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# Does Service-Dominant Logic Provide Insight about Operational IT Service Systems?

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## ABSTRACT

This paper uses relationships between Vargo and Lusch's (2004) service-dominant logic (S-D logic) and Alter's (2008b) of service system fundamentals to explore whether S-D logic provides insight about operational IT service systems. These approaches explicate fundamental ideas at different levels of analysis and for different purposes. S-D logic characterizes intersections between marketing and economics, whereas the service system frameworks and concepts in Alter (2008b) help business and IT professionals understand, analyze, implement, and improve service systems in organizations.

Synergies between these approaches might yield insights at both levels. The service system lens illuminates many areas where S-D logic might apply; it ignores topics related to markets rather than operational systems. Concepts in S-D logic related to customers, services, and economic exchange might enrich the analysis of service systems. The possibilities are tantalizing, but the paper raises questions about why S-D logic is cited so often in relation to operational service systems.

## Keywords

Service-dominant logic, service systems, IT services, work systems, service value chain framework

## INTRODUCTION

Vargo and Lusch (2004) argue that traditional goods-dominant logic is insufficient for understanding current markets, economic exchange, and marketing. Traditional goods-dominant logic "focused on tangible resources, embedded value, and transactions." New perspectives that focus on "intangible resources, the co-creation of value, and relationships" ... "are converging to form a new dominant logic for marketing, one in which service provision rather than goods is fundamental to economic exchange." (p. 1)

The first page of a current website devoted to service-dominant logic summarizes it as follows: "Service-Dominant (S-D) Logic is a mindset for a unified understanding of the purpose and nature of organizations, markets and society. The foundational proposition of S-D logic is that organizations, markets, and society are fundamentally concerned with exchange of service—the applications of competences (knowledge and skills) for the benefit of a party. That is, service is exchanged for service; all firms are service firms; all markets are centered on the exchange of service, and all economies and societies are service based. Consequently, marketing thought and practice should be grounded in service logic, principles and theories." ([www.sdlogic.net](http://www.sdlogic.net), 2010)

In addition to catalyzing debates in marketing, Vargo and Lusch's service-dominant logic (S-D logic) is often cited in discussions of service science (Chesbrough and Spohrer, 2006; Spohrer et al, 2007, Spohrer et al, 2008). The final white paper from a service science symposium attended by many researchers stated "Service Science embraces the world view of the service-dominant logic." (IfM and IBM, 2008, p. 17) A contemporaneous paper on "Service System Fundamentals," Alter (2008b) mentioned Vargo and Lusch (2004) as part of its rationale for three frameworks that were proposed as fundamental for understanding and analyzing service systems.

**Four levels for understanding services.** This paper assumes that services, service systems, and service thinking can be studied, understood, and applied at four levels that address different issues:

- Markets and economic exchange: How can ideas related to service help in understanding the nature of markets, economic exchange, and marketing?

- Service systems: How can one understand and analyze operational systems through which services are co-produced by service providers and service consumers? This level focuses on service operations.
- Service activities: How can an organization describe and improve specific service activities performed by service systems?
- Service computing: How can current forms of client-server computing architectures maximize flexibility, productivity, and reliability?

The first three levels are related hierarchically. Markets and economic exchange provide the context within which specific service systems perform value co-production. Service activities occur within those systems. Some service activities are front-stage (within the customer's view) and others are back-stage. Some involve person-to-person interactions; others are partially or totally automated. Transitional variations between manual, partially automated, and totally automated could lead to new classification schemes for service activities.

**Goal.** Focusing on IT service systems, this paper explores whether S-D logic supports a rich analytical view of operational IT service systems. Because all services of consequence are produced through service systems, anyone wanting to understand, analyze, or improve IT service offerings cannot avoid dealing with IT service systems that generate service results.

It is important to note at the outset that this paper's view of service systems differs from that of a number of leading proponents of S-D logic and service science. The term "service system" was not mentioned at all in the original paper on S-D logic, Vargo and Lusch (2004), or in a subsequent paper (Lusch and Vargo, 2006). In contrast, Vargo and Akaka (2009) mentions the term service system 53 times and adopts a definition of service system that views "service system" as part of an ecology of service systems engaged in economic exchange. Vargo and Akaka (2009, p. 33) cites a definition by Maglio and Spohrer (2008, p. 18) by which service systems are "value co-creation configurations of people, technology, [and] value propositions connecting internal and external service systems, and shared information." It quotes Maglio and Spohrer (2008, p. 18) in citing a statement by Normann (2001) that "The smallest service system centers on an individual as he or she interacts with others, and the largest service system comprises the global economy. Cities, city departments, businesses, business departments, nations, and government agencies are all service systems. Every service system is both a provider and client of service that is connected by value propositions in value chains, value networks or value-creating systems." A subsequent paper about service and value networks once again does not mention service systems at all (Lusch et al., 2010).

