Advancing Service Science with Service-Dominant Logic

Clarifications and Conceptual Development

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Service Science is an interdisciplinary effort to understand how service systems interact and co-create value. Service-dominant (S-D) logic is an alternative perspective to the traditional, goods-dominant (G-D) logic paradigm, which has been recognized as a potential theoretical foundation on which a science of service can be developed. While there are efforts to support and develop an S-D-logic-grounded service science, the paradigmatic power of G-D logic remains strong. This is evidenced by several recurring misconceptions about S-D logic and its application in service science. This chapter aims to guide the advancement of an S-D-logic-grounded service science by clarifying several misconstruals associated with S-D logic and moving forward with the formalization of key concepts associated with S-D logic and service science.

Introduction

The emergence of service science and its study of service systems – dynamic value-creating configurations made up of people, organizations and technology (Spohrer et al., 2007) – stems from the need to understand intangible, dynamic and evolutionary aspects of exchange. Service-dominant (S-D) logic (Vargo and Lusch, 2004) has been recognized as a potential philosophical foundation from which a science of service, and the investigation of service systems, can be built (Maglio and Spohrer, 2008). S-D logic is based on the premise that service, the application of competences for the benefit of another, is the fundamental basis of exchange. According to Maglio and Spohrer (2008, p. 19), S-D logic may provide the "right perspective, vocabulary, and assumptions on which to build a theory of service systems, their configurations, and their modes of interaction." This alternative perspective to the traditional, goods-centered logic focuses on concepts such as value co-creation, operant resources, and phenomenological value. It describes and explores the processes that take place when value is created in a mutually reciprocal manner, through systems of exchange.

Although S-D logic has been suggested as the theoretical foundation for service science (Maglio and Spohrer, 2008), the stronghold of the traditional, goods-dominant (G-D) logic paradigm remains. The paradigmatic power of G-D logic can be found in commonly used concepts such as value-added, profit maximization and transactions. This goods-centered language establishes a lexicon that has led to misinterpretations, and, thus, misrepresentations of an S-D-logic-grounded science of service (Vargo and Akaka, 2009). Focusing the study of exchange on units of output (tangible and intangible) and the divide between consumers and producers hinders the conceptual shift from goods- to service-dominant logic, even in the context of service science and service systems.

The purposes of this chapter are to (1) present S-D logic as a theoretical foundation for service science, (2) highlight and clarify some of the predominant misconstruals associated with S-D logic, and (3) describe and discuss S-D-logic-related concepts with the aim of advancing service science through the formalization of the language with which service science, grounded in S-D logic, can be investigated. The common misconstruals highlighted and clarified in this chapter relate to (1) the S-D logic meaning of "service," (2) service as the basis of all exchange, and (3) the nature of value (co)creation among service systems. As mentioned, these misinterpretations of S-D logic are largely driven by the continued influence of the G-D logic paradigm, particularly its separation of producers and consumers and its identification of goods and services as different types of exchange output.

The clarification of S-D logic's foundational premises points toward several core constructs related to service science and the study of service systems. These constructs include service, value, system, interaction and resources and can be viewed and described from both the G-D logic and S-D logic perspectives. However, the concepts emphasized within G-D logic differ dramatically from those

used within an S-D logic view (e.g., transaction vs. relationship) and the transition from goods- to service-dominant logic can be difficult.

To achieve the purposes of this chapter, we first contrast G-D logic and S-D logic as alternatives for service science and provide support for S-D logic as a theoretical foundation for service science. We then clarify several misconstruals associated with S-D logic, specifically those mentioned above. The influence of the G-D logic lexicon is explained and we discuss how its paradigmatic power may be reflected in, and potentially limit, the current development of service science. We outline the core constructs for studying service systems and compare and contrast G-D-logic- and S-D-logic-related concepts associated with each. The S-D-logic-related concepts are described and elaborated to aid in the formalization of the language needed for advancing the study of service science from an S-D logic view. Finally, the implications of an S-D logic founded service science are presented and discussed.

Alternative Logics for Service Science

Service science is an interdisciplinary field that "combines organization and human understanding with business and technological understanding to categorize and explain the many types of service systems that exist as well as how service systems interact and evolve to co-create value" (Maglio and Spohrer, 2008, p. 18). Service systems are "value co-creation configurations of people, technology, value propositions connecting internal and external service systems and shared information" (p. 18). Service systems are considered the basic unit of analysis in service science. These dynamic network structures are conceptualized as "open system[s] (1) capable of improving the state of another system through sharing or applying its resources…and (2) capable of improving its own state by acquiring external resources" (Spohrer et al., 2008).

Service systems establish an abstract phenomenon capable of being analyzed within a variety of disciplines and industries (Spohrer et al., 2008). They are continuously interconnected with other service systems and range in size from an individual person to a world-wide exchange system (e.g., the global economy). Maglio and Spohrer (2008, p. 18) explain:

> 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 (Normann, 2001).

The normative function of a service system is to connect people, technology and information through value propositions with the aim of co-creating value for all service systems participating in the exchange of resources.

The challenge with developing a science of service is the lack of cohesiveness in research related to service (Chesbrough and Spohrer, 2006; Edvardsson et al., 2005). The study of service has largely been conducted within individual business-related disciplines, such as management, operations, marketing and IT (Bitner and Brown, 2006), as well as in engineering and computer science schools (Chesbrough and Spohrer, 2006), with little integration or cross fertilization of ideas. Moreover, the concept of service has been studied using different meanings and, thus, has been operationalized in different ways (Edvardsson et al., 2005). Service science aims to integrate these seemingly disparate areas of research by focusing on service as the central phenomena of interest (IfM and IBM, 2007).

