

# Beyond the Goods-Services Continuum

Peter Koch<sup>1</sup>, Barry Smith<sup>2</sup>,

<sup>1</sup> Villanova University, 800 Lancaster Avenue, SAC 166, Villanova, Pennsylvania, United States

<sup>2</sup> SUNY @ Buffalo, 105 Park Hall, Buffalo, NY 14260, United State

## Abstract

Governments standardly deploy a distinction between goods and services in assessing economic health and tracking national income statistics, of which medical goods and services carry significant importance. In what follows we draw on Basic Formal Ontology (BFO) to introduce a third kind of entity called *patterns*, which help capture the various ways in which goods and services are intertwined and help also to show how many services generate a new kind of non-goods-related products. Patterns are an overlooked yet essential features of many economic sectors including medicine. Studying patterns offers new insights into various components of economic analysis, including outcomes-oriented evaluations of medical services and the value of human capital in the medical sphere.

## Keywords

Goods, Services, Medical Care, Economics, Basic Formal Ontology (BFO)

## 1. Introduction: Goods, Service, and the Goods-Services Continuum

The income statistics created by different governments standardly deploy a distinction between goods and services in assessing the economic state of a nation. Gross Domestic Product, for example, is described by the United Nations as “a basic economic growth indicator [that] reflects changes in total production of goods and services.” [1] On the one hand, *goods* are generally understood as alienable, often material things produced in an economic system, such as bottles of milk, songs, or combs – things that can be sold, lent, consumed, gifted, and so forth. On the other hand, *services* are typically understood as tasks performed for the benefit of a consumer and are marked by the fact that production and consumption occur simultaneously [2,3]. When a person goes to a comedy show, for example, that person simultaneously consumes what the comedian produces (jokes) in exchange for money. Drawing upon the terminology codified in the Basic Formal Ontology (BFO),<sup>2</sup> goods are independent continuants, which preserve their identify over time; services are occurrents, which unfold through time and have successive temporal parts, such as when a mechanic services a car by draining the old oil, changing the oil filter, adding new oil, and so on [4]. We note here that goods are often used in the performance of a service – we shall see more generally in what follows that goods and services overlap.

In coming to a clear understanding of the ontology of goods and services, it is useful to differentiate between pure goods, which are those goods that are unaccompanied by a service, and pure services, which lack any accompanying good. Examples of the former are books and bracelets; examples of the latter are financial consultation services and tours of historical monuments. Between these two extremes are many items of economic significance that fall along a continuum between goods and services and in which goods and services are in various ways intertwined. For example, when you purchase a car,

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EMAIL: peter.koch@villanova.edu (A. 1); smith@buffalo.edu (A. 2);

ORCID: 0000-0002-7923-0436 (A. 1); 0000-0003-1384-116X (A. 2);



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<sup>2</sup> Basic Formal Ontology is a top-level realist ontology that conforms to the standards specified in ISO/IEC 21838-1. As an established top-level ontology, BFO provides a standardized framework for effectively acquiring, analyzing, and integrating information from multiple disparate domains. BFO has been adopted in over 500 ontology-based projects in domains such as biomedical sciences, genomics, and military research.

the act of purchasing often involves a salesperson who assists in selecting among different cars and different features of cars, such as color, performance specifications, and so forth. The salesperson may also give you an overview of how to operate features of the car and of how you can best pay for it. These are what we can call *supportive services*. A restaurant server will provide supportive services of taking your order, running the food to your table, and so on. The purchase of a car and the experience of a restaurant meal are composed in different ways of bundles of goods and services; they each fall along the goods-services continuum.

## 2. Beyond Goods and Services: Patterns as Products

While the distinction between goods and services and the accompanying idea of a continuum of cases which fall between them is useful and frequently invoked, we contend that this framework is in an important respect faulty. Consider the product provided by a masseuse. Typically, this product (a massage) is described as a ‘pure service’, since there is no accompanying good and the production and consumption occur simultaneously. This follows from an understanding of a good as a tangible, alienable product. After all, there seems to be no good that we can point to or buy or sell following a massage.

