2° Service Systems

Perché sistemi di servizio?

Visione globale dei sistemi di servizio: il mondo come aggregato di entità di sistemi di servizio che interagiscono attraverso le proposizioni di valore per co-creare valore (vd. oltre Sampson)

System characteristics

- A system is any set of available variables selected by an observer to identify fundamental objects, the influential attributes of the objects, and the relationships of these objects that result in a phenomena
- **Basic assumptions**
  - Objects can be tangible or intangible
  - Objects have attributes
  - There are relationships amongst the objects
  - There are relationships amongst the object attributes

il termine sistema è spesso usato per descrivere un insieme di entità le cui relazioni e interazioni possono essere strutturate mediante un modello matematico
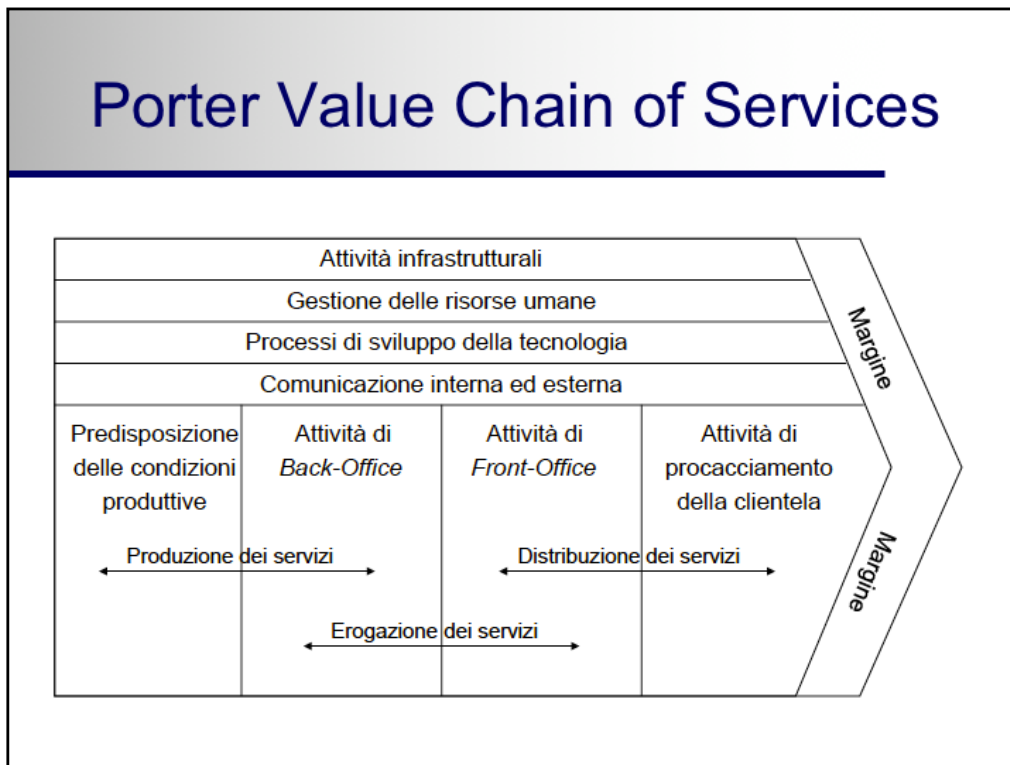
System Examples

Type	Description	Key Characteristic	Examples
Natural Systems	Biological, geological, or climatological phenomena that occur in the natural world	Constitutionally organic	Animal Earthquake Weather
Manufactured Systems	Designed creations or artifacts of living beings	Having designed subsystems defined as components, parts, or assemblies	Automobile Computer House Bee hive
Socio-technological Systems	Combination of natural and manufactured systems	Interaction elements between sociological and mechanical aspects	Business Government **Services**

Service System

- Socio-technological System
  - Any number of elements, interconnections, attributes, and stakeholders interacting to satisfy the request of a known client and create value
- Combination of natural and manufactured systems
  - **Humans, Processes, and Goods**
- Interaction elements between sociological and mechanical aspects
  - **Customization activity**
  - **Co-productive interaction between the provider and client**
  - **Economic transaction and creation of value**

Un sistema (sia industriale, sia economico, sia socio-tecnologico) include elementi, interconnessioni, attributi, e destinatari. Queste componenti possono essere rappresentate in modelli di processi con input e output, dove esiste un ciclo di feedback che definisce il coinvolgimento nel processo.

