innovation does embrace a S-D logic perspective, much of it does not. As Vargo and Lusch (2006, p. 47) point out, "Typically, service is treated as a kind of good (subset of product) that differs from other goods by lacking in certain qualities—tangibility, separability of production and consumption, standardizability, and inventorability."

A resource-based view of the firm provides a significant theoretical basis for much literature in this area (Edvardsson et al. 2000), in that the extent to which firms engage in new service development depends on their operant resources. Consumer demands for service innovation thus may be constrained by the resources and capabilities of a firm (Magnusson et al. 2003). The competencies of firms that strive to create new services may be classified according to three dimensions: different processes, the skills and knowledge of service providers, and physical facilities (Tax and Stuart 1997). These aspects of an offering are inherent to an organization and do not pertain to changes in a customer's co-creation role. If new competencies are needed to deliver a new service, a focus on operant resources is assured, though previous concentrations have been on "the extent of change to the existing service system" (Tax and Stuart 1997, p. 107), which is consistent with the manipulation of operand resources. The S-D logic view would propose that a market-creating service innovation represents "an idea for a performance enhancement that customers perceive as offering a new benefit of sufficient appeal that it dramatically influences their behavior, as well as the behavior of competing companies" (Berry et al. 2006, p. 56).

Innovations in services also may be underestimated, because they tend to be manifested as incremental, diffuse improvements rather than proper innovations (Berry et al. 2006; Cowell 1988), partially because of the involvement of the service provider and partially due to customization. In this context, the ability to separate production and use distinguishes S-D logic from G-D logic and clearly is essential to the creation of innovative services.

The extent to which incremental innovations are spread across the organization and then assimilated into a 'real innovation' (Sundbo 1997, see p. 437) depends on the operant resource deployment within the service firm. However, the higher the degree of knowledge sharing the more standardization may occur, which results in a situation in which it is "more difficult to involve the customers in the innovation process" (Sundbo 1997, p. 437). The S-D logic paradigm can address this paradox by advocating a customer-oriented, relational view in which innovation development focuses on a specific customer need, and the value proposition embraces the customer's co-creation of value. Boundary-spanning employees can share innovative, individual customized services then deploy them as necessary to increase customization.

So what role do discontinuous innovations play in services? Technology, for example, may influence a firm's ability to craft a value proposition that will transform the way customers interact with an offering. However, "technology is only the medium for a new service" (Sundbo 1997, p. 436) that offers an opportunity to provide new and innovative services. In this sense, technology can function as a repository and convenient delivery mechanism for key customer information or as a tool by which customers co-create value in a service encounter (Bitner et al. 2000). Thus, customization and discontinuity of innovation may coexist.

In addition, discontinuous innovations due to technology infusion may serve as a way to create spontaneous delight by delivering on value propositions designed around a customer view (Bitner et al. 2000). Discontinuous innovation in service provision also might provide an opportunity to reposition strategic alliances into a value constellation (Edvardsson et al. 2000; Normann and Ramirez 1993). Finally, as Berry et al. (2006) argue, service innovation may create new markets through innovations of either the service core or the service delivery. However, in their two-dimensional framework, Berry et al. (2006) continue to rely on G-D logic and underestimate the customer's role in co-creating value, as well as the importance of operant resources.

In fact, many of the shortcomings identified in our review of innovation in organizational settings are best illustrated in a review by Hauser et al. (2005). These authors find that "the integration of marketing concepts into a product-development organization" is a topic open for further investigation (p. 19), inferring that much research in organizations and innovation is focused inwardly upon the firm and on tangible product development, and lacks direct links to altered customer roles. Our approach to discontinuous innovation attempts to overcome the artificial distinction between product innovation and service innovation and focus on the customer's role, regardless of whether the offering is more or less tangible. Furthermore, we concentrate on the customer's value co-creation and extend this type of co-creation beyond a simple buyer–seller relationship into value constellations.