G-D logic and S-D logic establish two alternative theoretical frameworks for service science and the study of service systems. The traditional, G-D logic provides a view of economic exchange and value creation that focuses on the production and distribution of tangible goods and considers services as special types of goods with undesirable qualities (e.g., intangible, perishable products) or add-ons to tangible products (e.g., post-sale service). Alternatively, S-D logic focuses on value creation as a process that necessarily includes the participation, in varying degrees, of all parties involved. This perspective considers service – the application of skills for the benefit of another – in its own right, rather than in relation to goods. S-D logic argues that service is central to value creation and economic exchange. Although goods are still seen as important, they are considered as vehicles for (indirect) service provision.

Goods-Dominant Logic

The traditional, G-D logic view of economic exchange, concentrates on manufacturing and distribution activities and considers value to be created by the firm and destroyed (consumed) by customers (see Vargo and Lusch, 2004). In G-D logic, tangible output is ideal as it can be produced away from the customer, standardized and inventoried until sold. Intangible output (i.e.,"service") is considered less desirable because of qualities that make it difficult to standardize (heterogeneity), produce away from customers (inseparability), and store or inventory (perishability) (Zeithaml et al., 1985). The normative goal in G-D logic is to maximize operational efficiency and reduce firm costs in order to increase financial profits.

G-D logic is grounded in the work of Smith (1776) and the development of economic philosophy and science that followed. Smith's work initially acknowledged labor as the source of "real value" and emphasized the importance of the division of labor in creating value in society. He explained that real value was measured in terms of the labor required to achieve a benefit, or "value-in-use." Although his political views highlighted the importance of the division of labor and how it contributes to the creation of real value, value-in-use, Smith's work was ultimately guided by his normative goal of increasing national wealth for England. This effort took place in the context of the 18th century, an era in which limitations

on the transfer of information made the exchange of tangible goods, embedded with knowledge and skills, ideal. Thus, Smith focused his efforts on more measurable, – what he called "nominal," – sources of value, particularly tangible, exportable resources and the price paid for them in the market – "value-in-exchange."

Smith's emphasis on nominal value, value-in-exchange, was intensified by the advancement of the Industrial Revolution and the desire of economic philosophers' to develop economics into a legitimate Newtonian science. Thus, economic science was developed through models that focused on the production and distribution of tangible products, embedded with utility and exchanged for money. This goods-centered paradigm developed over the years and became the dominant paradigm for economics and other business-related disciplines (see Vargo and Morgan, 2005), including management, marketing, information technology, etc.

Within G-D logic, value is considered to be created by the firm through production and value-added activities such as distribution and sales. In early studies related to economic exchange, the dominance of this goods-centered orientation left the concept of service largely ignored. As attention grew towards intangible aspects of exchange, service became known as an add-on to the tangible core good or a type of product that did not fit well with goods-based models of exchange. Services were eventually identified as different from goods based on their "unique" characteristics of intangibility, heterogeneity, inseparability and perishability (Zeithaml et al., 1985). Generally, this conceptualization of service emphasizes undesirable qualities in service "products" that make them difficult to study with goods-based models of exchange.

The G-D logic perspective views recent economic activity as shifting from goods to services. This stems from an increasing number of market offerings that cannot be categorized as goods (e.g., are not tangible and standardized) and therefore are considered services. G-D logic implies that goods are the ideal form of exchange, because they can be standardized and stored, and that the models developed for investigating exchange must be adapted to study the less-desirable exchange of services. Using this goods-centered paradigm as the theoretical foundation for service science suggests that the development of the discipline is focused on a particular, inferior type of exchange phenomena. Alternatively, S-D logic provides a perspective that considers service as the underlying driver of the economy and concentrates on intangible and dynamic aspects of all exchange.

Service-Dominant Logic

S-D logic establishes an alternative perspective for investigating exchange, which focuses on service – the application of competences for the benefit of another – as the central process for value creation and treats goods as a vehicle for service provision (Vargo and Lusch, 2004). This service-centered view is consistent with Smith's initial discussion of real value and value-in-use. S-D logic proposes that market exchange is the process of parties using their specialized knowl-

edge and skills for the benefit of other parties. In other words, exchange is driven by reciprocal and mutually beneficial service provision.

S-D logic is rooted in ten foundational premises (FPs) that establish a dynamic, service-centered framework for exploring exchange-related phenomena. The FPs are presented in Table 1 and discussed below as they relate to service science and the study of service systems.

Table 1. Foundational Premises of Service-Dominant Logic
(adapted from Vargo and Lusch, 2008)

-	Premise	Explanation/Justification
FP1	Service is the fundamental basis of exchange.	The application of operant resources (knowledge and skills), "service," is the basis for all exchange. Service is exchanged for service.
FP2	Indirect exchange masks the fundamental basis of exchange.	Goods, money, and institutions mask the service-for-service nature of exchange.
FP3	Goods are distribution mechanisms for service provision.	Goods (both durable and non-durable) derive their value through use – the service they provide.
FP4	Operant resources are the fundamental source of competitive advantage.	The comparative ability to cause desired change drives competition.
FP5	All economies are service economies.	Service (singular) is only now becoming more apparent with increased specialization and outsourcing.
FP6	The customer is always a co-creator of value.	Implies value creation is interactional.
FP7	The enterprise cannot deliver value, but only offer value propositions.	The firm can offer its applied resources and collaboratively (interactively) create value following acceptance, but cannot create/deliver value alone.
FP8	A service-centered view is inherently customer oriented and relational.	Service is customer-determined and co-created; thus, it is inherently customer oriented and relational.
FP9	All economic and social actors are resource integrators.	Implies the context of value creation is in networks of networks (resource-integrators).
FP10	Value is always uniquely and phenomenological determined by the beneficiary.	Value is idiosyncratic, experiential, contextual, and meaning laden.

S-D logic's most basic premise – that service is the basis of all exchange (FP1) – suggests that service is always exchanged for service, and, thus, all economies are service economies (FP5). With its consideration of service as the basis of exchange, S-D logic indicates that the apparent shift in the economy is not one from goods to services, but rather it is a shift from focusing on tangible and static to intangible and dynamic resources (FP4). S-D logic establishes the primacy of *operant resources* (those that act upon other resources to create benefit), such as competences, over *operand resources* (those resources which must be acted on to be beneficial), such as natural resources, goods and money (Constantin and Lusch,

1995; Vargo and Lusch, 2004). That is, within S-D logic, operant resources (e.g., knowledge and skills) are the underlying source of value and drivers of value creation. In addition, S-D logic argues that value-creating resources are not limited to the firm; customers, suppliers, and other stakeholders (e.g., government or society as a whole) also constitute operant resources and contribute to value creation.