Porter Value Chain of Services

Attività infrastrutturali				
Gestione delle risorse umane				Margine
Processi di sviluppo della tecnologia				
Comunicazione interna ed esterna				
Predisposizione delle condizioni produttive	Attività di *Back-Office*	Attività di *Front-Office*	Attività di procacciamento della clientela	Margine

Produzione dei servizi ← → | Distribuzione dei servizi ← →

Erogazione dei servizi ← →

1985

si considera l'azienda come una serie di attività eseguite per progettare, produrre, vendere, consegnare e supportare determinati prodotti/servizi e in tale contesto la tecnologia dell'informazione costituisce una delle attività di supporto principali per la value chain.

I sistemi informativi svolgono un ruolo cruciale nella value chain, in quanto ogni attività di valore crea e utilizza informazioni e può influire sostanzialmente sul vantaggio competitivo dell'azienda

Model of Unified Services Theory

- The simplest form of the fundamental business operations model is that of a basic input/output process
- Sampson (2004): the primary differentiation factor between the traditional economic transaction model and the service system model is that in the service system model the customer (i.e., client or consumer) provides inputs into the process itself.
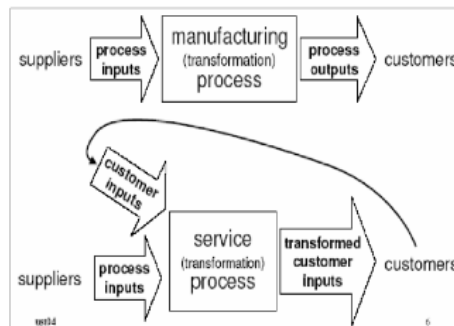
(Sampson, 2004, p. 6)

Sampson's (2004) Model of Unified Services Theory figure illustrates the difference between a traditional economic transaction model and a service engagement model. Where, a traditional economic transaction model (e.g., manufacturing process) is provided in the upper portion of the diagram, and a service engagement model (e.g., travel reservation process) is the lower portion of the diagram.

Sampson, S.E. (December, 2004). *The Unified Services Theory*. Paper presented at the 1st Production and Operations Management Society, College of Service Operations Meeting, Columbia University, New York. Retrieved March 2006, from http://www.demingcenter.com/poms/talks/Scott_Sampson.pdf
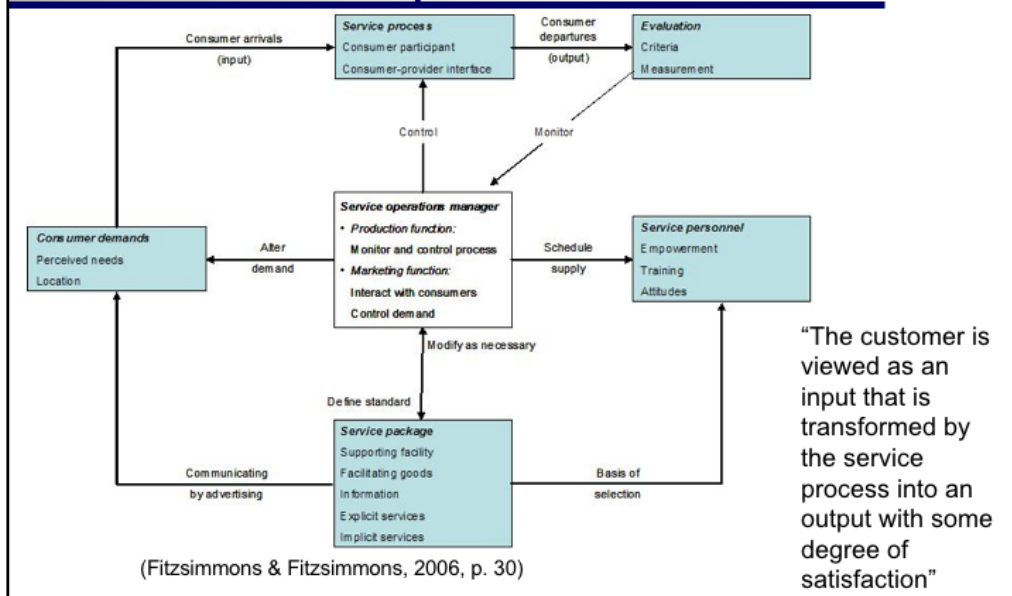
Sampson, S.E. (2001). *Understanding service businesses: Applying principles of Unified Services Theory* (2nd ed.). New York: Wiley.

