

# Service, value networks and learning

Robert F. Lusch · Stephen L. Vargo · Mohan Tanniru

Received: 17 December 2008 / Accepted: 30 December 2008 / Published online: 29 January 2009  
© Academy of Marketing Science 2009

**Abstract** Both supply chain management (SCM) and marketing in general have been moving from models and purposes narrowly focused on goods to more general models and purposes associated with partnerships, value networks, service provision, and value creation. Some of this movement has been captured in what has become known as service–dominant (S–D) logic. This article applies S–D logic to thinking about SCM in terms of service provision, in which goods are seen as service distribution or provisioning mechanisms, explores and elaborates on the concept of a value network, and develops a model of the firm as an essential service provisioning agent in a complex and adaptive value network. Research and managerial opportunities are also explored.

**Keywords** Service–Dominant logic · Value networks · Information technology · Resources · Learning · Supply chain management · Infomediaries · Service

## Introduction

Academics and practitioners have been rethinking the purpose, process, functions, and characterization of “supply–chains” (Chen and Paulraj 2004; Larson et al. 2007). A shift from a central focus on supply and movement of tangible materials for manufacturing to a broader focus on partnerships, relationships, networks, value-creation, and value constellations is evident (Bovet and Martha 2000; Hoyt and Huq 2000; Gunasekaran and Ngai 2004; Min et al. 2007; Spekman et al. 1998). Marketing management has also been transitioning away from its central manufacturing concerns (Achrol and Kotler 1999; Gronroos 1994, 2000; Sheth and Sisodia 2006) to concerns with relationships, networks, and service (Vargo and Lusch 2004a, b).

Recently, Lusch and Vargo (e.g., 2006; Lusch et al. 2007; Vargo and Lusch 2004a, b) proposed service–dominant (S–D) logic as a new scholarly focus in marketing, which can serve as a framework for integrating marketing and supply chain management (SCM) practices and research programs. It is consistent with Metz’s observation (1998) that SCM is now moving into a “super” role, in which the functions of marketing, product development, and customer service are integrated. According to S–D logic, *service—a process* defined as the *use of one’s resources or competences for the benefit of another entity* (Vargo and Lusch 2004a)—is the basis of economic activity. Thus service “centric” processes are the purpose of economic activity and this activity is fundamentally directed at seeking and providing solutions. That is, service is exchanged for service. It is noteworthy that the singular term “service,” is used by S–D logic, which has a considerably different meaning and connotation—doing something for and with another (the beneficiary of the service)—than the traditionally used “services”—intangible

---

R. F. Lusch (✉)  
Eller College of Management, University of Arizona,  
Tucson, AZ 85721, USA  
e-mail: rlush@eller.arizona.edu

S. L. Vargo  
Shidler College of Business, University of Hawaii,  
2404 Maile Way,  
Honolulu, HI 96822, USA  
e-mail: svargo@hawaii.edu

M. Tanniru  
School of Business Administration, Oakland University,  
Rochester, MI 48309, USA  
e-mail: tanniru@oakland.edu

units of output. S–D logic superordinates service to products (units of tangible or intangible output—goods (and “services”), which are only sometimes used in the process.

The purposes of this article are to: (1) apply S–D logic thinking to move marketing and SCM toward a focus on service provision, in which goods, while still important, are seen as service distribution or provisioning mechanisms, (2) explore and elaborate the concept of a value network, (3) develop a model which theorizes how a firm can learn to become an essential service provisioning part of a complex and adaptive value network, (4) develop new research opportunities for marketing and supply chain management scholars, and (5) identify opportunities for organizations for improving their ability to serve customers, other partners in the value network, and their own organization by adopting a service–dominant orientation.

### A focus on service

While S–D logic focuses on intangible resources, goods and tangible resources are not ignored; instead S–D logic sees goods as tools or appliances in the *customer's service-provision “supply chain.”* More broadly, the role of supply chains is to support the *customers' value creating processes* with service offerings, either directly or through goods (see also Gummesson 1995; Vargo and Lusch, 2004a). In S–D logic, then, the strategic mandate for a supplier is to find innovative ways to integrate the resources necessary for service provision (Ballantyne and Varey 2008). These applied resources may reside in the organization but also may be outsourced to other members of the value network.

SCM research and practices fit naturally with this service-centered view because it implies that SCM is concerned with developing and integrating resources to create competitively compelling value propositions. In the discussion that follows, we will show that information technology (IT) can support this service-centered view through distributing information and business processes throughout the value network; as a result IT is an increasingly important and essential resource in managing business processes. Notably, scholars have called for better integration of information systems and supply chain management (e.g., Gunasekaran and Ngai 2004).

### Converging around the value network

The network concept is not new to marketing (Achrol 1991; Webster 1992; Achrol and Kotler 1999) or SCM. SCM scholars have introduced the concept of a supply chain network structure which involved tiers of suppliers (from

first tier or direct interactions to second tier and beyond indirect interactions) and tiers of customers defined similarly (e.g., Lambert et al. 1998). Embedded in these tiers are business processes that are both internal and linking to other members of the supply chain network. We believe that the disciplines of marketing and supply chain management should converge around the concept of a value network, a central concept in S–D logic. A *value network* is a spontaneously sensing and responding spatial and temporal structure of largely loosely coupled value proposing social and economic actors interacting through institutions and technology, to: (1) co-produce service offerings, (2) exchange service offerings, and (3) co-create value<sup>1</sup>. The supply chain is a sub-part of the value network, embedded within these value networks. Further, a firm is often part of multiple supply chains in which competitors frequently use the same suppliers and the value network includes all of these as parts of the overall value network. Therefore, supply chains are nested within larger and more encompassing value networks.

Strong ties historically characterized many highly structured and rigid supply chains in a global network economy, but much of the value network is comprised of weak ties (Granovetter 1973, 1983) which enable seemingly unrelated organizational networks to form a larger macro-structure which can be more fluid, agile, and adaptable. Scholars have suggested that in knowledge-rich and turbulent environments the vertically integrated hierarchy is inefficient because it becomes overcommitted to specialized assets and upstream and downstream technologies (Achrol and Kotler 1999). As a result entrenched interests and power struggles slow and increase the cost of adaptation.

Spontaneously sensing and responding networks requires agility and adaptability for both the survival and growth of organizations that are part of the value network. In this regard, organizations must constantly learn how to better serve a customer with changing needs. Furthermore, as these value networks become global and more complex, agility, adaptability, and learning become even more critical to survival and growth (Achrol and Kotler 1999; Flint and Mentzer 2006).

### Value enhances supply

When adopting a value network perspective, value does not replace supply as a focal construct but enhances it and makes it more integrative with customers and marketing. Supply is a product- and firm-centric concept, whereas

<sup>1</sup> The concept of a value network can also be thought of as a service eco-system which may better capture the adaptive and evolutionary characteristics of a value network. It also may capture the nesting of supply chains with larger and more encompassing value networks.

value is external in focus. According to S–D logic, only the customer can assess value and always co-creates value. Stated alternatively, value is not obtained in the economic exchange of market offerings but rather through their use and within a context. An example from IT, which has historically been seen as a supplier of software tools, is illustrative. Buyers do not obtain value from acquiring or possessing software tools but from use of software tools for particular purposes. This is the rationale for software as a service (SaaS) in which access to software on a remote web server allows service to be provided on demand. In fact, some argue for viewing the enterprise “itself as a collection of ‘business services’ that are integrated to meet a changing customer demand” (Zhao et al. 2007, p.3). Fundamentally, this is also the central idea behind customer-driven IT (Moschella 2003) and Constantine and Lockwood’s (1999) “software-for-use” approach to software engineering.