While S-D logic views service as the central driver of the economy, it also recognizes that the direct service-for-service exchange is often masked by a web of interconnected intermediaries associated with exchange (FP2). Market complexities such as goods, money and organizations add to the dynamics of exchange among service systems (Figure 1). As these intermediaries contribute to the complexity of the market, they maintain important roles in the facilitation of exchange (FP3). Additionally, as specialization in the market increases, and many firms turn to outsourcing alternatives, service systems become increasingly complex and direct service-for-service exchange is often difficult to trace.
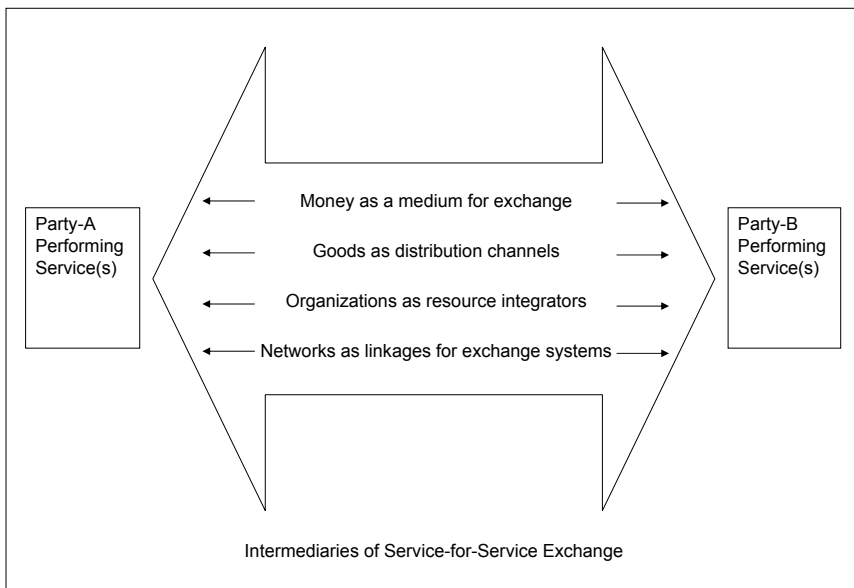

Figure 1. Service(s) Exchanged for Services (adapted from Vargo et al., 2010)

S-D logic's FP6 and FP7 emphasize the customer's role in the process of value creation. These FPs argue that value is always co-created in a process that requires the active participation of the firm, its customers and other stakeholders. More specifically, S-D logic argues that firms cannot create and deliver value; they can only propose value (FP7) and provide service as an input to the realization of value by the service beneficiary, usually the customer. In other words, value is not created until the beneficiary of a service (e.g., customer) integrates and applies the resources of a particular service provider (e.g., firm) with other resources. The

service provider's resources are integrated in the context of the beneficiary's access to private and public and resources, as well as resources from other service providers. This resource-integration process (FP9) occurs within and among service systems as resources are exchanged to create value for all participating service systems. Thus, the co-creation of value among service systems incorporates the integration and application of resources from service providers (e.g, firms), by service beneficiaries (e.g., customers) but, because value is always based on the context and perspective, it is always derived and determined by the beneficiary (FP10).

Clarifications of S-D logic in Service Science

While S-D logic has been suggested as a theoretical foundation for service science (Maglio and Spohrer, 2008), the development of the discipline has also been influenced by the assumptions of G-D logic. For example, whereas S-D logic argues that service is the basis of all exchange and that all economies are service economies, much of the literature regarding the development of service science suggests that the importance of the discipline stems from the evolution to a new "service economy" and the growth of the "service sector" (e.g., Spohrer et al., 2007). This acknowledgement of a growing service economy stems from the goods vs. service distinction established in G-D logic. Also, it is common to find reference to "services" science (plural – emphasizing intangible units of output) rather than "service" science (singular – emphasizing a process of value creation), although the latter is the common reference used by the discipline's primary originators (e.g., Maglio and Spohrer, 2008). The development of service science has clearly drawn attention toward intangible and dynamic aspects of exchange, including those in which S-D logic is grounded. However, the distinction between goods and services continues to underlie the development of service science, and, thus, evidence of the G-D logic paradigm remains.

The influence of G-D logic is noticeable in the language used to describe and investigate phenomena associated with economic exchange, including that related to service systems and service science. The deeply seeded roots of the G-D logic lexicon have created difficulties for the communication and development of S-D logic and, not surprisingly, have influenced the development of service science in its attempts to use S-D logic as a theoretical foundation. Thus, understandably, the pervasiveness of the G-D logic lexicon contributes to much of the misinterpretation of S-D logic and its theoretical foundation for service science. A number of misperceptions related to the language associated with S-D logic have been identified, such as the concepts of "service" versus "services" and "co-creation" versus "co-production" (Lusch and Vargo, 2006; Vargo and Lusch, 2006; Vargo and Lusch, 2008; Vargo et al., 2010). More specifically, evidence of G-D logic's paradigmatic power can be found in the misconceptions related to several fundamental principles of S-D logic and service science: (1) the S-D logic meaning of

service, (2) service as the basis of all exchange, and (3) the nature of value (co)creation among service systems.

The S-D Logic Meaning of Service

The distinction between goods and services as alternative types of products reflects a central aspect of the G-D logic orientation. This separation is specifically questioned by S-D logic and its argument that service is the basis of all exchange. As noted, whereas in G-D logic services are viewed as an intangible (inferior to goods) unit of output, in S-D logic service is considered a process of applying resources for the benefit of another and the underlying basis of exchange. This difference in the meaning of service is crucial for the implementation of an S-D logic foundation of service science. Ironically, the term service, from the S-D logic view, also suggests that there are no "services" (an intangible type of output that differs from goods) in S-D logic, except as the term is occasionally used to refer to various processes – never intangible output internally created by the firm.