Co-production

- The customer co-produces the value (or benefit) along with the service provider via ongoing interactions
- The extent of the co-production varies from
  - indicating preferences, e.g., styling preferences at a barbershop service
  - being an active pseudo temporary "employee" of the service process, e.g., collecting your order at a fast-food restaurant, or scanning your items, bagging, and paying using a supermarket self-checkout service system
- The customer as co-producer has interesting consequences; e.g., the quality of service (QoS) is typically tied to a customer's (or set of customers') perspectives and experiences

extent=estensione

Open-Systems View of Service Operations

Consumer arrivals (input) →	**Service process** Consumer participant Consumer-provider interface	Consumer departures (output) →
		Evaluation Criteria Measurement

Control | Monitor

Service operations manager
- *Production function:*
  Monitor and control process
- *Marketing function:*
  Interact with consumers
  Control demand

Consumer demands
Perceived needs
Location

Alter demand

Schedule supply

Service personnel
Empowerment
Training
Attitudes

Modify as necessary

Define standard

Service package
Supporting facility
Facilitating goods
Information
Explicit services
Implicit services

Communicating by advertising

Basis of selection

"The customer is viewed as an input that is transformed by the service process into an output with some degree of satisfaction"

(Fitzsimmons & Fitzsimmons, 2006, p. 30)

where "the customer is viewed as an input that is transformed by the service process into an output with some degree of satisfaction"

