

Services Science – a master in search of a discipline?

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Introduction

The importance of services in modern economies has been well-established for at least 25 years. In fact, the observed migration of workers to the services sector, the recorded growth in services contribution to the output of developed nations, and the hand wringing on the part of industry, academe, and government in acknowledging an inadequacy in assessing these developments are correlated.

Service and Work

From the perspective of the demand side of a market, it is convenient to think of a service as the dual of some work that one would otherwise have to do in order to accomplish something one values. This means, in most cases, that the recipient of a service would incur lower costs than if he or she were to engage in self-production or were to earn a rent from its provision. For example, providing bus service lowers the certain costs associated with walking, such as direct time and storage. Similarly, providing systems integration services lowers the costs that an organizational customer might incur in learning about using a complex IT platform.

From the perspective of the supply side of the market, the producer would need to understand the costs the consumer avoids or the rent the consumer earns from consuming the service, as well as the costs the producer incurs in producing the service.

Services and Goods

A product is an output, something that is produced. A commercial product is something that is priced explicitly. Prices are chosen as summary statistics of value, typically with the intention of clearing the market at a profit to the producer.

In almost all cases, a product is a composite that could be deconstructed—physically or figuratively. A physical example: an airplane could be sold to the market in a form that is complete—with wings attached, landing gear, cockpit, avionics, engines, and a tank of fuel that would power the plane over its serviceable life, among other key elements. Sold in this manner, the user may only fly it infrequently. A figurative example: all of the same components would be provided except that instead of delivering the fuel *ex ante*, the producer would provide the user a contract stipulating rights and restrictions for securing fuel for the airplane as it may be needed.

In either case, the airplane is a complex and marvelous product specification that can be exploited by its owner to generate a stream of services, namely, transportation through the earth's atmosphere. The owner could choose to generate these services for his or her private enjoyment or for the enjoyment of others.

In the computing and software industry, products are increasingly offered as services. Technologies such as component based development coupled with web services and the development of process standards have enabled software to be offered as a service. This has also resulted in the unbundling of the software packages into to fine granular functionalities each of which could be consumed as a service when needed. Similarly, with the advent of utility computing model users who once had to build and maintain their computing infrastructure could now consume computing capabilities as a

service. In many other industries a similar trend of selling the capabilities as a service instead of selling the product or equipment has become common.

Defining Characteristics of Services

There have been many attempts to establish defining characteristics of services (Cook et al., 1999; Gronroos, 1990; Kotler, 1994; Chase et al, 1998; Zeithaml, 1981; Cooper and De Brentani 1991). These definitions suggest that services have some distinguishing characteristics compared to products. Services are intangible, simultaneously produced and consumed, and customized to a client's need. However, it has also been pointed out that different services vary as regard to the characteristics described above. It is more useful to think about service as a mixture of tangible/intangible components, simultaneous/non-simultaneous components, heterogeneous/standardized components, and perishable/storable components. One way to view the heterogeneity is in terms of a service tableau (Betancourt & Gautschi, 2001). The tableau distinguishes three primitive economic activities: production, distribution and consumption. These activities can be joint or separated in time and space.

Time	{P, D, C}	D {P, C}	C {P, D}	P {C, D}	P D C
Space					
{P, D, C}	1	2	3	4	5
D {P, C}	6	7	8	9	10
C {P, D}	11	12	13	14	15
P {C, D}	16	17	18	19	20
P D C	21	22	23	24	25

Key: | denotes separation
 {} denotes joint activities

Tableau of Primitive Economic Activities in Services

Industrialization of Services: The Role of Technology

Over the last two centuries we have witnessed the evolution of product manufacturing from a craft model to the industrial model. In part this transformation has occurred through the process of externalizing task knowledge, codifying this knowledge and embedding the knowledge in processes and tool systems. Formalization and taylorization of production chains, increasingly held together by underlying ICT-networks, has allowed for discrete production steps to be delineated and eventually physically moved out of the lead enterprises, as evident in the surge of business process reengineering, outsourcing, and internationally dispersed production networks. These transformations have allowed manufacturing to scale effectively and improve productivity. A similar transformation in services is quite feasible and is perhaps needed to realize the productivity gains that manufacturing has witnessed in the last several decades. In large part information and communication technologies will be key enablers of such transformation.