Service, defined as a process in which one applies resources to benefit another, is not a new or novel concept (Lusch and Vargo, 2006). It falls in line with the perspective of a number of scholars who argue for service as central to value creation and exchange (e.g., Bastiat, 1860; Gummesson, 1995; Gronroos, 2000). The shift from defining service as a unit of output to a process of applying one's resources for the benefit of another emphasizes intangible and dynamic (operant) resources in exchange. Importantly, the S-D logic meaning of service suggests that service is not only recently gaining in importance. Rather, "it is only from the perspective of a model that includes the fundamental assumption that exchange is driven by goods (G-D logic) that the importance of service is just now becoming apparent and that the economy is perceived to be transitioning from goods focused to service focused" (Vargo and Lusch, 2006, p. 45), as discussed in the following section.

Service as the Basis of All Exchange

The shift from a goods- to service-dominant meaning of service requires the understanding of service as a transcending concept to goods. In other words, S-D logic does not consider service as a substitute for goods. Rather than replacing goods with services or a goods logic with a services logic, S-D logic makes service and service logic superordinate to goods and goods logic in terms of classification as well as function. This transcendence of service establishes a relationship in which G-D logic is nested within S-D logic. This nested relationship implies that the theoretical and conceptual components of G-D logic are relevant, but are not as deep or broad in scope as those of S-D logic. Thus, S-D logic broadens the conceptual lens from which service-related phenomena can be studied.

The transcendence of service as the basis of all economic exchange implies that the increased attention toward service(s) because of a growing "services economy," or the emergence of a "services revolution" (e.g., that a major portion of economic activity in developing countries is in "services") is, ironically, based on the influence of the G-D logic paradigm. Contrary to this popular perspective of the new or emerging services economy, service provision is not just now becoming abundant, nor is it recently "gaining importance. The recognition of a new or emergent services economy centers on the distinction between goods and services as alternative forms (tangible versus intangible) of products, which is based on the G-D logic view and its meaning of services.

S-D logic and its meaning of service suggest that service is always exchanged for service and, thus, there is not so much of a service revolution as there is a service realization or a revelation in service-centered thinking. This foundational understanding of service is essential if a "service system" is to be an inclusive (of value-creating activities) term and thus service science is to be inclusive of all phenomena involved in the mutual creation of value through service provision. Without this inclusivity, almost by definition, service science becomes a science of the exception – a science of somewhat inferior products. On the other hand, from an S-D logic view, in which service is central to exchange, service systems are made up of all "types" of exchange or more accurately, all processes associated with exchange. These processes include, but are not limited to, activities such as farming, manufacturing, distribution and delivery. In addition, service systems are found in *all* industries, from automotive to IT to retailing.

Although S-D logic suggests that service has always been the basis of exchange, there is, arguably, one revelation that is making the nature of service provision more apparent – the information revolution (Rust and Thompson, 2006). That is, the increase in specialization that has drawn attention toward intangible and dynamic aspects of exchange appears to be driven by exponential increases in knowledge and the ability to exchange information (i.e., operant resources) in a relatively pure, "liquefied" or "dematerialized" (Norman, 2001) form – that is without being transported by people and/or matter – through digitization. Advances in the capability of separating information from matter have furthered specialization as it relates to the division of labor and have increased the scope of the market (e.g., global) from which resources can be attained (e.g., outsourced). Thus, while service has not increased in importance in recent years, the service-nature of exchange has gained attention due to increasing complexities in the market and the decreasing necessity of tangible objects in exchange.

Nature of Value (Co)Creation among Service Systems

Generally, two broad conceptualizations of value have been discussed with regard to economic exchange: "value-in-exchange" and "value-in-use" (see Vargo et al., 2008). Although traditional market-related research focuses on value-in-exchange, more recently, attention has been refocused on value-in-use, to some

extent indirectly, through service- and systems-related (i.e., B2B) research. The increasing emphasis on value-in-use suggests that value is being co-created with and determined by customers, rather than produced and distributed by the firm. This notion of value co-creation has been developed by Prahalad and Ramaswamy (2000) and others (see Normann and Ramirez, 1993) and adopted and elaborated in S-D logic.

Likewise, service science has adopted value co-creation as one of the key components of service systems. However, in some cases it is discussed from the perspective of a production orientation, focused on value-added and value-in-exchange. As such, this production-orientation of value co-creation suggests at least a residual adherence to the G-D logic notion of *making "services."* Arguably, this position is often reflected in the study of phenomena related to "service-oriented architecture," "servitization," "service operations," "service factories," etc., all of which have been associated with service science, even if not fundamental to it. Perhaps more contentiously, the production-orientation of value co-creation is possibly reflected in, if not driven by, the "management" and "engineering" specifications of the extended title of service science – "service science management and engineering" (SSME).

This observation is not intended as a criticism of either management or engineering or their ties to service science. Rather, it simply suggests that these disciplines, as traditionally understood, tend to concentrate on design specifications and operational processes within the firm rather than viewing the scope of the broader value co-creation space. This focus on the firm and its operational efficiency is generally in line with the main issues related to G-D logic. Moreover, the emphasis of value co-creation beyond the activities of the firm does not suggest that production and manufacturing and related activities are not important in the value-creation process. Rather the discussion of the difference between co-creation and co-production is intended to highlight the role of co-production within the supoerordinate process of value co-creation.

S-D logic's conceptualization of value co-creation extends beyond the customer's involvement in the production, design customization or assembly processes (Vargo et al., 2008). The term "co-production" was used in the original article presenting S-D logic as an alternative to the G-D logic paradigm (Vargo and Lusch, 2004). However, since then, Lusch and Vargo (2006; see also Vargo and Lusch, 2006; 2008), have used the term "co-creation of value" to convey the customer's (and others') collaborative role in value creation. "Co-production" has since been used in S-D logic to describe the customer's (and others') participation in the development of a firm's offering (e.g., design, self-service). Based on these conceptualizations, the customer's role in *co-production is optional*, whereas his/her role in value creation is not; *value is always co-created*.