#### Holding the network together

The social and economic actors of a value network are held together by the trinity of competences, relationships, and information. A value network has structural integrity because each organization (economic and social actor) has competences (used to offer and provide service to others), relationships (with customers and suppliers—output and input relationships and governance), and information that is shared through common standards and protocols. Value propositions are then used to connect the firm with its suppliers and customers. Importantly, the firm’s connection to suppliers and customers tend to be held together by collaborative and non-coercive governance versus more authoritarian and/or coercive means of governance or influence, as is true in hierarchical bureaucratic industrial organizations, chains and channels.

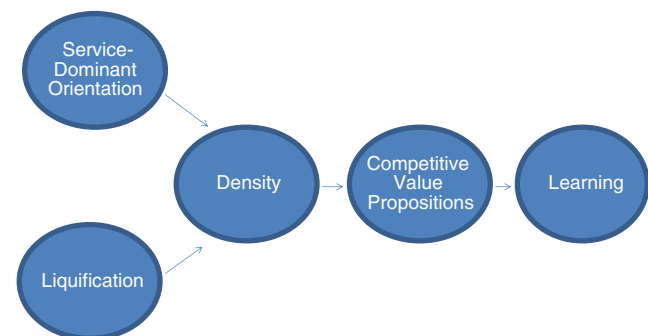
Consequently, the most valuable resources are those that center on competences and relationships (Normann and Ramirez 1993; Vargo and Lusch 2004a) and information (Evans and Wurster 1997; Lusch et al. 2007). Successful marketing and supply chain professionals collaborate to create, develop, foster, and integrate these resources. A challenge facing all organizations is better alignment between their competences to create, build and maintain relationships with customers (the ultimate source of revenue) and suppliers (the source of resource inputs). To do so organizations need to be agile and adaptable as they learn of changing customer needs. To this end, the firm that develops the most compelling value proposition, which offers a connection between competences and relationships, will perform the best; however, this relative performance advantage will be fleeting unless the organization learns to revise its value propositions in response to a changing customer.

In summary, all social and economic actors (and organizations) are resource integrators (Vargo and Lusch 2008b). Therefore, firms exist to integrate and transform micro-specialized competences into complex value propositions with market potential. To accomplish this, however, firms must recognize and act on value creation in the context of networks (and networks of networks). Since these value creation networks are constantly changing the firm must constantly learn to serve in a value network.

#### Learning to serve in a value network

To survive and prosper in a networked economy, the organization must learn how to be a vital and sustaining part of the value network. Because virtually all markets and organizations are now connected electronically they have become global and more dynamic (Flint and Mentzer 2006; Gunasekaran and Ngai 2004) and thus companies necessarily are trying to become more agile in order to respond to changing customer and market requirements. Consequently, the organization will not survive unless it has the ability to learn to adapt and change in order to offer competitively compelling value propositions to customers (Vargo and Lusch 2004a) as well as other members of the value network that supply it with needed resources.

In Fig. 1, we present a model which aims to explain how organizations are able to serve by adapting and learning to constantly offer competitively compelling value propositions. In brief, an organization enhances its chances of serving and thus remaining a viable and functioning part of a value network by: (1) developing an S–D orientation or logic, and (2) liquefying (i.e. separating information from a physical form) information resources (Normann 2001). When done successfully, the organization is capable of creating more and new types of density (i.e. configuring resources for best value) by reconfiguring business processes (Normann 2001) around form, time, place, and possession of resources and by improving upon its relieving and enabling processes. This leads to the organization



**Fig. 1** Learning to serve in a value network.

improving its ability to offer more competitively compelling value propositions. Next the organization receives feedback as it tests its value proposition (hypothesis) in the marketplace. In a dynamic and rapidly changing world the organization never learns less but always learns more; it learns what value propositions the customer responds to favorably and it learns those the customer rejects. Consequently the outcome is not necessarily only profits or cash flow, but feedback or learning. This feedback is often indicated by a variety of organizational performance measures, including cash flow. When the results lead to positive cash flow the organization is able to acquire the resources and service(s) it needs to survive, grow and prosper thereby reinforcing the positive learning loop.

In the discussion to follow the focus is on the first three constructs in the model or: (1) service dominant orientation, (2) liquification, and (3) density. We also provide a detailed discussion of the rise of infomediaries as institutions for improved liquification and density. Relatively little discussion is devoted to value propositions or feedback *per se* since they are discussed elsewhere in more detail (Vargo and Lusch 2004a, b; Vargo and Lusch 2008a, b).

#### S–D orientation

A service-centered view can be captured by eight commensurate shifts in thinking (Lusch et al. 2006). These include: (1) a shift to a focus on the process of serving rather than the creation of goods, (2) a shift to the primacy of intangibles rather than tangibles in the firm's marketplace offering, (3) a shift to a focus on the creation and use of dynamic operant resources as opposed to the consumption and depletion of static operand resources, (4) a recognition of the strategic advantage of symmetric rather than asymmetric information, (5) a shift to conversation and dialog as opposed to propaganda, (6) an understanding that the firm can only make and follow through on value propositions rather than create or add value, (7) a shift in focus to relational rather than transactional exchange, and (8) a shift to an emphasis on financial performance for information feedback and learning rather than a goal of profit maximization. Collectively, these eight perspectives provide a frame of reference for a mental model that encourages the organization to sense changes in customer needs and preferences, adjust its service offerings to remain responsive to the rapidly changing and complex environment that is a part of the global network economy, and learn from this experience.

#### Liquification

Organizations in a global network economy can better adapt and serve by liquefying information resources (Normann 2001; Lusch et al. 2007). The ability to liquefy

information resources is part of a continuing evolution over thousand of years but now has ascended to central importance and criticality because of the emergence, growth, and proliferation of digital communication and computation and increased ability to draw upon the inherent potential of the electromagnetic spectrum.

Throughout history, economic growth has in part been driven by growth in knowledge and information technology (Mokyr 2002). One can trace this back to the development of human language and mechanisms for its transmission such as drawing and writing, the printing press, radio, and the internet. For most of human civilization, information was embedded in physical matter and could not be separated in many cases. Artifacts that mankind developed were essentially frozen ideas or knowledge or what Vargo and Lusch (2004a) refer to as “informed matter;” wheels, gears, pulleys, clocks, were all matter impregnated with human ingenuity, which was used to alter their form to make them resources. However, with the growth of IT and especially the digital revolution, many information resources have the potential of being liquefied.

Today, we are witnessing an unprecedented unbundling of information from matter and in the area of SCM, what Clarke (1998) calls “virtual logistics” in which the physical and information components of supply chain logistics are independent from one another. Physical control or ownership of resources is no longer required to benefit from them. The result is the increased outsourcing and off-shoring of information technology and the growth of the information intermediary (infomediary). This trend is also transforming what buyers (households or businesses) can do for themselves versus being dependent upon others in the value network.