An underlying issue in this paper's exploration of S-D logic and service systems is whether the above definition of service system provides useful insights related to typical IT service systems, such as providing cloud computing services for corporate customers, providing IT call center services for a firm's employees, providing software design and programming services for corporate customers, and providing an online registration website that university students can use in self-service class registration. In all of those cases, the practical benefits of the above definition are unclear. Except for the way it emphasizes the importance of the service system's value proposition for the service system's customers, the advantages of saying that service systems are "value co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information" are not apparent. It is also unclear how those four IT service systems belong in the same category as an individual, city, business department, nation, or the global economy, all of which can be service systems by the definition apparently accepted by Vargo and Akaka (2009).

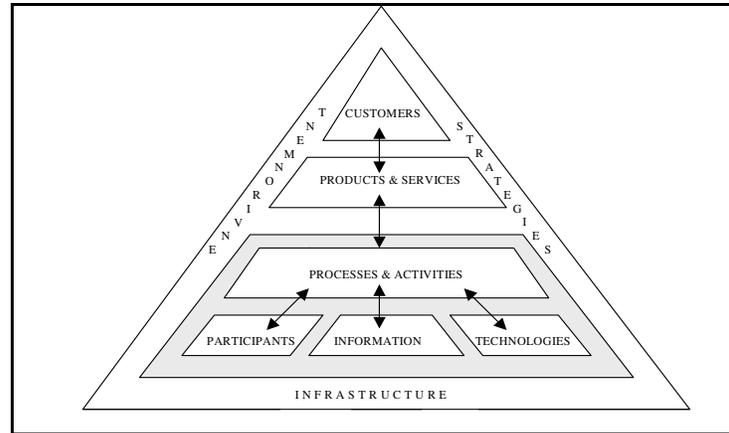
Alter (2010a) presents a more extensive discussion of alternative definitions of service system, arguing that a similar definition of service system proposed in IfM and IBM (2008) by leading proponents of service science is not practical for use by typical business professionals, and that a much simpler definition would lead to more benefits sooner.

The current paper is based on a set of simpler definitions used in Alter (2008c; 2010a; 2010b): Services are acts performed for someone else, including the provision of resources that someone else will use. A service system is a work system that produces services. A work system is a system in which human participants and/or machines perform work using information, technology, and other resources to produce products and/or services for internal or external customers.

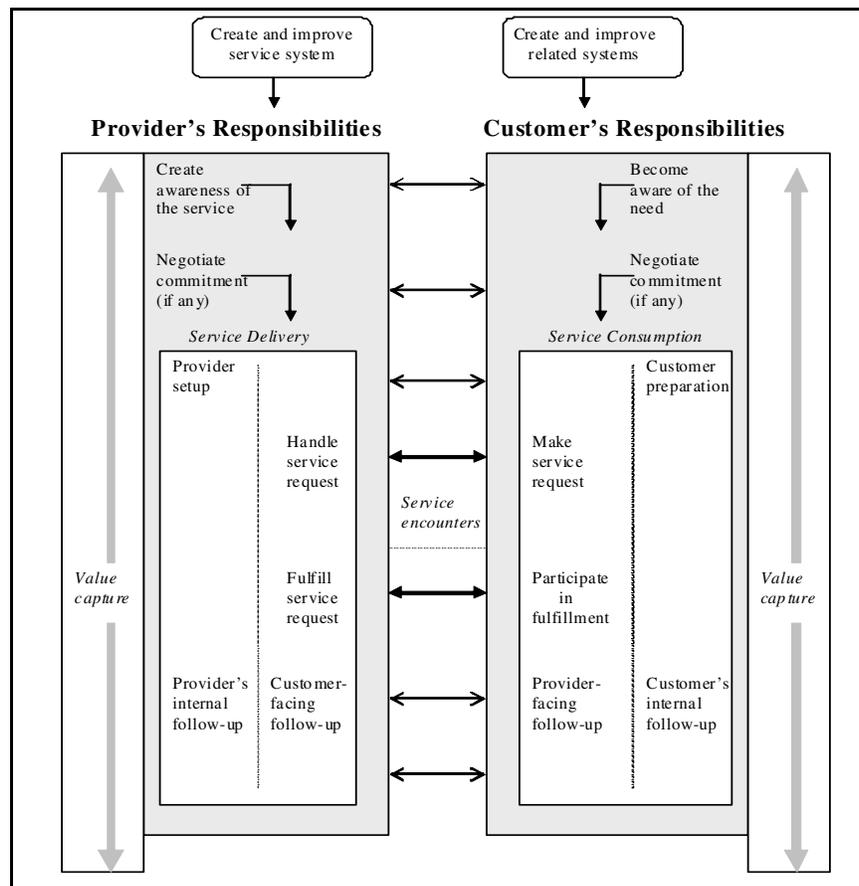
**Organization.** After illustrating two of three frameworks from Alter (2008b), this paper uses four IT service system examples to explore overlaps and possible contradictions between service system fundamentals and the eight "foundational premises" of S-D logic. Aspects of S-D logic are directly relevant to IT service systems; other aspects are at a different level of analysis. This paper avoids unnecessary repetition of arguments and references in readily available literature, which is appropriate given its length limitations and the extensive and well-documented discussions of S-D logic and service system fundamentals,