Advancing Service Science with S-D Logic Language

It has been suggested that S-D logic provides the appropriate theoretical framework and language for discussing and studying service science and service systems (Maglio and Spohrer, 2008). However, the misconstruals associated with S-D logic, discussed above, clearly indicate that the goods-centered lexicon reflects more than just words available to discuss economic exchange and service science; it reflects the underlying paradigm for thinking about and understanding commerce, the market and exchange in general. This has presented problems for discussing and describing S-D logic's counter-paradigmatic view of service science and, more specifically, service systems.

The use of S-D logic friendly concepts such as value co-creation and operant resources indicates that service science is moving toward a more service-centered foundation. However, the paradigmatic power of the G-D logic lexicon described above continues to limit the vocabulary available for discussing S-D logic and service science. If the language of S-D logic is to establish the foundation and aid in the advancement of service science as suggested (Maglio and Spohrer, 2008), the concepts currently used to discuss S-D logic and related phenomena must be formalized and developed. In an effort to develop the appropriate vocabulary for discussing service science from an S-D logic view, the comparison of G-D logic and S-D logic concepts have been made (Lusch and Vargo 2008; Lusch et al., 2008). These concepts represent several key constructs that can be used in the study of social and economic exchange among service systems. These constructs are (1) service, (2) value, (3) system, (4) interaction, and (5) resources. Table 2 presents these constructs and compares and contrasts their associated G-D logic and S-D logic concepts. To move forward with developing the language needed to describe and investigate service systems, the S-D logic concepts are described and elaborated below.

Table 2. Contrasting G-D Logic and S-D Logic Concepts (adapted from Lusch and Vargo, 2008; Lusch et al., 2008)

Core Constructs	G-D Logic Concepts	S-D Logic Concepts
Service	Goods & Services	Serving & Experiencing
	Transaction	Relationship & Collaboration
Value	Value-added	Value Co-creation
	Value-in-Exchange	Value-in-Context
	Price	Value Proposing
System	Supply Chain	Value-creation Network
	Asymmetric Information	Symmetric Information Flows
Interaction	Promotion/Propaganda	Open Source Communication
	Maximizing Behavior	Learning via Exchange
Resources	Operand Resources	Operant Resources
	Resource Acquisition	Resourcing

Service

Arguably, the most critical distinction between the language associated with G-D logic and that of S-D logic is found in the disparate meanings of the term service. The misperceptions and misinterpretations of S-D logic that stem from the conceptualization of "service" lead to the misunderstanding of much of the phenomena described within the S-D logic framework. As mentioned, most of the issues surrounding the term service seem to be tied to the fact that in G-D logic the term "services" (plural) is usually intended to refer to (intangible) units of output, whereas in S-D logic the term "service" (singular) refers to a process of doing something for or with another entity. Some have raised concerns that the term service has too much baggage (e.g., Lehmann, 2006), while others have suggested that the S-D logic definition of service is "novel" or "inconsistent" in relation to the conventional meaning of service (e.g., Achrol and Kotler, 2006; Levy, 2006). Still others argue that "service" is the wrong word choice, which creates a false dichotomy between goods and service (e.g., Brodie et al., 2006). Vargo and Lusch (2006) have acknowledged the baggage associated with the term "services." However, for reasons discussed above, they argue that the term "service" is precisely correct, if not essential to understanding exchange.

The S-D logic meaning of service, shifts the focus of exchange from transactions to relationships. With this conceptual shift, service is the common denominator of mutually beneficial exchange relationships and goods are considered service-provision mechanisms. In other words, with service as the underlying basis of exchange, the exchange of goods becomes a special case of indirect service provision. Thus, the false dichotomy between goods and service(s) (Brodie et al., 2006) is not created by S-D logic, but rather is rooted in G-D logic thinking and is, arguably, resolved in S-D logic (Lusch and Vargo, 2006).

Serving and Experiencing

S-D logic focuses on the interaction among service systems. The significance of that interaction is not found in the transfer of ownership of output (as in G-D logic), but in the interaction itself. The focus of S-D logic is in serving the needs of one or more service systems (e.g., customers) (Lusch et al., 2008). In other words, S-D logic centers on *service – the process of providing benefit (in conjunction with other service systems)* – rather than services – intangible goods – and the manufacturing and distribution of units of output. S-D logic's emphasis on service as a collaborative process necessarily includes the service beneficiary (e.g., customer) in the process of serving. As a part of the serving process, the customer is required to partake in *experiencing – determining value from a phenomenological and contextual standpoint* – the service. From this perspective, market interactions are more generally concerned with customer solutions and experiences rather than ownership.

Relationships and Collaboration

At the heart of the G-D logic view of resource exchange is the notion of a discrete transaction taking place between a producer (creator of value) and a consumer (destroyer of value). However, this producer/consumer dichotomy is inconsistent with the service-for-service exchange and the process of value co-creation that has been identified as a key driver of exchange in service systems (Maglio and Spohrer, 2008). Importantly, the S-D logic notion that service is always exchanged for service implies interdependence and reciprocity – that is, all parties are simultaneously both "producers" and "consumers" of value.

This reciprocal and mutually beneficial service-for-service exchange implies relationship. In S-D logic, however, relationships are viewed as more than merely repeat patronage. A service-centered perspective of exchange relationships among service systems highlights the interdependence of each service system, based on the specialization and the division of labor among systems. As specialization increases, so does the interdependence among systems. As service systems become increasingly interdependent, relationships emerge and the potential for collective action or collaboration increases. Thus, if the advancement of service science is guided by S-D logic it must consider relational aspects of customers and society at large.