Economic and social networks have existed since humans began to specialize and to exchange, as a corollary of this specialization. Trade led to markets but problems of coordination and communication were significant and this was especially true because information was imbedded in a physical form and thus moved at the speed at which the physical form could be transported. However, information technology advances have made markets more salient and efficient in the last quarter century. Some argue that IT is the meta-force altering business and society (Benkler 2006; Brown and Duguid 2000), and the practice of marketing and SCM. Gunasekaran and Ngai (2004, p.270) argue that “IT is like a nerve system for SCM.” Just like nerve systems in living organisms these IT nerve systems, as we will discuss later, can be central to sensing, responding and learning in the value network. According to Rust (2004), IT is the key driver of the need for and acceptance of S–D logic. Lusch et al. (2007) support this view and argue that, as per-unit communication and information costs approach zero, the fact that service provision is the central focus of SCM practice becomes more obvious.

We identify seven primary reasons why IT growth enables the expansion of service provisioning networks consistent with the principles of S–D logic<sup>2</sup>.

1. As information technology increases, goods become embedded with microprocessors and intelligence and become improved platforms for service provision (e.g. digital manufacturing, start/smart parts that embed intelligence, collaborative design through virtual modeling, idea generation through virtual conference rooms, product lifecycle management (PLM) to support liquification).
2. As information technology increases, the ability to self-service rises.
3. As information technology increases, the ability to serve others rises.
4. As the ability to communicate increases, the need to transport decreases.
5. As the ability to communicate increases, the ability to know customers and suppliers rise.
6. As the ability to communicate increases, the ability to interact directly with customers and suppliers rises.
7. As the ability to communicate at lower costs increases, coordination between firms becomes more efficient and responsive.

Individually and collectively, these factors illustrate how IT, value networks and the economy are synergistic.

#### Density: reconfiguring, relieving & enabling

Value networks are like living organisms and thus are constantly learning, evolving and adapting to changing requirements. Those networks that persist, adapt and compete by striving to integrate resources (Gunasekaran and Ngai 2004; Lusch et al. 2007) in ways that provide more competitively compelling value propositions. This is accomplished by striving for more density (Normann 2001) by reconfiguring processes around form, time, place, and possession and relieving and enabling processes (which are closely related to outsourcing and insourcing) (Michel and Brown 2005; Normann 2001), to allow the firm to make more competitively compelling value propositions. We now explain these concepts.

#### The density concept

Maximum density is a theoretical construct anchoring a continuum of resource presence and integration—that is, rebundling resources. Maximum density is reached when, at a given time and place, an actor provides and integrates all the resources necessary to co-create the best possible

value in that context. Value networks, when operating in a market economy, tend to strive for maximum density but in practice, this theoretical maximum never exists. Normann (2001 p.27) refers to maximum density as a situation in which “the best combination of resources is mobilized for a particular situation—e.g., for a customer at a given time in a given place—independent of location, to create the optimum value/cost result.” The business model that currently most closely approaches maximum density is the internet search models, such as Google. An individual anywhere in the world, with a connected PC can get the answer to virtually any question on demand. This current model exemplifies a higher density in contrast to the same process of answer seeking 25 years ago.

Not surprisingly, the potential for density creation increases as the ability to liquefy information resources rises because as liquification rises it is easier and less costly to rebundle resources. Rebundling resources leads to higher density. In fact, if one considers core processes in SCM and marketing such as sales management or customer relationship management one can find a large growth in internet based business models that essentially provide improved density. Consider all resources necessary for sales and customer relationship management from lead management, account preparation, performance management, inbound and internal communications, and external communications. Salesforce.com has assembled these resources in software-as-a-service (SaaS), which can be accessed globally, on demand, via the Internet. Salesforce.com has further increased density by creating an application-exchange (<http://www.salesforce.com/appexchange>) marketplace, in which other digital resources are made available and can be integrated with other resources for use not only in sales management but all business processes. This is accomplished by using the IT standards of service-oriented-architecture (SOA) and SaaS.

#### Bases of reconfiguration for improved density

The fundamental structure of a value network can be conceptualized in terms of the form of resources, the time they are available, the place they are available, and the possession or use of these resources. Higher density can be achieved by altering the structure of the value network. In fact, value networks are constantly adapting and morphing to improve density. Organizations that are part of these value networks must also adapt or risk extinction.

There is a long history in marketing of efforts to improve density by adjusting the dimensions of form, place and time. For instance, Alderson (1957) described the postponement of product availability as a tool to help determine the most efficient way to serve end-customers (also see Garcia-Dastugue and Lambert 2007). In the supply chain

<sup>2</sup> Roland Rust in a variety of public presentations has identified some of these factors and this has encouraged us to identify others.

and operations literature, Alderson's concept of postponement has been renamed manufacturing postponement, in which the form or identity of the product is delayed; geographic postponement serves to delay and therefore optimize the place of final location (Garcia-Dastugue and Lambert 2007). Both manufacturing (form) postponement or geographic (place) postponement can not be separated from time postponement simply because to delay form and place consumes time.

In the discussion that follows, our focus is on fundamental reconfigurations of form, time, place and possession, in which the basic structure and flow of the underlying processes of the business are examined for possible substantive changes to improve density.

*Reconfiguring form* Forms, or structures, have purpose or function and dominant forms emerge over time. Tangible examples can be found in transportation vehicles, warehouse racks, packaging, office furniture, apparel, or desktop computers. Intangible forms include contracts, policies and procedures, and business processes. Although dominant forms emerge it is important to question these forms with the intent of discovering if they can be altered or reframed to better perform a function(s)—that is, to become a more useful tool or service appliance.

Reconfiguration of form reexamines the fundamental function of all forms in the value network. By considering all functions and the forms that enable them, organizations can also find improved pathways to improved agility and adaptability. Consider, for example, what happened when the computer moved from the mainframe computer to the desktop computer to the computer embedded in everyday products. As computers became smaller (through miniaturization) and smarter (as software got embedded into hardware), the form in which information or entertainment was delivered as well as help and repair service was provided changed. Much of the change came from innovative, entrepreneurial-driven firms, which envisioned reshaped form, such as Apple, CompuServe, Dell, Oracle, Microsoft, and Siebel. These firms were not part of the mainstream industry, as were IBM and NCR.

When form is altered, it has an interactive effect throughout the value network. For instance, recently, Wal\*Mart has engaged in a major strategic initiative to sell products that are more environmentally sensitive. In this process they have discovered that the package size, a form dimension, is a key cause of energy waste but also has many interactive effects throughout the value network. Package size is often unnecessarily large because manufacturers have found that larger packages result in more linear feet of retail shelf facings and this creates more exposure and awareness and thus consumer purchases. Predictably, the reduction of package size created resistance

from consumer packaged goods manufacturers. To reduce this resistance Wal\*Mart is morphing its own form by providing participating manufacturers more end-cap displays to compensate for the lower shelf facing on interior shelf displays. Of course, the reduction in package size will ripple throughout the value network and influence how others adapt, including manufacturers of store shelving, advertising and media companies in package information displays, households in pantry stocking activities, and more.