To summarize the preceding section, we have provided a brief review of some innovation theory literature and focused on its underlying assumptions. We demonstrate that extant literature has been myopic in its classification of discontinuous innovations. Specifically, prior literature has

- Focused on products, to the detriment of the inclusion of service offerings;
- Concentrated on firm-level effects rather than customers' value-in-use; and

Table 1 Examples of SDL Innovations by category

Innovative Customer Value Co-creation (CVC)	Innovative offering	Description	Change of customer role			Change of firm's value creation		
			User role	Buyer role	Payer role	Embedded operant resources	Resource integration	Value constellation
Study and obtain a higher education degree without going to a physical classroom and without direct interactions with teachers and other students.	University of Phoenix	The University of Phoenix, founded in 1976, targets students that are not served by traditional universities. Most of its students are older and attend the school part-time. The business model allows the school to charge only $250 for a credit or $10.000 for a degree. By the end of 2003, it had served 150,000 students, including more than 50,000 online (Christensen et al. 2004, p. 105).	X				X	
Go to the "movies" not to "a movie"	Multiplex cinema	Instead of selecting the film first and going the cinema at a specific time, multiplex cinemas allow customers to decide on site which movie to watch because they offer so many choices.		X			X	
Shop mortgage through a broker instead of dealing directly with banks.	Mortgage broker	Most families buy their homes with mortgages, partly because they do not have sufficient assets and partly because it is tax efficient. In the United States, mortgage brokerage has become a major industry.		X				X
Rent and watch DVDs without leaving the house	Netflix	Unlike Blockbuster, Netflix has no brick-and-mortar stores but lets customers select the movies on a Web page and send them by postal mail. The business model is very successful, though more advanced technologies are available (e.g., video-on-demand through cable television).		X	X			X
Read a free newspaper on way to work within 20 minutes.	*20 Minuten*	The tabloid-format newspaper has become a major competitor for established players in Switzerland. The paper summarizes headlines and can be read within 20 minutes; hence the name *20 Minuten*. It is free for readers and paid for entirely by advertisements. Because it targets commuters who use public transportation (50% of the workforce in Zurich, Switzerland[a]), it is distributed very cost effectively at train stations and in trams and buses.	X	X	X			X
Shop for furniture in a self-service, casual, family-friendly atmosphere, do own transportation and assembly.	IKEA	Customers self-select their furniture in the store or by catalog, pick up the boxes from the warehouse, transport them, and assemble the furniture at home. Million copies of the IKEA catalog are printed in 23 languages. Only the Bible and Harry Potter books achieved a higher circulation.	X	X	X		X	

Table 1 (continued)

Innovative Customer Value Co-creation (CVC)	Innovative offering	Description	Change of customer role			Change of firm's value creation		
			User role	Buyer role	Payer role	Embedded operant resources	Resource integration	Value constellation
Exchange knowledge with others through a structured online database for free.		Wikipedia.org is written collaboratively by its readers and free to use. As of 2005, there were 600,000 registered users, so-called Wikipedians. Wikipedia contains over ten times as many articles as Encyclopedia Britannica and Microsoft's Encarta (www.wikipedia.org). Industry-wide sales for encyclopedia software is falling, and a recent study shows that Wikipedia is as accurate as the Encyclopedia Britannica (Goodin, 2005).	X	X	X		X	
Communicating while moving around	Mobile Phone	Initially, mobile phones offered the customer the possibility to move around while making and receiving phone calls. Newer technology allows customers also to listen to music, take pictures, play games, store personal information and pay at vending machines.	X	X	X	X		
Adjust individual insulin level	Glucose monitoring system	Instead of having the insulin level adjusted every week by a doctor, glucose monitoring systems allow diabetes patients to measure and adjust their dosage constantly. This saves the trip to the doctor's office and also decreases the risks for hypo- or hyperglycemia.	X			X		
Make better decision based on empirically validated models	Data mining software	Data-driven knowledge discovery reveals relationships between consumer behavior variables, which in turn can be applied to optimize marketing decisions.	X			X		
The user finds the relevant information on the Internet, the advertiser can connect with high potential prospects.	Google	Google's search engine, together with AdWords and AdSense (Goodmann 2005) links the interest of the user with the interest of the advertiser.	X	X	X			X
The user can prove his creditworthiness with one single score, the lender can easily and reliably assess the credit risk.	TransUnion (credit score)	TransUnion collects data about all individuals in the USA concerning their debt service behavior. Based on this data, a credit score for each individual is computed. This credit score can be used by potential lenders (mortgage companies, credit card firms, etc.) to assess the individual's creditworthiness. Financial services providers share information with TransUnion because it is in their interest to have this assessment available.		X	X			X