But while a massage does not result in an alienable product, the service provided by a masseuse does create a physical alteration in the consumer, such as the unbinding of knots and an accompanying relaxation of the back muscles. A new *pattern* emerges in the physical makeup of the consumer as a result of the massage. This change in pattern is valuable; the exchange of money is testament to this. Yet, standard accounts of services fail to incorporate the patterns that many, if not at all, services produce because – while they are *continuants*, in the BFO sense (see section 2.2, below) – they are not alienable; they are not something that is left over after the service is provided that can be bought and sold.

Such patterns are prevalent in every economic sphere; they are the products of many familiar services, which create, maintain, or protect these patterns. A hairdresser might create a new pattern on your head – a product that is neither a good nor a service as standardly understood. A landscape architect might transform a neglected lawn into a well-curated garden. This produces a new pattern in the terrain, though this product, again, cannot be transferred as a good to some third party. A gardener may maintain this pattern by weeding, fertilizing, and trimming the garden. They might lay mulch to protect the garden from future unwanted growth. These acts, too, are typically considered pure services, as no new good has been produced. However, the design of the garden is here not created but rather preserved and protected through the actions of ridding the garden of unwanted growth and introducing measures against future weeds. As it stands, the typical goods-services distinction does not account for this feature of economic production, in which a non-alienable physical change has taken place as a result of the provision of a service.

Yet the coming into existence of products of this sort frequently accompanies the provision of a service, despite not being recognized as an entity that is produced by the service. The principal reason for this, of course, is that the patterns in question are non-alienable. They cannot be bought or sold or gifted, and as a result do not enter, for example, into national income statistics. Yet they are of economic significance, nonetheless. Such patterns include, for example, the patterns in human beings we call skills and capabilities, the sorts of patterns that are created through the provision of those services we call education and training. Taken together the latter form what is called *human capital*, which we discuss further in section 2.3 below.

These patterns are valuable yet underappreciated products of myriad services and, as such, are critical components of market economies. Once patterns are recognized as products, it appears that most, if not all, services derive their value from the value of the resulting patterns that they produce. If this is the case, then patterns in our technical sense – non-alienable products of services – could constitute an important category for assessing and tracking the health of an economy beyond the traditional goods-services continuum.

## 2.1. Patterns and Health Care Services

In any market economy one important pattern-producing economic sector is health care. In 2021 health care spending in the United States accounted for over 18% of the Gross Domestic Product, and much of the underlying expenditure is directed towards health-related services.[5] For example, in 2017 the Centers for Medicare and Medicaid Services (CMM) estimated that Physician and Clinical Services accounted for about 20% of health care expenditures, or \$694.2 billion dollars, where Other Health, Residential, and Personal Care Services accounted for about 5 percent of health care service costs. [6] Many medical services are pattern-producing, typically by altering, maintaining, or protecting patterns that inhere in a patient's body. Curing an infection, analyzing bloodwork, reducing inflammation, and myriad other common medical practices and services result in non-alienable products that promote health and healing. These products – patterns that results from, or are maintained through, medical services, are (arguably) the basic unit of value for assessing such services. For the services are of value only insofar as they are pattern-producing or -protecting in one or other medically relevant sense.

Analyzing such services in terms of patterns provides an alternative framework for assessing and tracking the impact of the health care sector on an economy. Identifying patterns allows for a non-goods-related analysis of the outcomes of health care services – something the goods/services continuum does not provide. And we believe that focusing on patterns offers new insights into, the typical kinds of services that are offered by the medical profession.

Some medical services, such as cosmetic or therapeutic surgery, *create* patterns in patients. If a patient undergoes cleft lip and palate repair surgery, then a new pattern emerges in the patient. The same occurs for breast augmentation surgery or bunion correction. In each case, a service is rendered; no traditional good is produced; yet an important change occurs: a product emerges in the patient. This product is a created pattern. Other services, such as wellness checks from a primary physician, might contribute to the maintenance of patterns. Still others provide protective patterns – patterns which protect against the emergence of unwanted new patterns, as when a physician provides a vaccine against polio. Finally, many services restore patterns to their desired state, such as the removal of a cancerous mole or the treatment of mental trauma through therapy.