One aspect of reconfiguring with form, which is often discussed in the context of S–D logic, relates to the customization and outsourcing that S–D logic encourages. By creating standardized components, especially through the use of modular architecture (Baldwin and Clark 1997) such as in componentized software and web services, it is possible to outsource activities that are not core to organization competence. Ironically, by standardizing component processes, the value network is able to do more customization (Baldwin and Clark 1997). The reason is that the customer is buying a unique service solution that involves the integration of many distinct components into a customized market offering with a compelling value proposition. It is similar to writers using a standardized language of thousands of words which they can then combine into an almost infinite number of narratives. The offering thus can be customized even though it is made up of an integrated set of standardized components (McCarthy 2007).

One of the sources of innovation in the late 1990's occurred with process reengineering, in which a process was decomposed, standardized, and mapped into a best practice and evaluated against the firm's core competency. Often the result of such reengineering and redesign was an alteration of the form a business process takes within the firm and the way the associated information is manipulated by the people and technology (Marchand and Stanford 1995). For instance, an order fulfillment process, upon decomposition may lead to order configuration by the customer using the internet, order validation by an intelligent software system within the firm, order filling to the factory floor or to a supplier (if the product is warehoused at a supplier), order shipment and tracking to an external partner (UPS or FedEx), and invoicing to an external application service provider. The same is occurring with other processes that largely involve SCM and marketing such as compliance, security, collaborative planning and integration.

*Reconfiguring time* A second reconfiguration opportunity relates to the time at which activities are performed. If one maps a set of activities that is involved in the sourcing of inputs for production, the production of the product, the

distribution and sale of the product and the use by the customer of the product one will immediately see that these activities are arranged along a time continuum. Certain activities precede others, either by custom or necessity. For instance in building a site-based house there is a PERT chart for the building process: stake the lot, dig footings, do the rough plumbing, pour the foundation, rough carpentry and rough electric the walls, etc. However, once again, this does not have to be the process. Why? Because it assumes the house is site built. It is possible that walls can be assembled with rough electric at a factory as the foundation is being poured and then delivered and installed in a few hours. This illustrates the multiple new configurations that are possible if one asks if the time truly is by custom or norm or by necessity.

Concurrent engineering (Zirger and Hartley 1996) has been successfully used both in product design and manufacturing and in software development with the goal of speeding up the time to market (Boehm and Turner 2002). Greater modularization and componentization of the development process itself has been critical to this increased speed (McCarthy 2007). For instance start and smart parts in product lifecycle management (PLM) are dramatically changing the time it takes to build a part. Because engineers can start with a default specification for a standard part (“start part”) and revise it to meet customer requirements and intelligence embedded in the part (“smart part”) to ensure that the redesigned part is valid, when viewed in the context of where it is to be used. Similarly, in today’s on-demand software configuration environment, reusable software components that are made available as web services (for a fee or in an open source environment) are altering dramatically the time it takes for software development.

Time reframing should also include the customer or user as part of the value network. Traditionally, furniture makers would craft the completed piece of household furniture before it was shipped to the wholesale and retail distribution channel. However, IKEA changed this timing when it reframed furniture manufacturing to involve the customer doing part of the production at a time after purchase versus the manufacturer doing it in a factory. When considering the customer as part of the value network no industry should overlook the internet resources available and how this has altered the time sequence of traditional processes. Consider sites such as eBay, WebMD, or Google. They allow the customer to obtain information that traditionally was obtained by a visit to a store or service provider. In fact, armed with this information the customer interfaces differently with the retailer or service provider, often resulting in a shift in power away from the seller and to the buyer. The organization that does not adapt to these changes will face increasing survival challenges.

*Reconfiguring place* The place at which activities are performed is another reconfiguring process. Digitization and networks have altered the concept of place, where a task is performed, and where resources are delivered. In today’s world, in which firms are networked across the globe with its customers and suppliers/partners, an order may originate in the U.S., the parts ordered from manufacturing sites in Taiwan and Europe and assembled in Mexico. Similarly, a call center service request can be placed anywhere in the world, processed initially at some location in India, escalated up to someone in New York, and responded to the customer in a few minutes. In fact, personalized web portals (e.g. myDell) can make the “place” a “product” is ordered and delivered a consumer’s desktop, from which the customer can track the order throughout the entire value network, from initial placement to final delivery.

Increasingly, collaborations throughout the value network are occurring through virtual collaboration, in which the participants meet via the internet to work on projects. Not only can documents be shared throughout the organization but also with any other relevant parties in the value network. Parties can work on these documents at their place of business or elsewhere and become part of a virtual organization, in which place is independent of work. This is not only being done with simple, repetitive and explicit tasks but also in collaborations involving more complex projects such as new product development (Ganesan et al. 2005).

*Reconfiguring possession* Conventional marketing and economic thought is that value can be partially provided through ownership and possession of material things. However, S–D logic argues that it is the service, including the flow of service from appliances (good) that matters rather than possession *per se*. This simple idea can be used to reconfigure value networks because it suggests that firms can lease assets or pay for use of service flows, rather than selling or purchasing goods, a model that is increasing used in the software industry (Tormabene and Wiederhold 1998). However, this reframing can also occur with hardware. Consider Chep<sup>3</sup>, a container company, which is deeply rooted in a commodity business, in which product differentiation is very difficult. Despite this Chep dominates its rivals. One of the biggest product lines Chep produces is wood pallets. Wood pallets have been used since antiquity. Although recent versions have been adapted to include radio frequency identification functionality, their basic design, features, and use have not changed. Their only purpose is to stabilize goods (i.e. keep them from breaking)

<sup>3</sup> We thank Gunter Wessels for identifying and helping to develop this example.

during transportation. Therefore, they add to the pure cost of transportation when they work, and more so when they fail to work. Traditionally, manufacturers must purchase a pallet, place goods on it, and absorb the cost, or transfer it as a shipping and handling fee. For large shippers or manufacturers the cost of these pallets can add up.

Chep recognized that it was not in the ownership and possession of pallets that value was obtained but in their use. It also recognized that if they retained ownership of the pallets, they could re-use them, allowing them to manufacture pallets with more and better materials. As a result, Chep pallets do not break easily. Instead of selling pallets, Chep leases pallets to manufacturers, distributors, and others within the value network, and picks up pallets when they are empty. Chep's value proposition therefore becomes: at the same cost of purchase, it will provide the service provisioning that pallet's offer, which is integrated with the customers' storage systems and requirements, without pallets piling up in the loading dock.

#### Relieving and enabling processes

Fundamentally, there are two ways of providing service: relieving—doing a task or a series of tasks for another party—and enabling—making it possible for a party to do a task or series of tasks for itself more efficiently and/or effectively (Normann 2001). These processes are symbiotic. That is, being relieved (enabled) from some tasks enables (relieves) a party to perform other tasks more efficiently and effectively. For example, providing facilities management functions (relieving) for a firm allows (enables) it to more effectively and efficiently use its core competences in value-creating activities.

When value creation is viewed in the context of a systemic value network, these two processes provide enormous opportunities for improved agility and adaptability. When coupled with concepts of liquification and the notion that the customer is part of the value network, the possibilities for change are almost endless. For example, through liquification of inventory information, Wal-Mart relieves suppliers and distributors of order imbalances, thus enabling itself (and its customers) to compete through lower prices. Amazon extends this approach by allowing ordering information to flow directly to some suppliers (a relieving function for them, which enables them to have access to new markets) and products to flow directly to customers. eBay provides a similar function *among* its “customers,” which often play both “supplier” and “buyer” roles through online auctions.