"inputs are the customers themselves, and resources are the facilitating goods, employee labor, and capital at the command of the **service manager** "
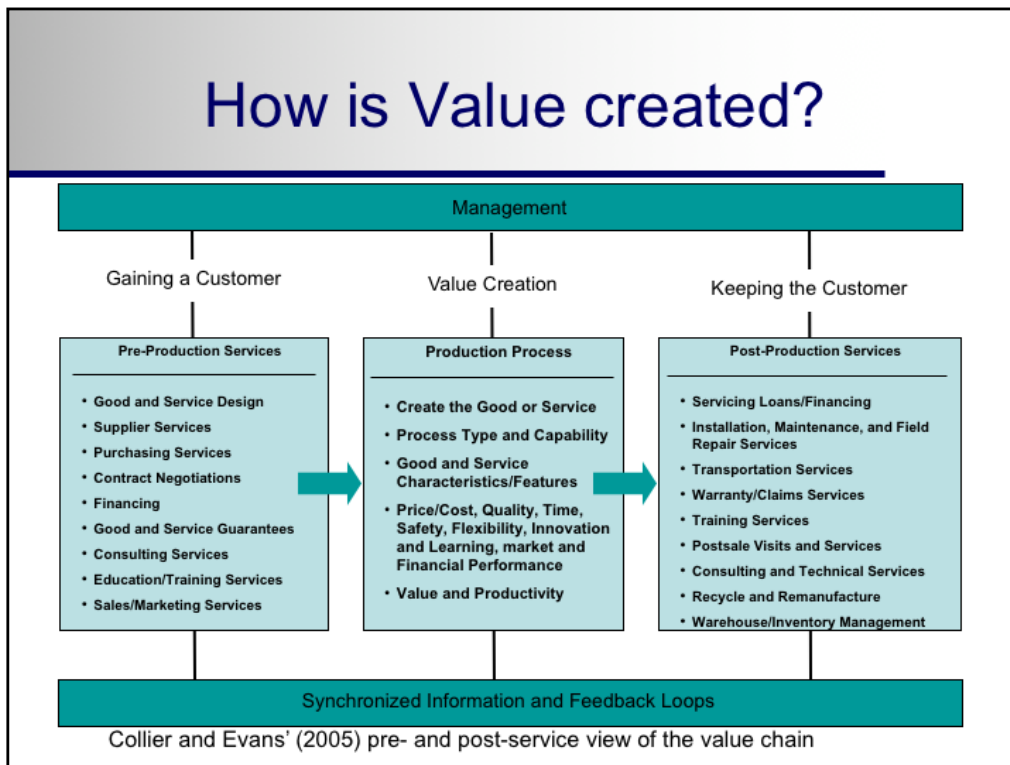
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Service-Profit Triangle

- A third model of a service system is that of Teboul (2005), which incorporates the concept of co-production of value from Sampson, and defines it through the different roles within the service process, as illustrated in the triangle
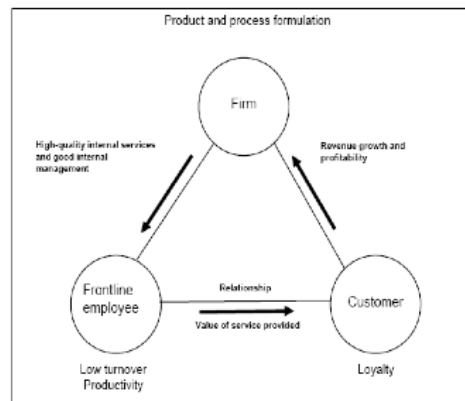
Teboul (2005) provides illustration of the concept as service triangle dynamics. Where the service engagement is often illustrated as "…the company or the firm is placed at the top of the triangle and customers and employees are placed on an equal level. Employees deliver, control and market their services, and clients take part in the production process (co-production), control and may even market the service (by word of mouth)" (p. 24).

Teboul, J. (2005). *Service is front stage: We are all in services… more or less!* Unpublished manuscript, Collège des Ingénieurs, Paris, France.

How is Value created?

Management

Gaining a Customer | Value Creation | Keeping the Customer

Pre-Production Services
- Good and Service Design
- Supplier Services
- Purchasing Services
- Contract Negotiations
- Financing
- Good and Service Guarantees
- Consulting Services
- Education/Training Services
- Sales/Marketing Services

Production Process
- Create the Good or Service
- Process Type and Capability
- Good and Service Characteristics/Features
- Price/Cost, Quality, Time, Safety, Flexibility, Innovation and Learning, market and Financial Performance
- Value and Productivity

Post-Production Services
- Servicing Loans/Financing
- Installation, Maintenance, and Field Repair Services
- Transportation Services
- Warranty/Claims Services
- Training Services
- Postsale Visits and Services
- Consulting and Technical Services
- Recycle and Remanufacture
- Warehouse/Inventory Management

Synchronized Information and Feedback Loops

Collier and Evans' (2005) pre- and post-service view of the value chain

Value is linked to value chains where success depends on decisions that impact value chain aspects of suppliers, inputs, processes, and output or outcomes. Examples of value chains are illustrated in Collier and Evans' (2005) pre- and post-service view of the value chain figure and examples of goods-producing and service-providing value chains table.