[a] www.bfs.admin.ch.

- Failed to apply operant resources, which play a significant role in innovation development, to research designs that can optimize understanding of the relational and customer-centric activities of a firm.

We now investigate how S-D logic might provide better ways to conceive of and manage firms' innovations.

Discontinuous innovations from a SDL perspective

As mentioned in the introduction, we term an innovation discontinuous if it (1) significantly changes how customers co-create value (value-in-use criterion) and (2) significantly affects market size, prices, revenues, or market shares (value-in-exchange criterion). Our case-based exploration revealed six categories of contemporary discontinuous SDL innovations. This is summarized in Table 1. The table indicates that any innovation we discuss always changes both the firm's value creation and at least one of the customer's roles. For illustrative and simplification purposes, we discuss the cases under only one of these two dimensions despite the fact that both dimensions are relevant.

In the following sections, we discuss the dimensions and use various mini-case examples to illustrate the six categories. The discussion and examples demonstrate that adherence to a G-D logic perspective results in overlooking many discontinuous innovations that the S-D logic view readily identifies.

First dimension: changing the customers' roles

An S-D logic posits that firms do not produce value for but rather with the customer. The value of a market offering (service, product, idea, promise) cannot be defined by the firm but only by the individual customer. Consequently, the customer is always a co-creator of value.

This co-creation of value requires that customers perform three different roles: users, buyers, and payers. This typology, suggested by Sheth and Mittal (2004), applies to individual consumers as well as organizational consumers. Depending on the context, the same person might perform all three roles (buying a bagel in a restaurant and eating it for breakfast), whereas on other occasions, the people performing the roles differ (a mother buys a shirt for her son with the money the grandmother gave him for his birthday). In business markets, a manager might buy a computer for his or her own use and pay for it from his or her own budget, or in a major decision, a buying center might comprise separate users, buyers, and payers.

These three roles are directly derived from S-D logic because the user's role refers to value-in-use, the payer's to value-in-exchange, and the buyer's role bridges value-in-use and value-in-exchange. Therefore, discontinuous innovations, according to a S-D logic perspective, significantly alter the customer's role as a user, buyer, or payer, or some combination thereof.

User role One example of discontinuous innovation that changes a user's role comes from higher education. The University of Phoenix has changed the learning experiences of thousands of students (Christensen et al. 2004). Although it has not invented new subjects or degrees ("products" in G-D logic), the University of Phoenix has altered users' roles dramatically. Students no longer must live in proximity to a campus but can earn a degree, at a pace they (rather than the university) define, from anywhere that offers online access.

Buyer role In contrast, multiplex cinemas are discontinuous innovations that have changed the buying process or role rather than the user role. Traditionally, moviegoers determined the movie they wanted to see at a specific time and drove to the appropriate theater. However, because multiplex cinemas with their many screens can show more than a dozen films at similar times, patrons can meet friends at the cinema and decide at the cashier's counter which movie to watch.