The general point is that, once the entire value-creation network (including “customers” and customer networks) is seen as a system of mutual value creation through

reciprocal, enabling and relieving service provision, all links (including with a firm's own “suppliers” and “customers”) in the network represents opportunities for innovation through assisting the parties in their own value-creation activities. Ramirez and Wallin (2000) refer to firms capable of reconfiguring value networks to enhance their own value as “Prime Movers” (see also Michel et al. 2008).

Most organizations do not need to develop a core competency around information technology although IT is central to liquification of resources. Rather they may look to an emerging array of infomediaries that can assist the firm with the integrated information resources needed to adapt and maintain competitive advantage. Because of the central importance of liquefying resources and IT, we delve deeper into the role of these intermediaries.

#### Infomediaries and value networks

Throughout history, distribution and marketing intermediaries have emerged in society to facilitate exchange between buyers and sellers. The central role of the exchange intermediary was to close gaps between the place of production and consumption, the time of production and consumption, and the information gaps between buyers and sellers. Not surprisingly, many of these intermediaries developed around the physical goods they assisted in exchanging. For instance the U.S. Census of Business classifies merchant wholesalers into durable and nondurable goods wholesalers. Similarly, retailers were often classified by the goods they handled such as hardware stores, apparel stores, grocery stores, book stores, general merchandise stores, automobile dealers, lawn & garden stores, etc. These intermediaries always handled two flows; physical and information but often they were embedded together into goods.

With increased liquification in value networks and society we are witnessing an unprecedented rise in intermediaries that uniquely and specifically integrate, process, distribute, and sell information (separate from tangible goods), and these are increasingly called “infomediaries” (Bakos 1991, 1998). The growth of infomediaries paralleled the evolution of Web technology. In the early stages of web development (Web 1.0) the focus of infomediaries (e.g. eBay, Google, Amazon, Experia, etc.) was on publishing information for communication and transaction (often viewed as “brick and mortar concepts” applied to the web: Getting 2007). Many individual firms were able to use this technology to share information with customers that have access to the Internet. Web 2.0 extended the role of infomediaries (e.g. MySpace, YouTube etc.) to allow information to be exchanged for supporting social interaction

and participation (Murugesan 2007; O'Reilly 2007). Often called “read–write” web, this technology enabled innovations such as virtual collaboration rooms, social bookmarking, wikis, blogs, mashups, etc. which supported improved interfacing and communication between buyers and sellers and also resulted in greater density. While web-enabling some business processes (e.g. web services) to support sharing of applications and information, firms needed to rely on external infomediaries to support inter-organizational interaction. Web 3.0 technologies (Web 3.0 2007), that add more context to the web content, enable some of these infomediaries to be “intelligent” agents that can automatically manipulate web services (read–write–execute web) and help firms react to changes quickly. In summary, as web technologies evolve, infomediaries will continue to develop unique competencies, and firms should be able to use them to reconfigure form, time, place and possession in order to increase density and enhance their value propositions to the customer. This is not an easy task as we will illustrate with an example.

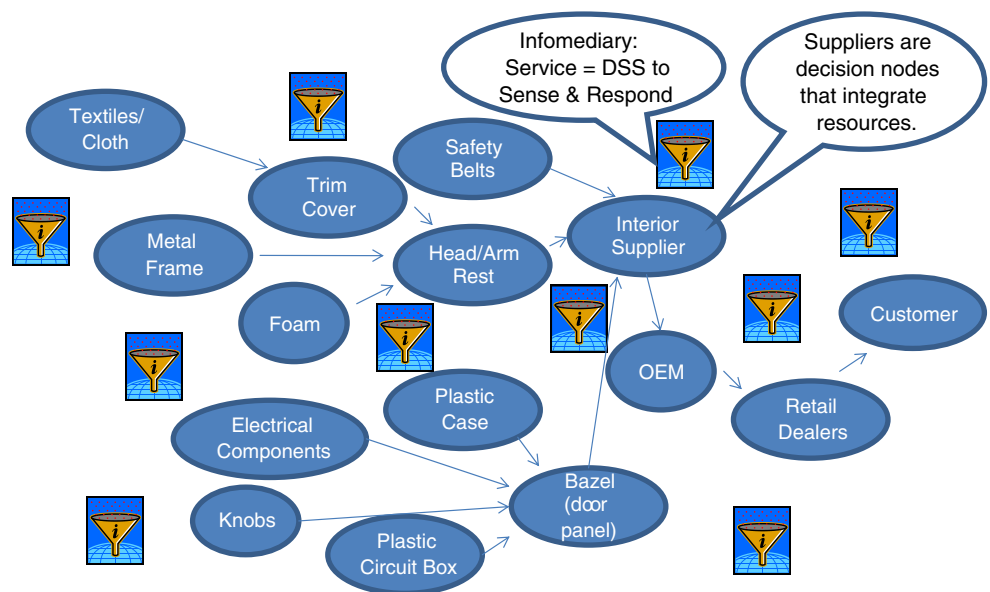
Consider Fig. 2, as a small part of an automotive value network that connects customers, dealers, original equipment manufacturers (OEMs such as GM, Ford, and Toyota) and tiers of suppliers. Each node in the network represents an entity (e.g. a firm, a collection of smaller firms bound together to form an automotive sub-system such as engine or interior, etc.). Each node in the network is a dyadic relationship between service provider and service recipient. In fact, many of the decision processes on both sides are done in parallel by different infomediaries, for instance an infomediary may assist a service provider in identifying design flaws by evaluating warranty data while another infomediary may analyze these data to advise service recipients about expected warranty problems. Also, by

sourcing some of the tasks to infomediaries that are viewed as competent at performing the tasks, supply chain processes can be reconfigured. This allows firms to focus on internal competencies and build a rich set of relationships needed in co-value creation.

As seen from the example, a firm striving to offer competitive value propositions has to first identify infomediaries that can support the value network, and then develop an appropriate architecture to integrate these infomediaries with a firm’s value network in support of co-created value. For example, there are infomediaries that are capable of sensing the needs of customers by tracking customer sales and warranty information, supporting the integration of resources by bringing multiple suppliers and customers together to design a product or address a design flaw, helping realize the fulfillment of an order by enabling the integration of various procurement, shipment, validation and payment activities in a secure manner using web service and other global supply chain standards, etc. As more data used by decision nodes on the value network are liquefied (digitized for sharing and collaboration), the greater the chance that each single application domain (e.g. procurement) may have a single or group of infomediaries helping to support the application (Aigbedo and Tanniru 2004). In fact, exchanges such as Covisint, a subsidiary of Compuware <http://www.covisint.com/> offers a mix of infomediary services.

The issue of integrating the capabilities of infomediaries with the value network through an organizational architecture is more complex. In order for a firm to create the density needed to support its value propositions by bringing all the necessary resources on-demand, just as Google tries to meet a customer search request by accessing and integrating all the needed information resource, requires a significant amount of

**Fig. 2** Infomediary for auto manufacturing value network: decision support system (dss) and related service computing interfaces.



standardization in the way services are accessed and coordinated along a complex value network. While service oriented technologies such as web service and service oriented architecture are being advanced to support this endeavor, we need a broader framework to help address the integration of various components in the complex value network.