The inclusion of references to patterns in the analysis of health care interventions captures an important traceable and analyzable feature of the contributions of the medical profession. The notion of patterns is also useful when services are poorly rendered or abandoned. If services are tracked without reference to patterns, then it becomes possible to track the outcomes of medical interventions in more coherent ways, for example by allowing distinctions to be drawn between services with no ostensible outcome, services with a desired outcome, and services with adverse outcomes.

Consider, for example, coronary bypass surgery. Imagine that three patients are each of them counted as undergoing the service of having this surgery performed. The first has a successful outcome; a new desired pattern emerges in the patient. When the surgeon operates on the second, she finds while operating that a previously undetected issue makes it unfeasible to continue the operation, and so she abandons the surgery mid-operation; new significant knowledge arises, but no new significant pattern results in the patient. In the third patient the surgeon accidentally nicks an artery, causing an adverse outcome; a significant, though unintended, pattern is produced. On its own, the goods/services distinction fails to capture the resulting changes in the patient, where the three different outcomes of the surgeries when understood in terms of patterns can help differentiate between the outcomes and so provide a more systematic framework for assessing value of the respective services.

Many other professions likewise offer services that create, maintain, restore, or protect patterns as products. A car mechanic might manipulate a car's engine, creating a new pattern through their service. They maintain patterns through oil changes, for example, or protect patterns through lubricating the undercarriage of a car. In these cases, the patterns are features of the car. Dentistry is focused on the maintenance, protection, restoration, and (in the case of cosmetic dentistry) creation of teeth. This involves in each case a focus on the pattern that inheres in the jaw or faciocranial features of the patient.

The digital world, too, is host to many services that result in altered patterns. Friedrich's Instagram curator might scrub his account of some photos and modify others – services that result in products not typically categorized as goods but are captured by the idea of patterns. Software developers manipulate

code, which as it appears on your hard drive forms patterns in the sense intended here; the job of the software developer is to create, inspect, modify, and protect patterns of code.

Focusing on health outcomes of medical services is, of course, nothing new. Outcome-focused assessments are a widely recognized and powerful tool for evaluating and comparing the contributions of the medical profession within market economies, and service-outcome relations have been explored in terms of ontological concepts[7][8][9]. However, our contribution lies in the recognition that these outcomes are neither goods nor services, traditionally understood, but rather non-alienable products here called patterns.

## 2.2. Basic Formal Ontology (BFO) and Patterns

Basic Formal Ontology offers the resources to categorize these entities: namely, as dependent continuants. Dependent continuants are entities that exist through time and exist only in virtue of another entity which is their physical bearer – an independent continuant in BFO terms. Examples of dependent continuants include qualities and dispositions, both of which inhere in independent continuants) and are, as such, non-alienable from their bearers [2]. For example, the quality of redness always requires a bearer, such as a tulip or an oil painting; the disposition of fragility requires a bearer, such as a vase. The “dependent” feature reflects the non-alienability of these products, which importantly distinguishes their production from the production of standard goods. We call these dependent continuants patterns. Patterns are the value-adding dependent continuants that are produced by many services; they are immensely prevalent in all economies of production. Thus, in assessing the production of an economy we need to move beyond the standard goods-services distinction in order to reflect the various relations between services and patterns, which may take different forms.

The standard kinds of services include the following:

- 1) Pure Services: Services that are unaccompanied by any sort of good. For example, a psychiatrist assesses a person’s decision-making capacity, which produces no ostensible good. (She is not required, for instance, to produce any report.) Therapists assist in resolving trauma; occupational and speech therapists change patterns of movement or speech. In all of these cases no good (no alienable continuant) is produced.
- 2) Goods-Accompanied Services: Services that complement or are required for the use of a good, such as for training or installation purposes. In medicine, examples include the development and use of removable prosthetics or devices such as a Left Ventricular Assist Device (LVAD), which are external, alienable goods that require high levels of service for maintenance and use.
- 3) Pattern-Producing services: Services that produce enduring ostensible dependent continuants, or patterns, e.g. an Instagram curator produces visible content, a fitness trainer produces enhanced physique, a dentist whitens teeth. In medicine, these might include cosmetic and therapeutic surgeries that result in altered features of the patient’s body.