(Collier and Evans, 2005, p. 45)

[value = perceived benefits/price (cost) to the customer]

Examples of Goods and Services producing Value

Organization	Suppliers	Inputs	Transformation Process	Outputs	Customers and Market Segments
Hospital	Pharmaceutical companies Equipment suppliers Food suppliers Organ donors Medical supplies	Patients Beds Staff Drugs Diagnostic equipment Knowledge	Admissions Lab testing Doctor diagnosis Food service Surgery schedules Drug administration Rehabilitation	Healthy people Lab results Accurate bills Community health education	Heart clinics Pediatrics Emergency and trauma services Ambulatory services Medical specialties and hospital wards
Pizza restaurant	Food wholesaler Equipment suppliers High school students	Food raw materials Orders Energy Labor Equipment	Order taking Home delivery In-store service Bill payment Food production	Good pizza Happy customers Quick service	Premium pizza Home delivery In-store seating Discount market Catering and group sales
State government	Highway and building contractors Employment agencies Food suppliers Equipment suppliers Other governments	Labor Energy Information Trash Crimes Disputes Sick people Low-income people	Health care benefits Food stamps Legal services Prisons Trash removal Park services License services Police services Tax services	Good use of taxpayers monies Safety net Security Reallocate taxes Clean, safe, and fun parks	Disabled people Low-income people Criminals and prisons Corporate taxes Boat licenses Building inspections Weekend vacationers Child custody services Legal court services

Collier and Evans' (2005) pre- and post-service view of the value chain
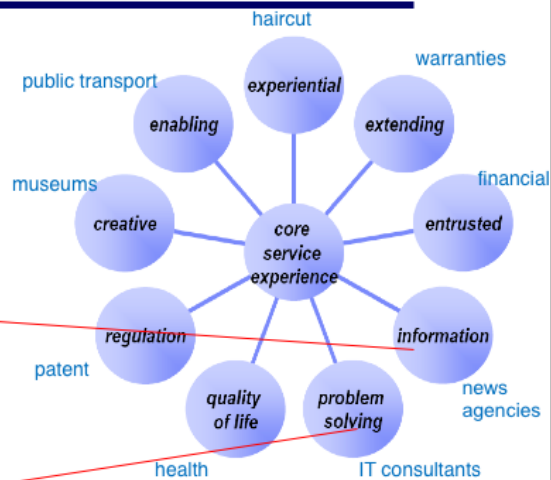
Characteristics of emerging Services

Example Emerging Services	Service Systems Engineering Characteristics			
	Information-Driven	Customer-Centric	E-Oriented	Productivity-Focused
Wholesale & Retail: Mass Customization	X	X	X	X
Business & Professional: "Early Warning" System	X			X
Education: Internet-Based Distance Learning	X	X	X	X
Government: Crime "Hot Spots"	X			X
Health Care: Medical Triaging	X	X	X	X
Finance, Insurance & Real Estate: Internet-Based Auctions	X	X	X	X
Transportation: Airline Passenger Screening	X	X		X
Communications: Real-Time Routing	X	X		X

Tien & Berg 2003 Service Systems Engineering: Characteristics of Example Services

Tien & Berg 2003 Service Systems Engineering: Characteristics of Example Services

Typology of Service Values

- The figure illustrates a range of possible values produced by different types of services, according to the theory of Bryson, Daniels, and Warf (2004)
- For example, the **Information** value is produced by services such as news agencies, search engines, data mining services, broadcasting; the value **Problem solving**, from professional consulting services etc.

Diagram labels: haircut, warranties, public transport, experiential, enabling, extending, museums, creative, financial, entrusted, core service experience, regulation, information, patent, quality of life, problem solving, news agencies, health, IT consultants

Bryson, J.R., Daniels, P.W., & Warf, B. (2004). *Service worlds: People, organizations, technologies.* New York: Routledge.