Payer role Discontinuous innovations can also alter the customers' buying and paying processes. Netflix is a mail-based DVD rental company. Customers order DVDs over the Internet, then receive the DVDs at their homes. In contrast, the traditional business model of Blockbuster required customers to drive to a store to select, obtain, and return the DVDs. Furthermore, the traditional model charges a fee per movie for a certain time, whereas Netflix customers subscribe to the service and receive a certain number of DVDs that they can rent simultaneously and keep for an undetermined amount of time. Thus, though consumers still rent and watch the films at home, the process they use to buy and pay for the service is radically different.

Changing multiple roles Situations also exist where some discontinuous innovations change all three customer roles. For example, consider newspapers for commuters that are distributed for free in major European and US cities. In Switzerland, for example, the newspaper *20 Minuten* is distributed for free at train and bus stations and used by readers to inform themselves during their commute to work. *20 Minuten* has changed the way customers use a newspaper (quick read, no long stories, no background information), how they acquire it (from train and bus stations or as "second readers" in trains and buses), and how they pay for it (free). *20 Minuten* offers one of the fullest illustrations of a S-D logic discontinuous innovation.

G-D logic, however, would not recognize this novel newspaper as a discontinuous innovation at all.

Finally, let's look at three well-known examples that have also changed all three roles of the customer. The Swedish furniture giant IKEA enables consumers to pay less for furniture but also prefers that they transport their purchases and then assemble the furniture themselves. Wikipedia, the online encyclopedia charges nothing for access to its content that is created and posted by users on an ongoing basis. The invention of the mobile telephone provides probably the broadest example of a change in all three consumer roles. Users can move around freely and are not bound to a telephone wire, buyers purchase not only the phone but often a package that includes the phone and a service agreement, and payers often receive the phone for free if they pay for the service they use.

Second dimension: changing the firm's value creation

Embedding operant resources into objects The application of specialized skills and knowledge is a fundamental unit of exchange (Vargo and Lusch 2004, p. 6). Knowledge and skills can be transferred (1) directly, (2) through education and training, or (3) indirectly through embedding into objects. We recognize that the S-D logic view does not exclude or neglect goods such as mobile phones, but rather considers them a special case of service provision.

G-D logic prioritizes product attributes to define innovations (Sood and Tellis 2005). On the other hand, S-D logic, with its inherent customer focus, defines an innovation with regard to its service provision. The critical factor in this context is not what it is (how smart is the product?) but what the customer can do with it (how does it make the customer smarter?).

Two examples illustrate discontinuous innovation through embedding operant resources into objects. Glucose monitoring systems enable diabetes patients to self-diagnose their blood sugar levels several times a day, a task that could be performed only by doctors previously. Knowing his or her glucose level immediately and with great accuracy, the patient can apply the most effective dose of insulin, which lowers the risk of both hyper- and hypoglycemia. As a second example, data-mining software applications similarly help managers make better decisions on the basis of factual information about customers, combined with model-based algorithms that turn the data into information and then into knowledge (Davenport et al. 2001).

Changing the integrators of resources The next S-D logic innovation category we propose relates to the specialization and division of labor, which is the fundamental cause of market exchange (Smith 2002; Vargo and Lusch 2004, p. 6). Inevitably, the process of co-creating value consists of dividing tasks to obtain specialization benefits and integrating them to realize the sought after value-in-use.

In other words, the question is not whether to integrate, but who integrates what. In a more recent publication, Vargo and Lusch (2006, p. 53) propose that "Organizations exist to integrate and transform micro specialized competencies into complex services that are demanded in the marketplace." Because the customer is always a coproducer, this foundational premise implies that CVC activity integrates operant and operand resources. This implication refers to the "conservation of integration" (Christensen et al. 2004, p. 19), which holds that a given value creation activity requires a certain amount of integration, such that the customer, as a co-creator of value, can integrate more or fewer resources as necessary.

The conservation of integration rule probably is better understood in business markets than in consumer markets. In simplified terms, a company that integrates more resources is considered a solution provider, whereas one that does little integration is a specialist. For example, a company might choose to have all its mail-related activities performed by Pitney Bowes, an integrated provider of mail services. Alternatively, the company also could integrate more resources itself by using the United States Postal Service and other specialist providers.