Value

In addition to the confusion regarding value co-creation and co-production, the G-D logic lexicon sometimes constrains perceptions of value, as it relates to S-D logic. Some have suggested that the conceptualization of value associated with S-D logic represents only "functional" benefits (e.g., Prahalad, 2004; Shembri, 2006). However, Vargo and Lusch (2006) explained that this apparent focus on utilitarian value is a reflection of the influence of the G-D logic lexicon rather than a limitation of S-D logic.

S-D logic's emphasis on phenomenological and experiential value was clarified with the addition of FP10 – value is always uniquely and phenomenologically determined by the beneficiary (Vargo and Lusch, 2008). In line with S-D logic's perspective of value, in service science value has been defined as "improvement in a system, as judged by the system or the system's ability to fit an environment" (Spohrer et al., 2008). This understanding of value, based on context and perspective, has been used as a framework for the exploration of value creation in service systems (Vargo et al., 2008). It establishes a foundation for discussing and studying service systems using S-D logic-related concepts such as value co-creation, value-in-context, and value proposition.

Value Co-creation

It is clear that value co-creation is one of the core concepts for investigating exchange among service systems from an S-D logic view. In service systems, value co-creation is the purpose and driver of interaction, relationship development and exchange (Spohrer et al., 2008). According to Spohrer et al. (2008), service systems engage in three main activities to co-create value: (1) proposing value, (2) accepting a proposal, and (3) realizing the proposal. Thus, at least two service systems must engage in both applying and integrating resources in order for service to be realized and for value co-creation to occur.

Although S-D logic is inherently customer-centric – that is, the beneficiary is considered the determiner of value – value co-creation does not focus solely on the beneficiary. This perspective would neglect to recognize the benefits the firm receives from an exchange. Value co-creation implies that value created through exchange is based on the mutually beneficial relationships among service systems and each system makes a decision for whether or not the result of the exchange is valuable, based on context and experience.

In addition, value co-creation is not limited to the activities or resources of any individual exchange occurrence. Value is ultimately derived through the assimilation of existing and new knowledge and other resources and is influenced by the context of the environment as well as the resources of interconnected service systems. The investigation of service systems from an S-D logic grounded framework establishes a dynamic system of transferring, applying and generating operant resources (e.g., knowledge). Within the mindset of a service-for-service exchange, the force, or purpose, of exchange rests in each system's desire to better its own circumstance and/or to provide benefits for others – ultimately the creation of value. The conditions that create value for service systems through exchange depend on the availability of resources and configuration of the system(s).

Value-in-Context

S-D logic's redirection of the focal point of value creation, away from a firm's output (and value-in-exchange) and towards the value uniquely derived and determined by an individual service system (e.g., customer – i.e., value-in-use), emphasizes a phenomenological and experiential conceptualization of value that has most recently been recognized in S-D logic as "value-in-context" (see Vargo et al., 2008). Value-in-context emphasizes the importance of time and place dimensions and network relationships as critical variables in the creation and determination of value.

Focusing on phenomenologically determined value implies that the context of value creation is as important to the creation of value as the competences of the participating parties. Although environmental resources, such as social, ecological and governmental surroundings, are traditionally considered exogenous to value creation, the contextual nature of co-created value suggests otherwise. Although it is not possible to control all aspects of the environment, this does not mean that

these resources are not integrated in the process of value creation. In fact, resources such as time, weather and laws, which are often considered exogenous and uncontrollable by individuals and organizations, are often integrated – if not relied on – in the value creation process by all service systems (e.g., customers, firms, families, countries).

Value Proposing

Maglio and Spohrer (2008) explain that value propositions connect internal and external service systems within value chains, value networks or value-creating systems. The concept of value proposing recognizes that value is composed of benefits and costs that unfold as a service beneficiary (e.g., customer) integrates the service-provider resources. Often, this process takes place over time. In other words, the trade off of benefits versus costs is discovered in the customer's personal realization of the value proposition, rather than prior to, or at the time of, the transaction (payment or commitment to pay) or value-in-exchange. Essentially, firms do not produce and/or deliver value; they can only propose value and, if the proposition is accepted, then, with the participation of the customer, co-create value. For competitive advantage, these value propositions should be more compelling than those of competitor service providers (Vargo and Lusch, 2004).

System

According to Spohrer et al. (2008), "a system is a configuration of resources including at least one operant resource, in which the properties and behavior of the configuration is more than the properties and behavior of the individual resources." The study of systems inherently incorporates the exploration of networks and the relationships and resources that establish links within and among them. The study of system structures and network configurations provides a dynamic framework for examining complex processes of exchange.

S-D logic's notion of resource integration implies that value creation takes place in networks of relationships and resources (value-creation networks). This service-centered perspective embraces the idea that value creation is a process of integrating, applying and transforming resources, which requires multiple actors and implies networks. In addition, all systems contributing to value creation are considered both service providers and service beneficiaries. This mutually beneficial relationship of service-for-service exchange establishes a balanced, symmetric framework, essentially the opposite of G-D logic's asymmetrical framework, which separates firms as producers (value creators) and customers as consumers (value destroyers).

Value-creation Network

Given the foundation of G-D logic and its ties to manufacturing and the Industrial Revolution, it is understandable that the traditional conceptualization of value creation is based on a linear supply chain. Within this model, supply chains are often characterized in terms of physical gaps (e.g., geographical distances) between producers and consumer (see Lusch et al., 2010). To close these gaps, intermediaries, such as wholesalers and retailers, emerged and contributed to the output of the firm through a seemingly vertical process and structure. While the supply chain was envisioned as something physical, the real source of wealth and value was in the knowledge and information (operant resources) embedded in tangible materials (raw materials and finished goods) and was used by the intermediaries to close the gaps highlighted above.

As mentioned, it is increasingly possible to separate or "liquefy" (Normann, 2001) information apart from goods. Thus, without information being embedded in a tangible product, most supply-chain concepts are inadequate. The liquification of information changes the location and nature of work as well as the connectivity of resources. In other words, as information is liquefied, the place where value is created and the work associated with its creation change as well as the medium through which the resources travel (e.g., mailing a letter versus sending an email). As the ability to liquefy information increases exponentially, opportunities arise in which firms can concentrate on specific competences and outsource or look to others for complementary competences.