 I nuovi servizi sarebbero creativi, abilitanti, esperienziali, estendibili (estendere la vita di un prodotto), basati sulla fiducia, con un elevato contenuto

informativo, innovativi, in grado di risolvere problemi emergenti, permettono miglioramento qualità della vita, assicurano regolamentazione

Summary

- A service system is considered to be an **open-system** in which the client provides input into the service process
- The client as a provider of direct input into the system creates a co-productive relationship with the service provider
- Disruptions to the service system can result from rigidity or imbalances in the system
- However, if the service system retains an acceptable degree of balance, value in the form of **quality of life, security,** or **prosperity** is achieved for both the client and provider

3° Service Productivity

Misure, 4 principali (qualità, produttività, conformità e innovazione sostenibile) vd. Libro Cinquini

Services and productivity

- Think about these questions:
  - Is service productivity an oxymoron?
  - Can service productivity be measured?
  - What are some relationships between innovation and productivity?

Service Productivity

- What is productivity?
  - Measure of economic efficiency which shows how effectively economic inputs are converted into output
  - Ability to produce more goods and services with the same or less input (time/person)
- How to check if producing goods experience is also applicable to services?

Services Paradox

- Economy is increasingly moving towards services, ma if productivity growth in services is inherently sluggish, economic growth must inevitably slow?
- But productivity in services is up …

Intrinsecamente lenta

Baumol's Disease

- In 1967, the economist William Baumol argued that most services were, by their nature, labor-intensive. Indeed, the perceived quality in service industries often depends on how much labor is involved : *"Even after 300 years it still takes four musicians to play a string quartet"*

- Therefore, according to Baumol, for structural reasons related to the type of technological progress there is a slow growth in the productivity of services, and therefore a slow growth of the economy ("Baumol's disease")

Frase di Baumol 1967 per motivi strutturali legati alla tipologia di progresso tecnologico di questi settori, la produttività cresce ad un ritmo minore.

Measuring Productivity

- Historically labor productivity was calculated to be the ratio of output per unit of labor input (persons or hours):

Labor productivity = (Output / Labor input*)

*Where labor input = people or hours

- A measurement exists for multi factor productivity (MFP) which is calculated as the output per unit of input (with input expanded to include labor, purchased inputs and forms of capital)

Multi-factor productivity = (Output / Labor input)**

**Where labor input = expanded to include multiple forms

Inputs in Services

Evolution of labor input by macro-sector: employed and hours worked - years 2008-2017
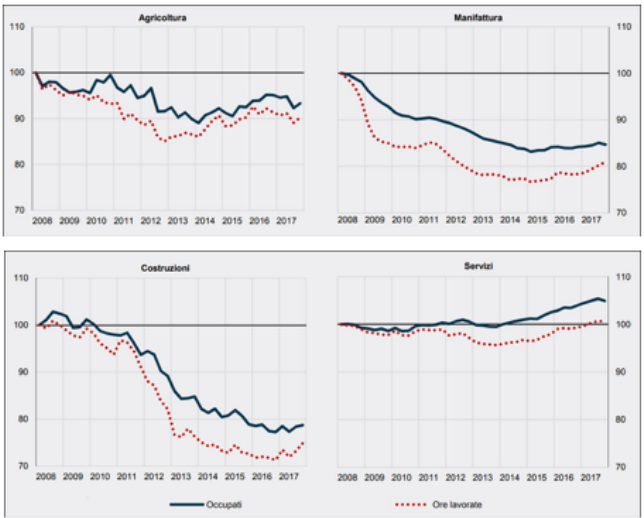
Measuring Services is a Challenge

- A challenge is to apply formulas of manifacturing industry to services productivity, especially taking into account that one of the determining factors of the services growth is **knowledge**
- A second challenge is to create a service **measurement model** that takes into account numerous indicators, many of which are intangible
- Productivity is different from efficiency, the latter is related to cost reduction
- Examples of productivity outputs:
  - Sales revenue
  - Projects completed
  - Hour of training completed
  - New products developed