Reducing complexity in system and organizational design has been a major issue since the 1970s. Early work on system complexity has focused on design modularity (Yourdon 1989) (Bonczak et al. 1981) and reengineering research has focused on delineation of competencies in organizations (Davenport and Stoddard 1994; Smith, 1998). Software engineering across organizational boundaries has focused on task/technology decomposition (Vitharana et al. 2003; Madhusudan and Tanniru 2005), and service support within organizations has focused on decoupling layers of interface (Zhao et al. 2007). The question then is—what approach is needed to address value network complexity?

We believe that product life cycle management (PLM) (Grieves 2006), which has been used as a decomposition framework for tracking tangible products along phases: conception, development, production, in-use and disposition, can be adapted using a service-dominant logic. This might be referred to as service life cycle management (SLCM) with phases such as service conception (as a part of co-created value), delivery (probably using PLM if the service is through a tangible product), continuing conversation and dialog among the service provider and recipient and perhaps the service community, on-going service evaluation, and co-creation of revised service offerings to include providing a framework to decompose the network. In other words, can we segment a value network along various phases of SLCM, so value propositions can be co-developed and coordinated at each phase? For each of these sub-networks that support a service phase, a firm then needs a strategy to assess which part of the decomposed network can benefit from one or more intermediaries, and how best are these intermediaries coordinated flexibly to meet the changing value propositions.

In summary, with information highly dispersed throughout an organization, the entire value network, and society, it has become paramount for a value network to focus on the information environment for improved knowledge creation (Achrol and Kotler 1999) and to sense, respond and learn (Haeckel 1999; Butner 2007) to efficiently and effectively adapt to changing environments. One of the most challenging tasks however is not the technology the intermediaries will bring to support a firm's ability to meet the value propositions, but gaining the participation of all parties in a complex and interdependent value network. A lack of trust in sharing critical information with supply chain partners has been found to be a fundamental impediment to collaborative efforts (Mentzer et al. 2000).

## Future research directions

In concluding it may be helpful to share ideas on research programs that could not only help integrate marketing and SCM in a common endeavor directed at co-creating knowledge that can be valuable to organizations in serving customers but also help to further develop S–D logic as an integrative framework. Importantly, we go beyond research suggestions related to the model presented in Fig. 1.

### Integrating the customer into marketing and SCM

S–D logic advocates treating the customer as endogenous to the firm and part of the value network and this appears to be consistent with contemporary developments in both thought and practice in SCM. In addition, S–D logic also views the customer as a co-creator of value. Taken together, these two principles open up a large stream of research, which is consistent with Womack and Jones's (2005) plea for joining together *lean production* with *lean solutions* or *lean consumption*. Rather than viewing what the firm produces as outputs, it is viewed as an input and service which becomes part of a customer's value creating activity. Granzin and Bahn (1989) conceptualized some of this opportunity when they advocated the study of consumer logistics. There is also the role of the customer in helping to produce the firm's core offering as is occurring with Jones Soda (where customers design soda bottles), Legos (where kids use a digital design factory to create product designs for the company) and Threadless (where designers submit t-shirt designs for the user community to vote on which then determine what the firm produces). Some research questions follow: (a) How customers decide about how much co-production they should engage? (b) How customers modify and adapt products to work better and create more value? (c) What is the role of customer communities in value networks? (d) How can firms involve the customer in time reframing, place reframing, form reframing, and actor reframing? (e) How do customers perceive their own value-creating activities and roles? (f) If greater customer participation in the value network means more information sharing, which runs counter to the desire for privacy, how are these two traded-off against each other (i.e. what price is a customer willing to pay for forgoing privacy to gain value?)

### The systemic nature of value creation

If value is co-created rather than firm created and delivered, and if co-creation involves complex networks rather than either dyads or sequential chains, it raises a whole host of research questions related to systemic and synergistic effects. For example: (a) What is the relationship between value creation in one part of the network and value creation in other

parts of the network? (b) What are the metrics of value creation in the system? (c) What is the meaning of “productivity” in an interactive, co-creation sense and how can it be measured? (d) What is the relationship between relieving and enabling in different parts of the network? (e) What is the role of competition in a value-creation network? The systemic nature of value creation is important for managers to understand because often competing firms use the same suppliers, suppliers or customers can also become a competitor to the firm, and value can only be accessed on a relative basis; that is in comparison to competitor offerings.

#### Market sensing and organizational learning

All organizations learn and what they know influences how they search, pay attention to and interpret what they find (Sinkula 1994). Since S–D logic views knowledge as the fundamental source of competitive advantage it is important to understand the fundamental issue of how organizations sense, respond and learn. This is quite different than how organizations use information or how they gather information and analyze it. It goes to a deeper issue of how organizations are able to sense the market (and the value network and its various actors). It also goes to how organizations learn and how they develop knowledge. Although there is a strong growth in knowledge management systems (software) the most interesting questions are much more fundamental. They deal, for instance, with issues such as: (a) What do the marketing and supply chain managers do to sense and learn from each other, from suppliers and customers? (b) What is the effect of learning through quantitative research versus qualitative research? (c) How do marketing and supply chain professionals identify their deeply held assumptions about each other, suppliers, and customers and how can they be suspended to stimulate learning? (d) What is the role of infomediaries and exchanges in aiding or hindering sensing and learning? (e) How do the value network density, breadth, and depth influence information sharing? (f) If tacit knowledge is the most critical for competitive advantage and largely resides in individuals how do we identify which individuals have this critical knowledge and how do we retain these people in the organization or how does a firm support formation of tacit knowledge clusters (in and around the value network) and partner with them as needed to compete? Because knowledge is the fundamental source of competitive advantage the preceding and many other questions and research topics can be of substantial benefit to managers.

#### Governance issues with value networks

We have learned a lot about market and hierarchical (firm) governance but know relatively little about value networks

and their governance. Part of the challenge is that unlike an organization which can be owned, no one owns the value network. Managers should be highly interested in these topics because governance is wrapped up in the issue of contracting which is central to all business relationships. A research program could begin with questions such as: (a) Are manufacturers, wholesalers or retailers in a better position to be the value network architect? (b) What are the power sources that are most likely to be effective in value networks versus markets or hierarchies? (c) What role do norms play in the value network? (d) How are norms formed and modified? (e) When the value network is global and no single actor located in a particular geopolitical area is dominant who is responsible for ethical and/or legal violations? (f) If the customer is part of the value network then what is their responsibility? (g) What dictates who enters and leaves the value network and when? (h) In the traditional goods–dominant logic, the product manufacturer has always been the key node that dictated the composition of the value network, however, how does this change in a network and service–dominant world?