However, discontinuous innovation does not necessarily imply that companies offer more solutions instead of products, nor that they should (see Table 1). When customers want to integrate more resources themselves (because it is cheaper, more efficient, more fun, or gives them more control, privacy, and flexibility), disintegrated offerings are preferable.

Discontinuous innovations are especially powerful if they turn noncustomers into customers. These noncustomers often can be reached by offering resources that are more integrated. For example, the integrated, graphical user interfaces of Apple Macintosh and Microsoft Windows made computers accessible to computer novices, because they lessened the customer skills required in the CVC process. However, noncustomers may lack not the skills but the wealth. Because less integrated offerings are less costly for the provider, they become more affordable for consumers. McDonald's, for example, is far less integrated than a fine dining restaurant and a lot less expensive. The same is true for IKEA, which lets the customer integrate more resources him- or herself than do traditional furniture retailers. In summary, by altering the scope of integration, CVC activity inevitably changes and can in turn trigger discontinuous innovation.

Reconfiguring value constellations The final category of discontinuous innovation enables us to break free of a

myopic value-in-exchange GDL focus between a firm and a customer and study how operant resources from multiple sources can form innovative value constellations.

Discontinuous innovations substitute and complement customers' skills and knowledge, and they often link them together to create a network of operant resources (Lusch and Vargo 2006, p. 285). Compared with a more traditional G-D logic view, the S-D logic perspective contains two key differences. First, market exchange is not restricted to two parties but is open to many actors. Second, the idea of a linear value chain (Porter 1985) gets extended to more complex value constellations, or what have been referred to as "value stars" (Normann 2001, p. 72). We find that innovative value constellations fall into one of two categories. The more obvious ones are Internet-related applications, which have been truly discontinuous in the past 10 years. Less obvious are those that are not Internet-based but bring together economic actors by other means. Google offers the most popular case of the first category. By its very nature, a search engine links skills, expertise, information, and data. The user of a search engine co-creates value by entering search strings, and the quality of the search results, in terms of their comprehensiveness, depth, and breadth, depends largely on the user's ability to define his or her interest with appropriate keywords. Furthermore, Google's revenue model relies on context-specific links to paying companies.

Bringing together economic actors in innovative value constellations is the second category and it was created prior to the Internet age. Credit score agencies (e.g., Equifax, TransUnion, Experian) in the United States provide money lenders, such as banks and credit card companies, comprehensive information about actual and potential customers. In turn, those lenders report their customers' payment history to the agencies. Customers can order the summary reports and learn about how to improve their credit scores. This system improves the average efficiency of private credit application processing through its high standardization and the collection of multisource information.

Discussion

The novel view of discontinuous innovation presented offers substantive implications for society and marketing. In this section, we offer implications of service-dominant logic innovations for developing economies, for management and for policy makers. The discussion indicates that SDL is not inherently managerial (Vargo and Lusch 2006) and potentially offers a reorientation for a theory of society (p. 54).

Implications for developing economies

While we have explored examples of discontinuous innovations in a S-D logic perspective, so far all our examples are managerial in nature and set in developed countries. However, we believe that an S-D logic perspective to innovation may be even more relevant when applied to developing countries and when extended beyond managerial questions, as suggested by Vargo and Lusch (2006, p. 51). Here we discuss how S-D logic-led discontinuous innovation can change not only developing markets, but also impact the social structure and enhance the quality of life for the world's poorest. This is relevant, considering that half of all households in India live on an annual income below US$2000.