**BASIC IDEAS ABOUT SERVICE SYSTEMS**

Figures 1 and 2 show the first two of three frameworks that summarize the fundamentals of service systems from an operational business viewpoint. The third is not discussed here because it concerns the way systems change over time.



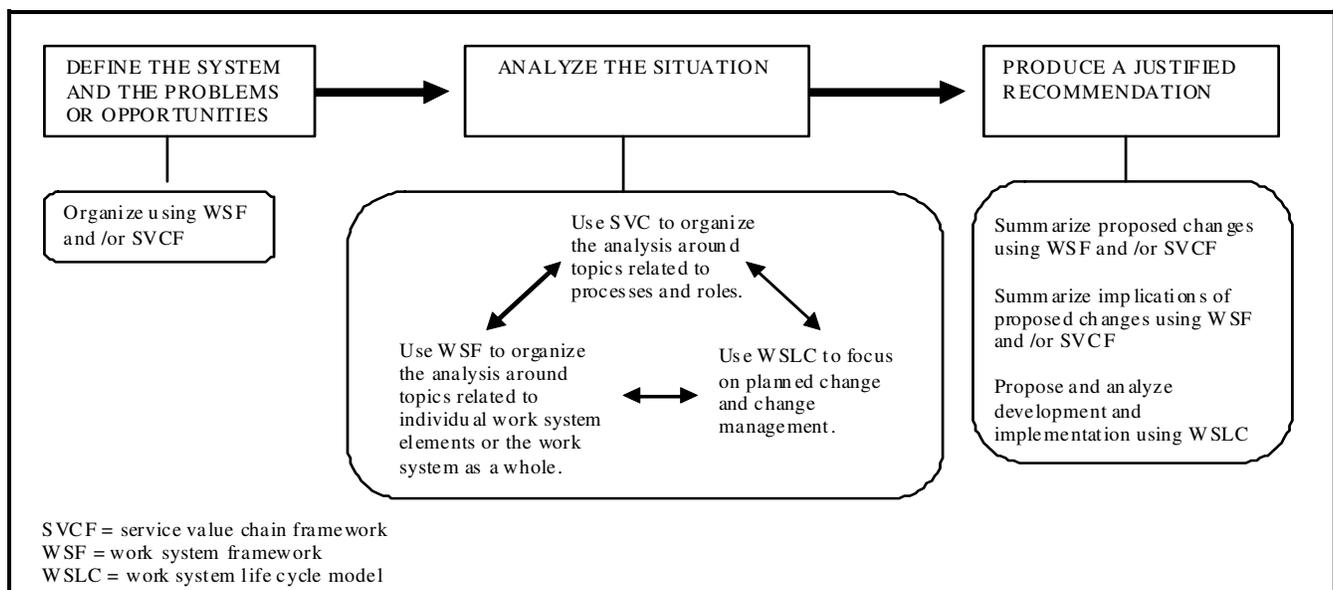
**Figure 1. The Work System Framework (slightly updated from Alter 2006)**