#### Innovation

In the old industrial model, innovation and product development was centralized in the firm. Firms hired scientists and engineers and they developed intellectual property which formed the basis of new product development. With S–D logic and value networks product innovation has become open (Chesbrough 2006) and democratized (Von Hippel 2005). Managers are more cognizant that no single firm has enough knowledge and sufficient human resources to create the innovations that are needed to compete globally. Thus managers can benefit from the managerial and strategic insights that could accrue from the following research opportunities: (a) What is the most effective way to bring suppliers and customers into the product design process? (b) What is the role of weak ties in stimulating innovation? (c) How do customers motivate competing suppliers to collaborate? (d) How does or should one safeguard intellectual property when customers and suppliers are brought into the product development and innovation process? (e) How can innovation tools be applied to foster service innovation? (f) How can one reframe the value network to speed up innovation processes and make them more agile? (g) What is the nature of relievers and enablers? (h) With so much knowledge centered around or moving through infomediaries, can a group of exchanges, through effective information sharing, collaborate to become the sources of tacit knowledge and develop the competence to innovate (develop new ideas, develop alternative ways to service a customer, etc.).

## Concluding comments

We know the relationship between marketing and supply chain management can be improved, in academic thought, teaching, and practice. Exceptions exist but this is the current state of affairs and likely the motivation for this special issue of the *Journal of the Academy of Marketing Science*. But what is, is not what should be, or might be. Toward this end we have identified S–D logic as a potential unifying paradigm that allows for a more fully informed understanding of the true nature of economic exchange from which arises the need for supply chains, marketing and their respective management. From this fundamental understanding of the essential nature of economic exchange, the exchange of service, or the application of one's resources for the benefit of another, we can both reframe marketing and supply chain management and converge them into a unified process and system for enhancing firm performance, customer value, and societal well-being. All economic actors are suppliers to the customers they serve. When and if this occurs the firm will be better able to adapt to survive and thrive in a network world.

**Acknowledgement** We would like to thank Mark Lusch and Gunter Wessels for reviewing earlier drafts of this manuscript.

## References

- Achrol, R. S. (1991). Evolution of the marketing organization: New Frontiers for Turbulent Environments. *Journal of Marketing*, 55, 77–93. October. doi:10.2307/1251958.
- Achrol, R. S., & Kotler, P. (1999). Marketing in the network economy. *Journal of Marketing*, 63, 146–163. Special Issue. doi:10.2307/1252108.
- Aigbedo, H., & Tanniru, M. (2004). Electronic markets in support of procurement processes along the automotive supply chain. *Production Planning and Control*, 15, 688–695. October. doi:10.1080/09537280412331298210.
- Alderson, W. (1957). *Marketing behavior and executive action: a functionalist approach to marketing theory*. Homewood, IL: Richard D. Irwin.
- Bakos, Y. (1991). A strategic analysis of electronic marketplaces. *MIS Quarterly*, 15(3), 295–310. doi:10.2307/249641.
- Bakos, Y. (1998). The emerging role of electronic marketplaces on the internet. *Communications of the ACM*, 41(8), 35–42. doi:10.1145/280324.280330.
- Baldwin, C., & Clark, K. (1997). Managing in an age of modularity. *Harvard Business Review*, 75(5), 84–93.
- Ballantyne, D., & Varey, R. J. (2008). The service–dominant logic and the future of marketing. *Journal of the Academy of Marketing Science*, 36(1), 11–14. doi:10.1007/s11747-007-0075-8.
- Benkler, Y. (2006). *The wealth of networks: how social production transforms markets and freedom*. New Haven: Yale University Press.
- Boehm, B., & Turner, R. (2002). *Balancing agility and discipline*. Boston: Addison-Wesley, Pearson Education.
- Bonczak, R. H., Holsapple, C. W., & Whinston, A. B. (1981). *Foundations of DSS*. NY: Academic.
- Bovet, D., & Martha, J. (2000). *Value nets: breaking the supply chain to unlock hidden profits*. New York: Wiley.
- Butner, K. (2007). “Sense-and-respond supply chains for optimized performance”. In K. Butner, T. Gilliam, H. Goldstein, J. Kalina, C. Taylor, & M. Witterding (Eds.), *In reshaping supply chain management: vision and reality* (pp. 32–40). Boston: Pearson Custom.
- Brown, J. S., & Duguid, P. (2000). *The social life of information*. Boston: Harvard Business School Press.
- Chen, I. J., & Paulraj, A. (2004). Towards a theory of supply chain management: the constructs and measurements. *Journal of Operations Management*, 22, 119–150. doi:10.1016/j.jom.2003.12.007.
- Chesbrough, H. (2006). *Open business models: how to thrive in the new innovation landscape*. Boston: Harvard Business School Press.
- Clarke, M. P. (1998). Virtual logistics: an introduction and overview of the concepts. *International Journal of Physical Distribution & Logistics Management*, 28(7), 486–507. doi:10.1108/09600039810247461.
- Constantine, L. L., & Lockwood, L. A. D. (1999). *Software for use: a practical guide to the models and methods of usage-centered design*. Boston: Wesley.
- Davenport, T. H., & Stoddard D. (1994). “Reengineering: business change of mythic proportions?” *MIS Quarterly* (June): 121–127.
- Evans, P. B., & Wurster, T. S. (1997). Strategy and the new economics of information. *Harvard Business Review*, 75, 71–82. September–October.
- Flint, D. J., & Mentzer, J. T. (2006). “Striving for integrated value chain management given a service–dominant logic for marketing”. In R. F. Lusch, & S. L. Vargo (Eds.), *The service–dominant logic of marketing: dialog, debate, and directions* (pp. 150–165). Armonk, New York: M.E. Sharpe.
- Ganesan, S., Malter, A. J., & Rindfleisch, A. (2005). Does distance still matter? Geographic proximity and new product development. *Journal of Marketing*, 69, 44–60. October. doi:10.1509/jmkg.2005.69.4.44.
- Garcia-Dastugue, S. J., & Lambert, D. (2007). Interorganizational time-based postponement in the supply chain. *Journal of Business Logistics*, 28(1), 57–81.
- Getting, B. (2007). “Basic definitions of web 1.0, 2.0 and 3.0.” <http://www.practicalcommerce.com/articles/464/Basic-Definitions-Web-10-Web-20-Web-30/>.
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380. May. doi:10.1086/225469.
- Granovetter, M. S. (1983). The strength of weak ties: a network theory revisited. *Sociological Theory*, 1, 201–203. doi:10.2307/202051.
- Granzin, K. L., & Bahn, K. D. (1989). Consumer logistics: conceptualization, pertinent issues and a proposed program for research. *Journal of the Academy of Marketing Science*, 17(1), 91–101. doi:10.1007/BF02726358.
- Grieves, M. (2006). *Product lifecycle management: driving the next generation of lean thinking*. New York: McGraw-Hill.
- Gronroos, C. (1994). From marketing mix to relationship marketing: towards a paradigm shift in marketing. *Asia–Australia Marketing Journal*, 2, 9–29. August.
- Gronroos, C. (2000). *Service management and marketing: a customer relationship management approach*. West Sussex, UK: Wiley.
- Gummesson, E. (1995). “Relationship marketing: its role in the service economy”. In W. J. Glynn, & J. G. Barnes (Eds.), *Understanding service management*. New York: Wiley.
- Gunasekaran, A., & Ngai, E. W. T. (2004). Information systems in supply chain integration and management. *European Journal of Operational Research*, 159, 269–295. doi:10.1016/j.ejor.2003.08.016.
- Haeckel, S. H. (1999). *Adaptive enterprise: creating and leading sense-and-respond organizations*. Boston: Harvard Business School Press.
- Hoyt, J., & Huq, F. (2000). From arms-length to collaborative relationships in the supply chain: An evolutionary process. *International*