Services can be viewed as a mixture of activities such as physical tasks, manipulating information, and dealing with customers. Opportunities for service innovation arise when these activities are disaggregated and recombined differently. Services that have higher information content as defined by the proportion of information manipulation activities of the total service activity are more amenable for disaggregation (Apte & Mason, 1995). Service innovations are also possible by careful examination of the informational components of physical and customer interaction activities. Automation of the informational component or providing self service capabilities can lead to reconceptualization of the service work systems.

Services are knowledge driven tasks much of which is embodied in the minds of the people involved in service delivery. Technology could be used to encode some task knowledge and thereby assist the

service provider. In part this could result in the use of lower skilled resources in service provision thereby reducing costs. It could also be a means to attain some uniformity in the productivity levels of service personnel. This is particularly important when task complexity increases because the variations in productivity levels of low and high skilled personnel in such tasks have been found to be substantially different (Hunter et al, 1990). Encoding task knowledge in the technology could also enable services to be disaggregated and allow for temporal and spatial separation of services activities. For some services where the task knowledge can be completely encoded in technology artifacts and underlying processes complete automation of the service is feasible.

Disaggregation could have a profound impact on the characteristics of services. First of all, the need for simultaneity can be reduced or eliminated since the information related components could be performed disjointed from the other components of the service. Second, perishability can be decreased when some customer interactions is substituted with self service systems that can be accessed by customers anytime and used before actual consumption of the service. Recently McDonalds decided to separate the order taking process from the service delivery tasks of its drive through counters. Order takers sitting in call centers in remote locations greet customers, take their orders and transmit them to the fulfillment counter. The company claims that this disaggregation allows it to reduce the service time for drive through customers, especially during peak times and at the same time reduce the costs incurred in the order taking tasks through improved efficiency. In addition, by consolidating the order taking processes for several stores in one call center, the firm has now created an infrastructure and capabilities that can be leveraged to offer similar services to other organizations thereby creating additional revenue streams.

Outsourcing, especially off-shoring is transforming the value chains of services that could create the networked models of production and distribution that are common in industrial products. Take commercial software development for example which has traditionally been developed by a single firm or a few firms working together. It is entirely possible to source software components from the marketplace or have a software supply chain with different agents involved in the production of specialized software components that could be packaged to create applications (Ravichandran & Rothenberger, 2003). Similarly, informational components of health care services such as medical transcription and reading radiology outputs and tasks such as the analytical work involved in providing financial services are increasingly being provided from off-shore locations. These changes have fuelled the development of businesses that specialize in the provision of such specific services.

The emergence of firms specializing in the provision of IT-enabled services also allows firms to source capabilities and thereby rethink the size and structure of their organizations (Ravichandran & Chanvarsuth, 2006). Economies of scale and scope that come with specialized service offerings could transform the supply chains of services. Service innovations often involve development of a new service concept and concurrent changes in the customer interactions and the service delivery processes (de Jong et al. 2003). These concurrent changes are needed because service delivery processes are often tightly coupled, integrated and predominantly done in-house. With the increasing commoditization of processes (Davenport, 2005) and the emergence of IT-enabled service providers, service firms could focus more on the development of new service concepts and the required customer interactions and construct the capabilities to deliver these services by assembling a set of appropriate process capabilities sourced from external service providers. Service firms could become value orchestrators where they create the context and the value proposition, develop the customer relationships and create a platform through which they can integrate services provided by external agents in a flexible manner to meet customer needs (Hagel & Brown, 2005).

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