From an S-D logic view, the "venue" of value creation in service systems takes place in the value configurations – interactions among social and economic actors – and thus, value is created within and among service systems, at various levels of aggregation (Vargo and Lusch, 2008). This network framework for value creation requires reconceptualizing the supply chain in terms of a dynamic system of resources – service system – which represents the connection of distinct (mostly operant) resources. Because networks are not limited to linear, vertical or horizontal arrangements and are arranged in an infinite number of ways, their configurations can become a major source of innovation and competitive advantage. That is, the network perspective inherent to S-D logic and service systems suggests new opportunities for configuring all the resources that are necessary to solve a given problem at a given time and place – what Normann (2001) labels "density creation." In S-D logic, value networks or what have been increasingly referred to as service ecosystems are "spontaneously sensing and responding spatial and temporal structure of largely loosely proposing social and economic actors through institutions and technology, to (1) co-produce service offerings, (2) exchange service offerings, and (3) co-create value" (Lusch et al., 2010).

Symmetric Information

Spohrer et al. (2008) define economic exchange as "the voluntary, reciprocal use of resources for mutual value creation by two or more interacting systems."

This focus on the symmetric exchange of information and resources implies that (1) firms should not mislead customers, employees or other stakeholders by withholding critical information or manipulating communications and (2) all exchange partners are equally important in the process of value creation (Lusch et al., 2008).

Along the same vein, S-D logic suggests that actors involved in an exchange are relational and thus openly share relevant information. This is different from suggesting the actors give up intellectual property, which is quite a different discussion. The symmetric flow of information is not equivalent to the granting of property rights or sharing of property rights in intellectual property.

In the global service system, information symmetry is essential for driving out organizations and leaders that are not trustworthy. In S-D logic, organized service systems (e.g., firms and government entities) promote the symmetric flow of information and communication both externally (e.g., across firms and customers) and internally (e.g., within the firm). Additionally, the symmetric treatment of trading partners means that all parties in an exchange should be treated as equals. This perspective fosters interaction among social and economic actors, which involves collaborative communication as well as learning through exchange.

Interaction

As noted, G-D logic is developed from a deterministic equilibrium-based Newtonian model of science. Alternatively, S-D logic's service-for-service, interdependent and interactive model implies dynamic, non-equilibrium and non-deterministic relationships and models of exchange. Thus, just as Newtonian models of science have been subordinated by more dynamic, relational, and emergent models, such as relativity, quantum theory and complexity theory, so too should an S-D-logic-founded science of service. That is, theories and models developed for service science, within an S-D logic mindset, should focus on interactive and dynamic aspects of exchange, such as collaborative communication among service systems and the learning that takes place via exchange.

Collaborative Communication

S-D logic's symmetric framework and focus on value co-creation suggest that the interaction between and among service systems should be characterized by collaborative communication among multiple parties, rather than unidirectional messages from one party to another. In service systems, collaborative communication is founded on trust, learning and compromise. This notion of collaborative communication is not limited to the relationship between firms and customers, but also includes the interaction among employees and other relevant stakeholders (e.g., shareholders, society) that may be involved with or affected by service exchange.

With collaborative communication among service systems, customers, as well as employees and other stakeholders, are considered as partners or key collaborators in value creation rather than "consumers" or destroyers of value. This treatment of customers, employees and other stakeholders as participating in open and active communications with firms highlights S-D logic's primacy of operant resources. The interactions among multiple service systems do not occur on a one-to-one or dyadic basis, but rather a "many-to-many" (Gummesson, 2005) conversation takes place with regard to value creation in exchange. In large part, this multiple-party conversation has become increasingly possible, or at least more evident, because the Internet has established a public resource through which communities of customers and other stakeholders can engage in dialogue with or without the active participation of the firm.

Learning via Exchange

Dynamic interaction and open communication among service systems provides a mechanism for learning via the exchange process. As mentioned, the S-D logic mindset refocuses the purpose of exchange from the acquisition of tangible, oper- and resources to the integration, application and generation of intangible, operant resources. Just as value in a service system is judged by the relative improvement of the system (Spohrer et al., 2008), in S-D logic, social and economic actors exchange with other actors in order to improve their existing conditions, generally by improving the conditions of others (Lusch et al., 2007). The service-for-service foundation of S-D logic establishes the basic hypothesis that, if an actor takes a certain action (engages in exchange) and changes (improves its circumstance), then it will be better off. However, the improvement of wellbeing for any service system (from an individual to the global service system) is a process that requires feedback and learning.

For the firm, one of the most critical metrics of feedback, which contributes to learning, is based on financial assessments of the firm. That is, financial feedback (e.g., revenue and/or profit) allow entities to learn how they are doing in helping to create value in the market. Thus, although S-D logic places a strong emphasis on value-in-use and value-in-context, it does not ignore value-in-exchange. While S-D logic argues that value-in-exchange could not exist independent of value-in-use, it recognizes the importance of value-in-exchange as feedback to the firm and an intermediary of service provision.

Resources

It is clear that the study of resources plays a key role in understanding S-D logic and the relationships within and among service systems. At the heart of service systems is the transfer and sharing of resources. Four categories of resources

have been identified and examined: (1) resources with rights, (2) resources as property, (3) physical entities, and (4) socially constructed entities (Maglio and Spohrer, 2008). Maglio and Spohrer (2008, p. 19) explain that "[e]ntities within service systems exchange competence along at least four dimensions: information-sharing, work-sharing, risk-sharing, and goods-sharing." They suggest that the key to understanding the exchange of resources within service systems is found in the distribution of competences, such as knowledge and skills, among service systems and understanding the value propositions that connect such systems.