Triplett-Bosworth: Productivity in Services

- In 2004 two Brookings Institution economists, Jack E. Triplett and Barry P. Bosworth, pointed out how most of the post-1996 growth in productivity has come in services, and that *"IT may just be the cure for Baumol's disease"*
- They found that 24 out of the 29 service industries they studied exhibited growth in labor productivity after 1995, the service industries where overall productivity did not grow were hotels, health, education and entertainment
- The contribution of IT was therefore decisive in reviving the services productivity
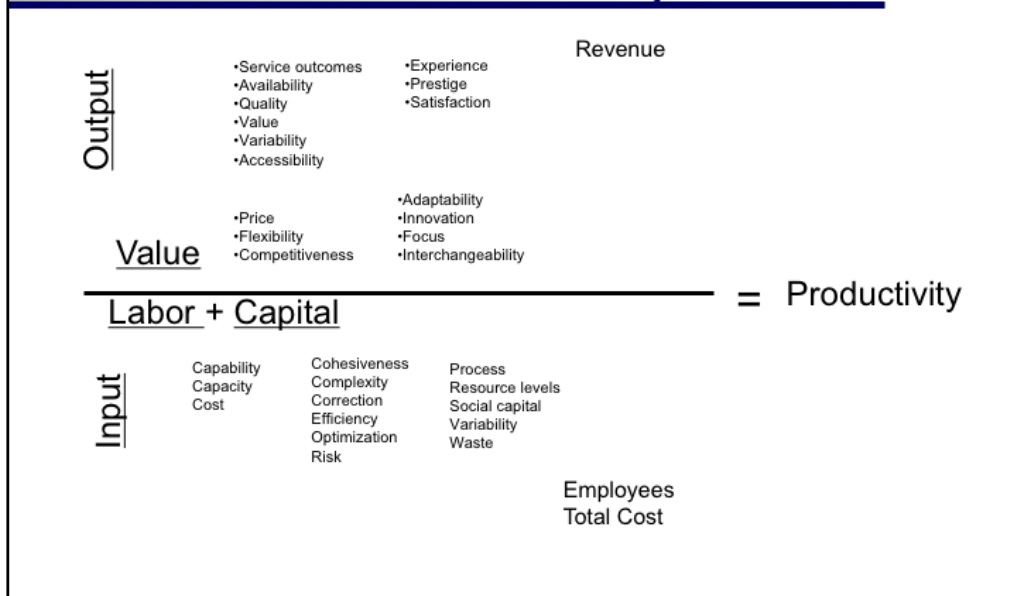
(fonti: Triplett, J.E. and Bosworth, B., (2004) Productivity in the U.S. Services Sector, New Sources of Economic Growth, Washington D.C., USA: Brookings Institution Press; Varian, (2004), Information Technology May Have Cured Low Service-Sector Productivity, New York Times)

Tra il 1995 e 2001 la produttività nei servizi è cresciuta di un 2,6% a fronte del 2,3% dei beni
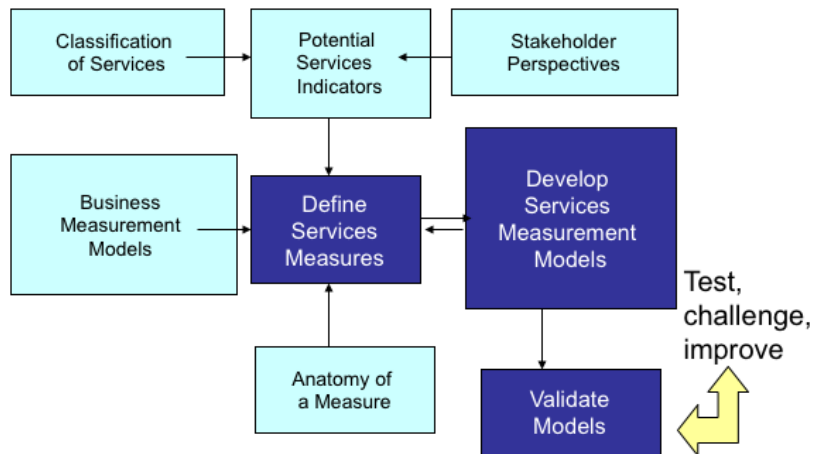
Diagramma