**Figure 2. Service Value Chain Framework (updated from Alter (2008b))**

- The *work system framework* (WSF) identifies nine elements for summarizing any system that performs work within or across organizations. Service systems are work systems. (Alter, 2008a; 2008b) IT service systems are service systems that generate IT services.
- The *service value chain framework* (SVCF) augments the WSF by introducing functions that are associated specifically with services. Its bilateral view of service processes reflects the S-D logic claim that services are co-produced by service providers and service consumers. (Alter, 2008)
- The *work system life cycle model* (WSLC) looks at how work systems (including service systems) change and evolve over time. The WSLC represents iterations involving planned and unplanned change. (Alter, 2008b)

In combination, the three frameworks provide a rich and broadly applicable model of how services operate and evolve. They create a platform for comparing service situations, identifying special cases of services, and describing service design strategies. These ideas can contribute to research about the advantages and disadvantages of different service methods and approaches in the presence of specific situational characteristics. Figure 3 shows how the three frameworks can be used together when analyzing, designing, or improving a service system.



**Figure 3. Use of three frameworks when analyzing, designing, or improving a service system.**

#### FOUR EXAMPLES OF SERVICE SYSTEMS

Vargo and Lusch (2004, p. 2) define service as “the application of specialized competences through deeds, processes, and performances for the benefit of another entity or the entity itself.” Table 1 summarizes customers, competences, and intangibles in four IT service systems that satisfy their definition. An observer of these situations could use WSF and SVCF to summarize each example as an IT service system. This paper explores whether S-D logic helps in analyzing these four IT service systems:

- A vendor provides cloud computing services for corporate customers.
- An internal IT group provides IT call center services for employees.
- A consulting company provides software design and programming services for corporate customers.
- University students register for classes using an online registration website.

Example of an IT Service System	Customers	Application of specialized competences	Intangibles
Cloud computing services provided through remote data centers	Firms wanting to minimize their investment in fixed computing resources	Specialized competences in running data centers and providing customer support.	Ease of working with the vendor, Ease of integrating the cloud with in-house data centers
IT call center services for employees	Employees who use the firm's data processing resources.	Specialized competences in providing advice and solving problems.	Quality of interaction with employees, Speed of initial response, Reputation for problem resolution.
Software design and programming services	Companies requiring design and programming services.	Specialized competences in design and programming; other specialized competences built into the software.	Quality of interaction with vendor, Software quality
Online course registration	Students are self-service customers. Customers also include instructional departments.	Student's knowledge of online capabilities and courses. Specialized competences built into the software.	Extent to which registration occurs quickly and with minimal inconvenience.

**Table 1. Customers, competences, and intangibles in four examples**

**APPLICABILITY OF THE EIGHT FOUNDATIONAL PREMISES OF S-D LOGIC**

Table 2 lists eight “foundational premises” and six attributes of S-D logic from Vargo and Lusch (2004). Due to length limitations, this section examines the foundational premises and without similar (and somewhat repetitive) discussion of the attributes. Attributes will be mentioned later in comparisons between S-D logic and service system fundamentals. Subsequent articles on S-D logic added two more foundational premises (Vargo and Lusch, 2008) that will not be discussed here because the eight premises in the original article suffice for the comparison at hand.)

<b>Eight foundational premises (pp. 6-12):</b>	<b>Six attributes of S-D logic (p. 7):</b>
<ul style="list-style-type: none"> <li>• FP1. The application of specialized skills and knowledge is the fundamental unit of exchange.</li> <li>• FP2. Indirect exchange masks the fundamental unit of exchange.</li> <li>• FP3. Goods are distribution mechanisms for service provision.</li> <li>• FP4. Knowledge is the fundamental source of competitive advantage.</li> <li>• FP5. All economies are service economies.</li> <li>• FP6. The customer is always a co-producer.</li> <li>• FP7. The enterprise can only make value propositions.</li> <li>• FP8. A service-oriented view is customer oriented and relational.</li> </ul>	<ul style="list-style-type: none"> <li>• A1. Primary unit of exchange (benefits of specialized competencies, not just goods)</li> <li>• A2. Role of goods (goods as intermediate products used by customers in value creation processes, not just end products that are transferred)</li> <li>• A3. Role of customer (co-producer of service, not just recipient of goods)</li> <li>• A4. Determination and meaning of value (determined by customer based on value in use, not determined by producer)</li> <li>• A5. Firm-customer interaction (customers as active participants, not just acted upon in transactions)</li> <li>• A6. Source of economic growth (application and exchange of specialized knowledge and skills, not just surplus tangible resources and goods)</li> </ul>

**Table 2: Foundational premises and attributes of S-D logic (Vargo and Lusch, 2004)**

*FP1. The application of specialized skills and knowledge is the fundamental unit of exchange.*

Business professionals analyzing IT service systems would normally consider the skills and knowledge of human participants (operant resources in S-D logic) regardless of whether those service systems are internally or externally directed. All four examples in Table 1 require specialized skills and knowledge. However, saying that specialized skills and knowledge is the fundamental unit of exchange is not generally helpful in analyzing or improving specific IT service systems in the four areas since the economic exchange is performed by other work systems that transfer money. It is even less clear how FP1 offers useful insights for analyzing or improving IT service systems that are totally automated (e.g., doing automatic backups).