Resource-advantage (R-A) theory (Hunt and Morgan, 1995) is a resource-based view of the firm and market competition (Penrose, 1959) that has been recognized as one of the fundamental conceptualizations tied to the emergence of S-D logic. R-A theory posits that heterogeneous, imperfectly mobile resources meet hetero-geneous demands in the market. This theory implies that substantial variation ex-ists among firm resources, as well as customer needs, and proposes resource-based comparative advantages. While R-A theory provides a theoretical foundation for exploring resources related to the firm, S-D logic expands the focus of resources beyond the firm, to systems of service exchange or service systems (Lusch and Vargo, 2006). S-D logic focuses on the operant resources of customers, employees and the environment and considers them endogenous, rather than exogenous, to the value-creation process. Thus, the competences of customers, employees and other stakeholders are key components of competitive advantage (Lusch et al., 2007). Moreover, the S-D logic consideration of resources treats both operant and operand resources as inputs in the value-creation process. In other words, the crea-tion and determination of value depend on the process of "resourcing" (Lusch et al., 2008) which converts a potential resource into a specific benefit and involves (1) resource creation, (2) resource integration, and (3) resistance removal.

Operant Resources

One of the most critical differences between S-D logic and G-D logic, along-side the difference between their meanings of service, is the distinction between operand and operant resources (Constantin and Lusch, 1994; Vargo and Lusch, 2004). Operand resources have been identified as those resources which need to be acted upon (e.g., goods), while operant resources are those that are able act upon other operand (and operant) resources (e.g., knowledge and skills). Operant resources are generally intangible and invisible, dynamic and infinite. This means that although the resources cannot be produced and distributed per se, they can evolve, transform and multiply. Because operant resources are producers of ef-fects, they enable humans with their ingenuity to increase the value of natural re-sources and generate new operant resources (new ideas and knowledge). Almost by definition, G-D logic is centered on operand, tangible resources, while S-D logic makes operant, intangible resources primary in exchange.

S-D logic, and its emphasis on value co-creation, considers customers, employ-ees and other stakeholders as operant resources, those which act upon other re-

sources to co-create value. Thus, the ability to compete in the market is a function of both individual and collective (organizational) knowledge, and a firm's ability to contribute to value creation in the market also relies on the resources of customers and other external stakeholders (e.g., government entities). S-D logic's primacy of operant resources does not diminish the importance of operand resources in value creation, but it emphasizes the idea that operand resources only become valuable via the application of operant resources.

Resourcing

According to S-D logic, value creation only occurs when a potential resource (usually operant) is applied and contributes to a specific benefit. This activity has been termed "resourcing" (Lusch et al., 2008) and includes the creation and integration of resources and the removal of resistances. The first aspect of resourcing, the creation of resources, either operant or operand, always involves the application of an operant resource. Human ingenuity has led to the development of countless resources, both operand and operant, and continues to drive the evolution of the market as well as society.

The second aspect, resource integration, is a basic function of all service systems (e.g., firms, families and nations). At the firm level, organizations are considered resource integrators, as are departments held within the firm. Essentially, organizations transform employee-level, microspecialized competences (knowledge and skills) as well as other internal and external (e.g., market-acquired) resources into service provisioning.

The third aspect of resourcing, the removal of resource resistances, removes barriers that can prevent resources from being useful. The removal of resistances (e.g., lobbying for new laws) is a process that involves not only firms or service providers, but also involves the effort of customers, users or beneficiaries. In fact, often times the barrier to resource creation stems from customer resistances. These resistances are generally due to negative attitudes that individuals or groups of individuals hold against a particular firm or industry that prevents businesses from making their resources available in the market. It is through this process of resourcing that the resources of one service system can contribute to the co-creation of value between that and other systems.

Implications for Service Science

Building a true science of service requires solid theoretical foundations and the development of core constructs and concepts. This is no easy task. The advancement of service science becomes particularly difficult when faced with the challenge of applying an alternative logic to the traditional, goods-centered paradigm. The paradigmatic grip of the G-D logic lexicon makes it hard to break away from traditional understandings of concepts such as service and value.

The clarification of S-D logic above addressed the issues related to the S-D logic meaning of service, service as the basis of all exchange, and the nature of value co-creation among service systems. From these clarifications it is evident that service, the act of doing something for and with another party, can be done directly or indirectly (e.g., through a good). Thus, in an S-D-logic grounded understanding of service science there are no "services" (intangible units of output), there is only the service provision that occurs among service systems. Moreover, although attention towards intangible aspects of exchange has increased in recent years, there is no new service economy. Importantly, from the S-D logic view, economic activity has always been driven by service-for-service exchange and the process of value co-creation – the collaborative effort among service systems to create value for others and for themselves.

Based on the need for the clarification of S-D logic concepts, it is clear that the pervasiveness of the G-D logic paradigm remains strong. The importance of distinguishing G-D logic concepts from S-D logic concepts is that the vocabulary used to describe phenomena within each directs academics and practitioners down vastly different paths with regard to understanding economic exchange. G-D logic terms, such as transaction, value-added and price, point toward asymmetrical processes of value creation and tangible aspects of exchange. Alternatively, S-D logic vocabulary, such as relationship, value co-creation and value-in-use, highlight dynamic and reciprocal phenomena associated with exchange.

The clarification of S-D logic, particularly as a foundation for service science, is done here to draw attention toward the influence of the dominant goods-centered paradigm. In order for S-D logic to contribute to and potentially guide the advancement of service science, misinterpretations of its foundational premises need to be reevaluated. Moreover, for S-D logic to aid in the future advancement of service science the language used to discuss S-D logic and service science must be more clearly defined and agreed upon.

The use of S-D logic friendly terms in the discussion of service science indicates that the transition to a service-centered science of service has begun. This move is also evidenced by the subtle but powerful switch from calling the discipline services science (the original title) to service science. However, formalization of the terms and further development of the concepts associated with S-D logic and service science is needed. Several core constructs of S-D logic and service science and their related concepts were presented here. We suggest that this collection of key concepts may help to establish a framework from which theory development and testing can be furthered and service-centered models of exchange explored.

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