La misurazione delle imprese di servizi si concentra sul concetto di produttività, definito nel senso più ampio possibile (output / input)

Quasi tutte le misure di servizi hanno un impatto sul numeratore di produttività e / o sul denominatore. Le domande chiave per la misurazione della scienza dei servizi riguardano l'impatto di misure specifiche e le loro interdipendenze.

Examples of indicators

Services -- Software Providers – Key Indicators (Example Companies) and Metrics:

- Quality (Model: Monster.com, eBay)
    - Reliability
    - Performance
    - Ease of Use
    - Brand Perception
    - # of Active Users
- Innovation (Model: Google – Ad Service)
    - Novelty (Sony, Microsoft with Online Video Game Networks)
    - Market Share Growth
    - Market Share secured from competitors
- Complexity (Model: Webex –teleconferencing services)
    - Barriers to entry
    - Market Share
    - Brand Perception

Innovation and Productivity

- What can we learn from manufacturing?
  - Producers of goods have reorganized to reduce costs, improve quality and increase adaptability to changing markets
  - Some service sector firms have adapted innovative work practices from manufacturing
  - But if services emulate manufacturing models limit their innovation opportunities
  - New models need…

Engineering Model versus Interpretive Model

Engineering model
- Product design comes before process design
- Process predictable, repeatable
- Some key dimensions: product conformance, production cost, speed and variety

Interpretive model (Hertzenberg et al. 1998)
- Takes as problematic what engineering takes as given (product and production process)
- Workers develop skills in understanding customer wants and needs, they translate those into services they provide
- Process continuously adapts to the customer

(Herzenberg, S.A., Alic, J.A., Wial, H., (1998), New Rules for a New Economy, Employment and Opportunity in Postindustrial America)

The two Models

Engineering model	Interpretive model
Design comes before process	Product and process intertwined, Product design emerges from the process, not specified in advance
Workers execute tasks	Workers interpret needs and execute tasks
Improvements come from changes to design or process	Improvements follow from improving worker's ability to elicit and interpret, respond to the situation to select work practices from repertoire or learn or invent new services

Differences of Services with Goods Design

- In services, there is always a need for judgment (subjective aspect)
- Often the attributes of a service may be inseparable from the process of production (like a restaurant)
- Product design is often part of the production process
- Indeed, some services vary too much with the situation
- These differences do not permit the application of the engineering model to service design

Conclusions of Services Productivity

Hertzenberg points out that to improve performance and service measurement **we can not apply methods that worked in manufacturing** (no engineering model)

On this same position are other approaches to the study of the services productivity, e.g.:

- Not only the specificities and differences of services with goods, but also the service activities associated with the production of goods are important -> Servitization
- Role of knowledge in services (KIBS knowledge-intensive business services - Ian Miles)

(Gadrey, J. and Gallouj, F., (2002) *Productivity, Innovation and Knowledge in Services, New Economic and Socio-Economic Approaches,* Cheltenham, UK: Edward Elgar)

KIBS and Productivity

- What is the output of a knowledge worker?
  - It cannot be measured only in lines of code
  - A distinction must be made between **output**, what one creates, and **outcome**, which is the added value of a knowledge worker
  - The formula becomes:

Productivity = outcome / input

"The most important contribution management needs to make in the 21st century is to increase the productivity of KNOWLEDGE WORK and the KNOWLEDGE WORKER." (Peter Drucker, 1982)