*FP2. Indirect exchange masks the fundamental unit of exchange.*

The comment about FP1 said that consideration of specialized skills and knowledge as the fundamental unit of exchange is not generally helpful in analyzing or improving specific IT service systems such as those in Table 1. Consequently, the idea that indirect exchange masks the fundamental unit of exchange is also not generally helpful in analyzing specific IT service systems.

*FP3. Goods are distribution mechanisms for service provision.*

FP3 is not directly relevant to the four IT service systems in Table 1 since they are not involved with creating goods. The same applies for most IT service systems.

*FP4. Knowledge is the fundamental source of competitive advantage.*

It is widely agreed that knowledge is the fundamental source of competitive advantage, regardless of whether the topic is goods or services. For companies in the IT industry, such as cloud computing vendors and companies providing design and programming services, it is especially clear that the knowledge of employees is the fundamental source of competitive advantage. However, although IT service systems certainly contribute to competitive advantage for such firms and for some firms in non-IT industries, most IT service systems are in companies that are not in the IT industry. Even though IT applications increasingly enhance the product and service offerings of those firms, most IT service systems in most non-IT firms are directed internally and have little or no competitive impact beyond allowing the firm to operate competently.

Knowledge required for the operation of IT service systems appears in various parts of the WSF. It is embedded in the structure of processes; participants use their knowledge to perform work; knowledge may be codified in databases; customers use knowledge when they co-produce value.

*FP5. All economies are service economies.*

This premise operates at a different level than the analysis of specific IT service systems. Furthermore, if one accepts FP3, then all purposeful systems (even the goods producers) are service systems, consistent with the argument in Alter (2010b) that work systems can be considered service systems because they produce products and services for customers. Since organizations operate through service systems, one might conclude directly that all economies are service economies. However, that conclusion is not useful in analyzing or improving the performance of specific IT service systems.

*FP6. The customer is always a co-producer.*

The SVCF (Figure 2) is based on the premise that co-production of value is a general characteristic of services, at least to some extent. For analyzing or improving a specific IT service system, the interesting issue goes beyond the assertion that all service systems involve co-production. Placing a request for a service and waiting for delivery represents a minimal level of co-production. The interesting issue involves the choice of which specific activities should be co-produced within the service system and what is the appropriate extent of co-production for those activities, e.g., the amount of involvement of customers across entire service systems such as designing and programming software or resolving incidents reported to the IT call center. (Alter, 2010b)

Note: The foundational premises discussed in this paper were proposed by Vargo and Lusch (2004). A subsequent paper (Vargo and Lusch, 2008) providing clarifications of S-D logic argues that co-creation of value is a more fundamental issue than co-production. (Vargo and Akaka (2009, p. 39) expressed this as follows: “Value is always cocreated. If goods are used as vehicles of service they might be coproduced but the cocreation of value is not optional.”

*FP7. The enterprise can only make value propositions.*

An enterprise's value propositions to its customers appear at a different level than the design or analysis of specific service systems. Nonetheless, the term value proposition appears in analysis based on WSF because strategies, the ninth WSF element, combine internally directed production strategies and externally directed value propositions for customers. (Alter, 2008a) The issue concerning value propositions is whether an improved service system might generate better value propositions.

In relation FP7 one might note that espoused value propositions of many enterprises are inconsistent with capabilities of their service systems. In the examples in Table 1, the value proposition of minimizing IT expenses by transferring computing to the cloud might be undercut by the difficulty of providing IT call center support for end users whose understanding of in-

house computing systems is no longer valid. Similarly, the enterprise value proposition of “providing classes that you need to graduate” might be undercut by an inadequate online registration system that does not give priority to near term graduates.

*FP8. A service-oriented view is customer-oriented and relational.*

The content and form of WSF show that the analysis and design of service systems should be both customer-oriented and internally oriented because service systems should be effective (addressing customer needs) and efficient (addressing internal productivity needs). Well-designed and well-managed service systems achieve appropriate tradeoffs between effectiveness and efficiency. Thoughtful analyses of service systems should consider both types of goals.