- Journal of Physical Distribution and Logistics Management*, 30(9), 750–764. doi:10.1108/09600030010351453.
- Lambert, D. M., Cooper, M. C., & Pagh, J. D. (1998). Supply chain management: implementation issues and research. *International Journal of Logistics Management*, 9(2), 1–19. doi:10.1108/09574099810805807.
- Larson, P. D., Poist, R. F., & Halldorsson, A. (2007). Perspectives on logistics vs. SCM: a survey of SCM professionals. *Journal of Business Logistics*, 28(1), 1–24.
- Lusch, R. F., & Vargo, S. L. (Eds.). (2006). The service-dominant logic of marketing: dialog, debate, and directions. Armonk, New York: M.E. Sharpe.
- Lusch, R. F., Vargo, S. L., & Malter, A. (2006). Marketing as service-exchange: taking a leadership role in global marketing management. *Organizational Dynamics*, 35(3), 264–278. doi:10.1016/j.orgdyn.2006.05.008.
- Lusch, R. F., Vargo, S. L., & O'Brien, M. (2007). Competing through service: insights from service-dominant logic. *Journal of Retailing*, 83(1), 5–18. doi:10.1016/j.jretai.2006.10.002.
- Madhusudan, T., & Tanniru, M. (2005). Knowledge Partitioning—A Strategic Approach to Product Lifecycle Management. *International Journal of Product Development*, 2(1/2), 85–104. doi:10.1504/IJPD.2005.006670.
- Marchand, D. A., & Stanford, M. J. (1995). “Business process redesign: a framework for harmonizing people, information and technology”. In V. Grover, & W. Kettinger (Eds.), *Business process change* (pp. 34–56). Pennsylvania: Idea Group.
- Mentzer, J. T., Foggin, J. H., & Golicic, S. L. (2000). Collaboration: the enablers, impediments, and benefits. *Supply Chain Management Review*, 4, 52–58. September/October.
- Metz, P. J. (1998). Demystifying Supply Chain Management. *Supply Chain Management Review*, 1(4), 46–55.
- McCarthy, R. M. (2007). “Cost-effective supply chains: optimizing product development through integrated design and sourcing”. In K. Butner, T. Gilliam, H. Goldstein, J. Kalina, C. Taylor, & M. Witterding (Eds.), *Reshaping supply chain management: vision and reality* (pp. 102–135). Boston: Pearson Custom.
- Michel, S., & Brown, S. W. (2005). “Market offerings as relievers and enablers: building on the service dominant logic of marketing”. San Antonio: AMA educators’ winter conference (Conference Proceedings).
- Michel, S., Brown, S. W., & Gallan, A. (2008). An expanded and strategic view of discontinuous innovations: deploying a service-dominant logic. *Journal of the Academy of Marketing Science*, 36(1), 54–66. doi:10.1007/s11747-007-0066-9.
- Min, S., Mentzer, J. T., & Ladd, R. T. (2007). A market orientation in supply chain management. *Journal of the Academy of Marketing Science*, 35, 507–522. Winter. doi:10.1007/s11747-007-0020-x.
- Mokyr, J. (2002). *The gifts of athena: historical origins of the knowledge economy*. Princeton: Princeton University Press.
- Moschella, D. (2003). *Customer-driven IT: how users are shaping technology industry growth*. Boston: Harvard Business School Press.
- Murugesan, S. (2007). “Understanding Web 2.0.” IEEE Computer Society (July–August): 34–41.
- Normann, R. (2001). *Reframing business: when the map changes the landscape*. Chichester: Wiley.
- Normann, R., & Ramirez, R. (1993). From value chain to value constellation: designing interactive strategy. *Harvard Business Review*, 71, 65–77. July–August.
- O’Reilly, T. (2005). “What Is Web 2.0, design patterns and business models for the next generation of software.” <http://www.oreilly.com/lpt/a/6228>.
- Ramirez, R., & Wallin, J. (2000). *Prime movers: define your business or have someone define it against you*. Chichester: Wiley.
- Rust, R. (2004). If everything is service, why is this happening now, and what difference does it make? *Journal of Marketing*, 68, 23–24. January.
- Sinkula, J. M. (1994). Market information processing and organizational learning. *Journal of Marketing*, 58(1), 35–45. doi:10.2307/1252249.
- Sheth, J. N., & Sisodia, R. S. (Eds.). (2006). Does marketing need reform: fresh perspectives on the future. Armonk: M.E. Sharpe.
- Smith, G. F. (1998). Towards a heuristic theory of problem structuring. *Management Science*, 34(12), 1489–1506. doi:10.1287/mnsc.34.12.1489.
- Spekman, R. E., Kamauff Jr, J. W., & Myhr, N. (1998). An empirical investigation into supply chain management: a perspective on partnerships. *International Journal of Physical Distribution & Logistics Management*, 28(8), 630–650. doi:10.1108/09600039810247542.
- Tormabene, C. A., & Wiederhold, G. (1998). Software component licensing: a primer. *IEEE Software*, 15(5), 47–53. doi:10.1109/52.714771.
- Vargo, S. L., & Lusch, R. F. (2004a). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing*, 68, 1–17 January. doi:10.1509/jmkg.68.1.1.24036.
- Vargo, S. L., & Lusch, R. F. (2004b). The Four services marketing myths: remnants from a manufacturing model. *Journal of Service Research*, (May), 324–335.
- Vargo, S. L., & Lusch, R. F. (2008a). Why ‘service’. *Journal of the Academy of Marketing Science*, 36(1), 25–38. doi:10.1007/s11747-007-0068-7.
- Vargo, S. L., & Lusch, R. F. (2008b). Service-dominant logic: continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1), 1–10. doi:10.1007/s11747-007-0069-6.
- Vitharana, P., Zahedi, F. M., & Jain, H. (2003). Design, Retrieval, and Assembly in Component Based Software Development. *Communications of the ACM*, 46, 97–102. November. doi:10.1145/948383.948387.
- Von Hippel, E. (2005). *Democratizing innovation*. Cambridge: MIT.
- Web 3.0 (2007). From Wikipedia: [http://en.wikipedia.org/wiki/Web\\_3](http://en.wikipedia.org/wiki/Web_3).
- Webster, F. (1992). The changing role of marketing in the corporation. *Journal of Marketing*, 56, 1–17. October. doi:10.2307/1251983.
- Womack, J. P., & Jones, D. T. (2005). *Lean solutions: how companies and customers can create value and wealth together*. New York: The Free.
- Yourdon, E. (1989). *Managing the structured techniques* 4th edn. Prentice Hall, N.J.
- Zhao, J. L., Tanniru, M., & Zhang, L. -J. (2007). Services computing as the foundation of enterprise agility: overview of recent advances and introduction to the special issue. *Information Systems Frontiers*, 9, 1–8. March. doi:10.1007/s10796-007-9023-x.
- Zirger, B. L., & Hartley, J. L. (1996). The effects of acceleration techniques on product development time. *IEEE Transactions on Engineering Management*, 43, 143–152. May. doi:10.1109/17.509980.