Poor customers differ from well-off customers not only by disposable income. They also perform the roles of *users*, *buyers*, and *payers* very differently. In developing countries, the cultural context, the value system, social relationships, and status is typically not built around or impacted by a consumer culture. A significant portion of the citizenry is illiterate, which affects business-to-consumer as well as business-to-business markets. Consider the case of the Grameen Bank in Bangladesh. By reconfiguring all three customers roles, it created a discontinuous business strategy called micro-credits to serve the poor as small teams of customers (Yunus 2003). Group members are required to support each other in using the bank's loans (user role) and receive small loans with disbursement staggered and continuing as long as those already holding a loan are repaying regularly (buyer role). Interest rates are significantly lower than the going market rate of loan sharks (Prahalad and Hammond 2002, p. 52). As soon as a loan is repaid, members usually take out a fresh one, $20 or so larger than the previous one (payer role).

The next category of discontinuous innovations—*innovating embedded operant resources*—is also becoming more relevant when serving the poor. The poor often lack the skills to gain access to resources that they need to improve their capabilities. This quandary can be overcome by embedding operant resources into offerings which 'de-skill' the customer's value co-creation. In Peru, Voxiva de-skills the process of diagnosing disease by providing pictures of different states of illness. Lower skilled health workers in remote areas can compare the pictures with the symptoms and can report their observations to the medical center in Lima by telephone by just indicating the numbers of the matching pictures (Prahalad 2005, p. 39; see also Christensen et al. 2004, p. 105). Voxiva has evolved into a showcase for a profitable business that improves the quality of life for people with an income less than $2 a day (Prahalad 2005, p. 192–198).

Integrating resources differently offers many innovative opportunities when serving the poor. As a rule, offerings need to integrate resources that are not part of the infrastructure as they would be in developed countries. Simple tasks, such as entering an ATM code, are hurdles for many illiterate customers. To simplify the customers' value co-creation, the retailer Elektra in Mexico integrates the identity check by building fingerprint recognition devises into their ATMs (Prahalad 2005, p. 43).

Finally, serving the poor often requires *reconfiguring value constellations*. Since poor countries and poor households lack the infrastructure others take for granted, discontinuous innovations can be used to overcome those hurdles. This can be done by leapfrogging technological progress. For example, remote rural areas that were never reached by wired telephones are gaining access to mobile phones. The business model of the Village Phone program by Grameen Phone in Bangladesh allows women to get a loan to subscribe to phone service, trains them on how to operate the GSM phone and how to charge other households to use the phone. While the disposable income of each household is very low, a single phone is used by many households and the phone company generates an average revenue of $90 per month per Village Phone (Prahalad and Hammond 2002, p. 49).

In conclusion, addressing the needs of the fastest growing markets in the world that serve more than four billion poor customers requires more than producing and delivering innovative and affordable goods. It requires an approach that integrates operant resources to enable new ways of co-creating value.

Implications for managers

Employing a S-D logic requires firms to take a broader view of innovation beyond the discipline's traditional focus on the payer role or value-in-exchange. This expanded perspective enables managers to see more discontinuous innovation opportunities that are not related to the discoveries made in R&D laboratories. We encourage managers to invest in competencies to better understand the customers' multi-faceted role of buyers, payers and users. Given that the customer is always a co-creator of value, innovations either improve the customers' value co-creation function or create new markets by making value propositions to non-customers. We also suggest that managers segment selected non-customers based on the resources available to them (skills, knowledge, time, money, relationships, etc.) and find ways to loosen the constraints that inhibit those segments from becoming customers. For those who lack the financial resources, disintegrated solutions (e.g., University of Phoenix) or a change in the payer role (e.g., 20 Minuten newspaper) are potential strategies. For those who lack time, more integrated solutions (e.g., Disneyland) may be considered growth opportunities. For the unskilled segment, knowledge-embedded offerings can offer promising innovations.

Further, our new perspective mandates that managers realize that discontinuous innovation is increasingly created not by the simple firm–customer dyad, but rather through multiple sources forming innovative value constellations. With S-D logic, exchange and value creation is not restricted to two parties, but open to many actors, including as many as several firms and several customers. The emergence of value constellations has been accelerated by technology that has made operant resources (the basic unit of exchange) more mobile, accessible and connectable on a global basis. Thus, discontinuous innovation often links the substitutable and complementary knowledge and skills of actors to create a network of operant resources. All this means that firms must broaden their perspective to embrace the mandate of collaborating with other firms offering different operant resources and with customers offering their own operant resources to create unique constellations of value. The health care industry represents a setting where the perspective we are describing could provide a break through way for creating novel solutions.