FP8 does not provide important insights about the four examples. Typical customers of cloud computing vendors care much less about relationships with the vendor and much more about receiving automated IT services with maximum reliability and minimum inconvenience. Most customers of IT call centers want quick advice and solutions, not relationships. Customers of software design and programming services may want a substantial level of customer-orientation if they need customized application programs. However, they usually care less about customer-orientation or relationship and more about whether the software fulfills needs and is produced on time and within budget. The online registration system basically provides a machine for self-service which allows the student to enter specific information. Although customer-friendly user interfaces are obviously preferred to poorly designed interfaces, talking about the machine as customer-oriented and relational is not meaningful.

### OVERLAPS AND NON-OVERLAPS IN TERMINOLOGY

The previous section reveals some commonality of terminology between S-D logic and service systems, along with many areas of non-overlap in central concerns. S-D logic focuses more on the nature of markets and economic exchange. A service system approach focuses more on understanding, analyzing, implementing, and improving systems through which services are co-produced by service providers and service consumers.

Given the “patchwork” (Vargo and Lusch 2004, p. 6) nature of S-D logic, an effective way to examine overlaps and non-overlaps is to search for S-D logic ideas related to the various elements of WSF and SVCF, Figures 1 and 2.

### S-D Logic and the Work System Framework

This section identifies overlaps and non-overlaps between each element of the work system framework (Figure 1) and attributes and foundational premises of S-D logic (Table 2). Consistent with the previous section, it demonstrates that S-D logic addresses some topics related to customers and products and services, but says rather little about the other seven WSF elements. The main topics related to customers and products and services involve co-production of services by providers and consumers (FP6) and the treatment of goods (products) as distribution mechanisms for service provision (FP3), which applies much more to situations with tangible products than to most IT service systems.

**Customers.** According to FP6, “the customer is always a co-producer.” Vargo and Lusch’s (2004, p. 7) summary of A4 says, “value is perceived and determined by the customer on the basis of ‘value in use.’” Their summary of A5 says, “the customer is primarily an operant resource. Customers are active participants in relational exchanges and co-production.”

In WSF, customers include direct recipients or users of whatever is produced, plus other customers with less direct interest and involvement. As applied to IT service systems, WSF assumes that customers receive products and services, but it also allows customers to be service system participants, as occurs in the self-service registration system in Table 1. While WSF assumes that both effectiveness and efficiency are important, it contains no general assumptions about whether or how customers co-produce value. That is where SVCF takes over, since it is organized around the assumption that customers co-produce value, at least to some extent. SVCF embodies a service metaphor for thinking about systems but expresses a less assertive version of the ideas in FP6, A4, and A5. Its representation of co-production assumes that the extent of service co-production and value co-creation varies depending on the design of specific service systems.

**Products and services.** WSF contains the term *products and services* rather than *goods and services* because the former fits with operational system terminology, whereas the latter fits better with economic terminology. Even when a work system is viewed as a service system, WSF assumes that the work system produces products and services because its actions for its customers might include the creation and transfer of physical things or information as part of the services provided.

Vargo and Lusch’s (2004, p. 7) summary of A2 refers to goods as “transmitters of operant resources (embedded knowledge); they are intermediate “products” that are used by other operant resources (customers) as appliances in value creation processes.” FP3 says, “goods are distribution mechanisms for service provision.” Using A2 and/or FP3 when analyzing a

service system would require determining how any goods produced are transmitters of operant resources and how the goods are distribution mechanisms for service provision.

Although possibly valuable for thinking about economies and economic exchange in general, that level of detail is too general for thinking about operational systems. Also, that level of abstraction is probably beyond the capabilities and interests of most systems analysts, who, by training and inclination, tend to focus on system specifics rather than abstract theory.

**Processes and activities.** WSF views all actions as processes and activities, thereby covering a full range of situations, including highly structured workflows and “artful processes” whose sequence and content “depend on the skills, experience, and judgment of the primary actors.” (Hill et al, 2006). Although WSF says nothing about whether value is co-created, SVCF is organized around that assumption. WSF also says nothing about specific service functions included in SVCF, such as creating awareness, negotiating, preparing, handling service requests, fulfilling service requests, and performing follow-up.

Other than mentioning co-production of value, the six attributes and eight foundational premises of S-D logic say little or nothing about processes and activities that produce products and services. The definition of service refers to those processes activities indirectly as “the application of specialized competences (knowledge and skills) through deeds, processes, and performances.”