However, there are also other kinds of services that are valuable on account of their relation to patterns:

- 4) Pattern-Maintaining services: these are services that *maintain* (though they do not necessarily alter) existing patterns. These might include the services offered by a physician who performs a wellness check, the services provided by a car maintenance mechanic, or a dental hygienist, etc. In these cases, services are provided to ensure that an existing pattern – the healthy human body, in the case of medicine – retains its form.
- 5) Pattern-Restoring services, or those that *restore* patterns to their desired previous form. This might include landscaping to restore garden beds; a doctor treating a fungal infection; the restoration of an oil painting. Medical services of this sort might include occupational therapies, which restore a patient’s movements to a previous level of functionality.
- 6) Pattern-Protecting services, or those that protect against the threat of damage or impairment to an existing pattern through the introduction of a distinct service, for example those services offered

by a bodyguard or security firm. An example of such a medical service is the provision of vaccinations against certain diseases or topical creams that prevent rashes from poisonous plants.

As will now be clear, the patterns that are maintained, restored, or protected by services can take many forms and inhere in many different kinds of bearers, whether individual or collective. A pattern can be present in a garden in the form of a design; a pattern can be that of the forces operating within a family in relation to which a family therapist or social worker might intervene; it can be the pattern of forces created when a politician is present in a crowd, the many variations of which may include enhancement through the services of a loudspeaker system or protection by a bodyguard. The resulting patterns are dependent continuants; they are not goods, and so they are not captured by the goods-services distinction, yet they are important value-adding components of services. Identifying which patterns are the products of a given service can explain why that service has value in an economy when seemingly no material goods are at stake.

### **2.3. Human Capital**

An important aspect of any economy is human capital, or the assets of persons that positively contribute to the production process. These assets might include capabilities such as personability, job-related abilities, management skills, networking skills, and so forth. Companies invest directly in developing these assets in employees through education, training, and other programs. The development of human capital, then, is typically understood as a product of pure services, as training modules and educational programs are services with few, if any, related goods.

While economists traditionally recognize human capital as an essential feature of an economy, the nature of human capital and of its relation to goods and services has historically been a matter of debate [10, 11]. Our discussion of patterns and services provides a clear structure for understanding human capital and how services can contribute to its development. These valuable assets of persons are capabilities, where capabilities are (roughly) beneficial dispositions of persons. Like dispositions in general, capabilities are grounded in the physical makeup of the person who is their bearer. This makeup is a pattern, for example of a neurological sort. When companies invest in creating and maximizing the capabilities of their workers – i.e., their human capital – they are attempting to use services (e.g. training modules) to produce, maintain, or protect certain patterns, which are the grounding of these capabilities. As a person's patterns change through training and education, this person develops new capabilities. Thus, once again: services oriented towards human capital are producing something, namely those patterns which are formed out of capabilities.

### **2.4. Summary**

Nearly all services are directed towards the altering of patterns. Consulting firms review patterns manifested in the behavior of companies, for instance in their manufacturing processes or in their financial distribution processes, and they recommend various ways to alter these patterns to maximize efficiency or minimize costs. A sports psychologist attempts to reorganize an athlete's physiological patterns so that they might respond differently to pressure. A dog trainer alters a dog's neurological patterns so that the dog's responses to the environment change. Sales training is an attempt to reorganize a salesperson's patterns to maximize that person's capabilities to sell goods. Such services do not themselves produce goods; but they do produce results. These results can be described as the production, maintenance, restoration, or protection of patterns. Recognizing and tracking such patterns is particularly important in medicine, as health care services often produce, protect, or maintain patterns in or relating to patients or research subjects, especially in cases where no accompanying good is produced. The full impact of many such health care services is not captured by the typical goods-service distinction; the introduction of patterns-as-products, however, does well to fill this void. The introduction of patterns is thus not merely an academic endeavor; recognizing the various relations

between services and patterns can contribute to the assessment of services through the value added by the patterns which they produce.

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