Our work also fundamentally challenges managers to reconceive how innovation impacts their firm's strategic positioning and the creation of sustainable, differentiated competitive advantages. Considering the various customer roles challenges the view that market segments are made up of individuals with homogeneous characteristics, wants and/or needs. Thus, firms that wish to remain or become highly relational with their existing or targeted core market may need to rely on partners in their 'value constellation' to maintain communication and intimacy with customers. This places additional value on relations among members of the constellation, and increases the value of knowledge transfer among partners in the network. Additionally, operant resources become more explicitly evident, to both partners and customers, as service and solutions are exposed for the quality of value they offer. Therefore, managers will increasingly need to develop recognition of the value of customer knowledge across buyer, payer and user roles, and be able to strategically and creatively design value propositions that convey real meaning to all involved.

Implications for policy makers

Generally, a new product with improved features is considered an innovation, while changing the way customers co-create value is not. Likewise, innovation productivity is usually measured in terms of applied patents and

innovation success in terms of sales, which is a value-in-exchange metric. Consequently, policy makers providing funding for innovation research favor G-D logic innovations over S-D logic innovations. For example, application forms for research grants often explicitly ask for "deliverables", "copyrights" and patent protection. Innovating value constellations, for example, is not considered 'science' and therefore does not qualify for corresponding funding. While our article will not rectify this situation, we offer a different, S-D logic-based perspective for categorizing innovations that are relevant not only for marketing problems, but address broader public policy and societal issues as well.

Implications for researchers

There are ample opportunities to further extend *innovation theory* by adopting S-D logic. This logic demands that we change our view of innovation from the production of innovative 'products' to resource integration and enhanced value propositions; and, from exchanging operand resources to applying and embedding operant resources to help co-create new consumer experiences. It is innovation that reshapes customer value-in-use, thereby urging firms to innovate co-creation of value with customers. Discontinuous innovation stresses inclusion of operant resources within an offering or experience in ways that enable the customer to innovate. Future research on innovation should investigate the ways in which partners in value constellations collaborate synergistically to create networks of operant resources. How do service providers combine such resources to the benefit of the consumer? How does customer co-creation apply operant resources to create value and experiences?

A growing body of literature focuses on *customer equity*, the financial aspect of customer relationships (Rust et al. 2004). While this approach has merit, there is a danger to perceiving customers as 'payers' only. Calculating return-on-customers for alternative innovation projects may result in preferring incremental innovations over discontinuous innovations. Discontinuous innovations are often discarded by market leaders because the revenue projections from the current customer base is not compelling, hence creating an "innovator's dilemma" (Christensen 1997). Future research on customer equity should find ways to include discontinuous innovations in models, possibly by considering constructs related to the user's role as antecedents for buyer-related constructs.

In a similar manner, the measurement and management of *customer satisfaction* favors attribute-driven scales. Discontinuous innovations may call for the development of new scales and constructs that better integrate customers' value-in-use. Further research should operationalize constructs that are able to link the three customers' role, customer value co-creation, satisfaction, and customer loyalty, in order to understand the antecedents and consequences of discontinuous innovations.

Conclusion

A S-D logic perspective provides a rich and new theoretical foundation that forces rethinking and reevaluation of much of the accepted empirical generalizations in innovation theory. This demands a shift in thinking from attributes to value-in-use, from produced operands to embedded operants, and from a firm perspective to a genuine consumer-centric view. Compared to traditional goods-dominant logic, S-D logic also offers a broader scope that enables scholars to grasp and study and managers to better understand and help create discontinuous innovation in a more enlightened manner.

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