**Participants.** WSF contains the term *participants* (not users) because people who are not direct users of relevant technologies may nonetheless perform important roles. WSF makes no assumptions about whether customers are participants but recognizes that customers may be participants.

The six attributes and eight foundational premises of S-D logic refer to customers as participants (A3, A4, A5, FP6) but speak of other service system participants quite indirectly, as in FP1, “the application of specialized skills and knowledge is the fundamental unit of exchange.”

**Information.** The *information* in a service system might include computerized databases, documents, shared knowledge, or even unrecorded discussions and commitments.

The attributes and foundational premises of S-D logic refer to knowledge but do not mention information. FP4 says, “knowledge is the fundamental source of competitive advantage.” As mentioned earlier, knowledge can exist in many different places in a work system (service system). It can be embedded in structured processes and activities; it can be in the heads of participants (who might include customers); and it can be codified in databases.

**Technologies.** Technologies in WSF include both tools and techniques embedded in tools. The term *technologies* is used, rather than IT per se, because multiple technologies may be relevant.

The attributes and foundational premises of S-D logic speak of technology only indirectly in the guise of knowledge. Specific references include the “application of specialized skills and knowledge” (FP1) and “knowledge [as] the fundamental source of competitive advantage” (FP4)

**Environment.** A service system’s environment includes organizational culture and relevant regulations, policies and procedures, competitive issues, organizational history, and technical developments.

A1, A6, FP1, FP3, FP4, and FP5 all focus on the environment within which economic exchange occurs, but do so at a level too far removed from operational issues to be useful in analyzing or designing IT service systems, especially those with internal customers.

**Infrastructure.** A service system’s infrastructure consists of human, information, and technical resources that it uses but are shared with other work systems and managed and controlled outside of it.

S-D logic does not mention infrastructure directly.

**Strategies.** While recognizing that strategies often are not articulated clearly, WSF includes the term *strategies* because misalignment in strategies of the firm, organization, and work system (service system) are usually problematic. An articulated service system strategy includes its internal production strategy and value propositions for its internal and/or external customers.

S-D logic has many implications for firm strategy at an abstract level (e.g., FP3, “goods as distribution mechanisms for service provision”). FP7 refers to value propositions, one part of a firm’s strategy, by saying, “The enterprise can only make value propositions.” Once again, these statements are too far removed from operational issues to be useful in analyzing or designing most IT service systems.

### **S-D Logic and the Service Value Chain Framework**

WSF implies a service metaphor by including the customer and placing the customer at the top, which itself provides more of a service focus than most frameworks used in systems analysis for IT professionals.

SVCF expresses a service metaphor more fully by identifying service components.

A detailed comparison between SVCF and S-D logic will not be presented because it would echo the previous section's observations. Several additional observations are worthwhile, however.

S-D logic addresses similar topics related to co-production, but the original version (Vargo and Lusch, 2004) used all or nothing tone through statements such as "the customer is always a co-producer" (FP6). As mentioned earlier, subsequent articles such as Vargo and Lusch (2008) argued that the fundamental phenomenon is co-creation of value, and that that various degrees of co-production are possible.

SVCF expresses a less assertive version of ideas in A3, FP6, A4, A5 and FP8. It assumes that services are co-produced by providers and consumers while also recognizing variation in the extent to which customers co-produce services and co-create value. Since this is a system design question with a range of possible resolutions, consideration of co-production should go beyond a yes/no distinction (consistent with Vargo and Lusch (2008)).

The SVCF's phases and two-sided form are generally consistent with FP8, which says, "a service-oriented view is customer-oriented and relational." The consistency is partial, however, because the SVCF's two-sided form gives equal weight to the provider and customer.

While representing service interactions explicitly, the SVCF recognizes that provider-customer interaction is not the core of service and value creation for many services (especially IT services) where most of the work occurs backstage. The recognition that important service-related activities and responsibilities of providers may be invisible to consumers (especially in IT services) conflicts with A5 and FP8, at least to some extent.

The phases of SVCF are mentioned at best indirectly in the attributes and foundational premises of S-D logic. For example, the SVCF negotiation and service request phases are indirectly related to A1 and FP1, which say that the "application of specialized skills and knowledge is the fundamental unit of exchange." Consistent with the masking effect of FP2, it is questionable whether people negotiating about service contracts and service requests governed by those contracts pay attention to the exchange of skills and knowledge. In particular, non-paying internal and/or external customers probably focus on specific services that will be provided in return for money or other forms of value that they do not control or influence, and that therefore may be far removed from their understanding of the services.

### **SEEKING SYNERGIES BETWEEN S-D LOGIC AND THE UNDERSTANDING OF IT SERVICE SYSTEMS**

This paper explored the relationship between S-D logic and an extension of the work system approach that focuses on service systems. The two approaches attempt to explicate fundamental ideas at different levels of analysis and for different purposes. S-D logic explores the intersection of marketing and economics, whereas WSF and SVCF help business and IT professionals understand, analyze, implement, and improve service systems in organizations.

The most direct overlap involves the role of customers and the co-production of value. The S-D logic attributes and foundational premises most directly related to these topics are A3, FP6, A4, and A5. The most directly related aspects of the service system approach include placement of the customer at the top of the WSF and the SVCF's inclusion of responsibilities of service providers and service consumers across its phases.

Continued development of each approach is surely possible without consideration of the other. Nonetheless, finding areas of synergy might be worthwhile.

**Linking service systems with markets and economic exchange.** S-D logic focuses primarily on markets and economic exchange, which actually operate through service systems. It speaks about customers and goods and services, but says little about processes, participants, information, and technologies through which service systems operate. Future extensions of S-D logic could certainly delve into those topics.

It is unclear what a system-oriented version of S-D logic might look like, especially given the current "patchwork" appearance of S-D logic as a non-integrated set of attributes and foundational premises. Incorporation of system-related ideas might generate additional attributes and foundational premises, or might associate system-related concepts based on existing attributes and foundational premises.

A different view of service systems might be more effective as a starting point for developing a system-oriented version of S-D logic, especially in relation to IT service systems. For example, Mathiassen and Sørensen's (2008) theory of organizational information services distinguishes between four types of services: computational, adaptive, networking, and collaborative services. Comparing their approach with S-D logic might prove fruitful.

**Using S-D logic for understanding and analyzing service systems.** S-D logic provides a possible direction for extending Figures 1 and 2 and the related analysis approach. For example, the ninth WSF element, strategies, includes both production strategies and value propositions. Perhaps S-D logic could offer a deeper understanding of value propositions. Similarly, distinctions involving relational versus transactional aspects of economic exchange (e.g. see Gutek (1995), Hillebrand and Bloemer (2004)) might be incorporated into both S-D logic and service system analysis and design efforts.

**Addressing central concerns in marketing.** Synergies between S-D logic and a service system approach might result from applying both approaches to central marketing issues, such as designing products and services, finding sales prospects, performing transactions with customers, establishing relationships with customers, and performing market research.

**Seeking links with service computing.** This paper explored whether S-D logic helps in understanding IT service systems. One might ask whether service computing, service-oriented architectures, and web services should be included in the same discussion. While sharing the word service, it is unclear whether the latter three terms belong in the same family, and if so, how closely or distantly they are related. Chen and Vargo (2007) present a three-layer model linking CRM and SOA. Alter (2008b) notes that SVCF concepts map into certain concepts in Umamathy and Purao's (2006) reference model for classifying web services standards. Such potential links need more exploratory work.

**Other views of service systems.** Spohrer et al (2008) view service systems as negotiated arrangements for service provision, rather than operational systems of co-producing value. That view is more aligned with S-D logic and system governance, and less involved with how systems actually operate. Further discussion is beyond this paper's length limits.

**This paper's contributions.** The coherence and continuing development of service science require links between its many levels and topics, including IT service systems. This paper made several contributions to that effort.

- It identified the challenge of linking four levels of analysis: markets and economic exchange, service systems (including IT service systems), service activities, and service computing.
- Its exploration of links between S-D logic and operational IT service systems identified areas of overlap, complementarities, and conflicts in approach or rhetoric.
- It demonstrated a way of exploring relationships between different levels of analysis related to services. In some areas there was agreement, such as the treatment of all purposeful business activity as services. In other areas, differences in emphasis revealed important issues.

At this point it seems doubtful that S-D logic as originally described by Vargo and Lusch (2004) provides important insights about operational IT service systems. Subsequent research may have extended S-D logic in ways that make it more useful in relation to IT service systems. A follow-on effort could build on this brief paper by exploring subsequent literature that addresses related issues, such as different types of IT services (e.g., Mathiassen and Sørensen (2008)), different views of service systems (e.g., Spohrer et al (2008)) and the entire discussion of customer relationships, service through relationships vs. encounters (e.g., Gutek (1995)) and relationship marketing.

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