Bocconi

MASAN

OBSERVATORY OF PROCUREMENT AND CONTRACT MANAGEMENT IN THE HEALTHCARE SECTOR

From CapEx to Outcomes:

A Framework for Navigating Health Partnerships in Europe

Veronica Vecchi, Ludovica Mager, Niccolò Cusumano

February 2025

Università Bocconi
CERGAS
Centro di ricerche sulla Gestione dell'Assistenza Sanitaria e Sociale

SDA Bocconi
SCHOOL OF MANAGEMENT
MASAN - OSSERVATORIO SUL MANAGEMENT DEGLI ACQUISTI E DEI CONTRATTI IN SANITÀ

Index

1. Introduction 1
1.1. EU context 1
1.2. The Role of Partnerships 3
2. Healthcare public-private collaborations at meso level: blended finance, research programs and payment schemes. 5
3. Healthcare public-private collaborations at micro level 8
3.1. Overview 8
3.2. PPP for Hospital Buildings 9
3.3. PPP for Fully Fledged Clinics and Long-term Care 10
3.4. PPP for Equipment and Technology-based Services/Solutions 11
4. Value based contracts for medical device 14
4.1. ESTAR - Italy 16
4.2. Other Experiences in Europe 18
5. Concluding Remarks 20
Bibliography 22

1. Introduction

1.1. EU context

The healthcare sector, besides its fundamental role in ensuring the well-being of people, is also relevant from an economic point of view.

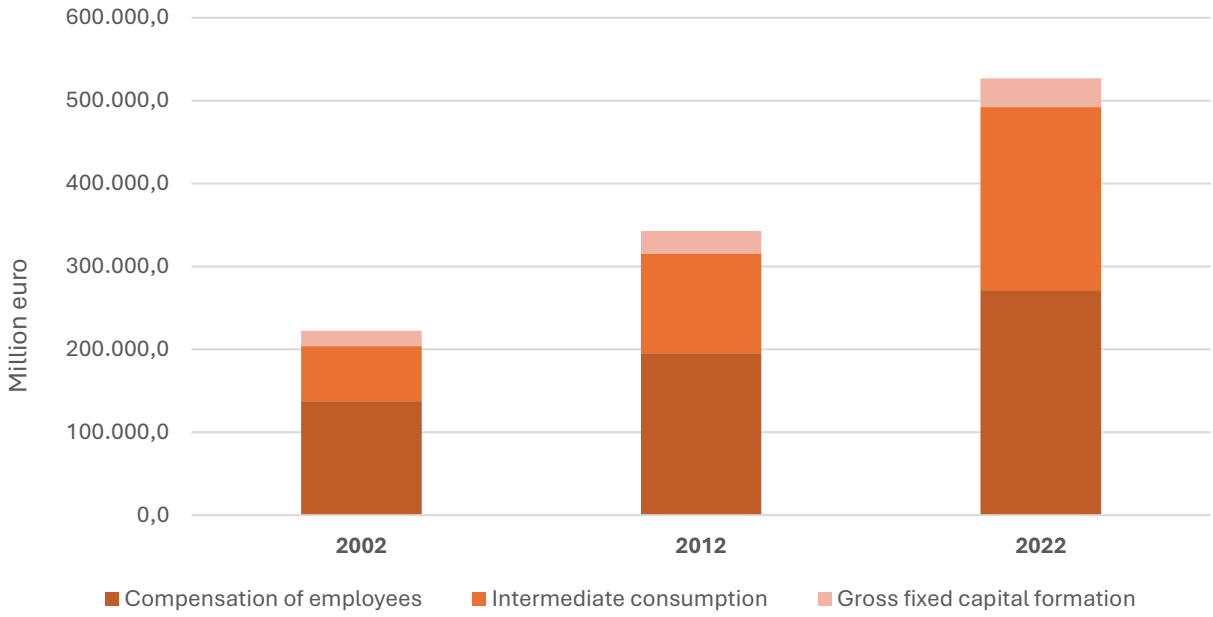
In the early 2000s and up until the great financial crisis of 2008, the growth of the European healthcare sector outpaced the rest of the economy[1]. In the following decade, the healthcare sector aligned to the dynamics of the overall economy. Still, over the last twenty years, public expenditure in healthcare, besides few exceptions (Italy, Hungary and Slovakia), had always outpaced the growth of total government expenditure[2].

Rising healthcare costs are often associated with (i) rising incomes, both at individual and societal level (when societies get richer, they may indulge unhealthy lifestyles, such as smoking, limited physical activity, or bad dietary habits); (ii) ageing, which brings an evolution of the prevalence of disability and chronic diseases; (iii) the introduction of innovative medical technologies; (iv) and more recently the adverse impacts of climate change[3] (European Commission, 2024[4]; Okunade & Osmani, 2018). Growing costs are not compensated by higher productivity because of the nature of health services, under the so called "Baumol disease"; production processes in healthcare are inconsistent with standardization and it is difficult to reduce the labor content (Baumol, 1993; Baumol et al., 2012).

If we disaggregate public healthcare expenditure for direct provision (thus, excluding "social benefits", i.e. provision through social insurance assistance), in 2022 the so-called intermediate consumption, i.e., the purchase of goods and services – which are associated with procurement -, represented 42% the total expenditure, with an increase of 30% from 2002 and almost equaling personnel cost (see **Figure 1**).

[1] According to Eurostat the healthcare sector outgrew the general economy by 15% in terms of value added measured at current prices from 2002 to 2012 and 1% from 2012 to 2022.
[2] According to Eurostat general government expenditure for healthcare outgrew total expenditure by 8% from 2002 to 2012 and 12% from 2012 to 2022.
[3] direct, effects include death or injuries due to extreme weather events, additional, indirect, effects from climate change, notably related to the induced gradual transformation of the environment, range from temperature-related illnesses, mental health effects, water stress, air pollution and vector-borne diseases.
[4] Pag. 66-74

Figure 1. Public healthcare expenditure component (Europe)



Source: Eurostat

What a country spends on healthcare does not necessarily translate into a healthier population and existing evidence does not show a strong correlation between spending and outcomes (Lippi et al., 2016; Nixon & Ulmann, 2006). Still, EU countries experienced a 25% decrease in so-called amenable deaths due to healthcare[5] between 1999 and 2016, proving the effectiveness of healthcare systems (Costa & Santana, 2021). It is interesting to notice that, in the aftermath of global financial crisis, 17 out of 26 EU countries experienced a brief reversal of their achievements and witnessed a worsening of health conditions. Costa & Santana (2021) argue that this may be due to a decrease in public spending that caused barriers to care access and an increase in waiting times, leading to a deterioration in health services with the greatest impact on the least educated, financially and materially disadvantaged people. This is an important reminder about the importance of long-term sustainability of healthcare systems.

ccording to the European Commission, healthcare expenditure is projected to increase by approximately 0.4 percentage points of GDP by 2070 compared to 2022, thereby raising healthcare expenditure from 6.9% to 7.3% of GDP in purchasing power parity (European Commission, 2024)[6]. While this may appear to be a small and manageable increase, it is important to consider that by 2070, there will be 35 million more individuals aged 65 and over compared to 2023 (see **Figure 2**)

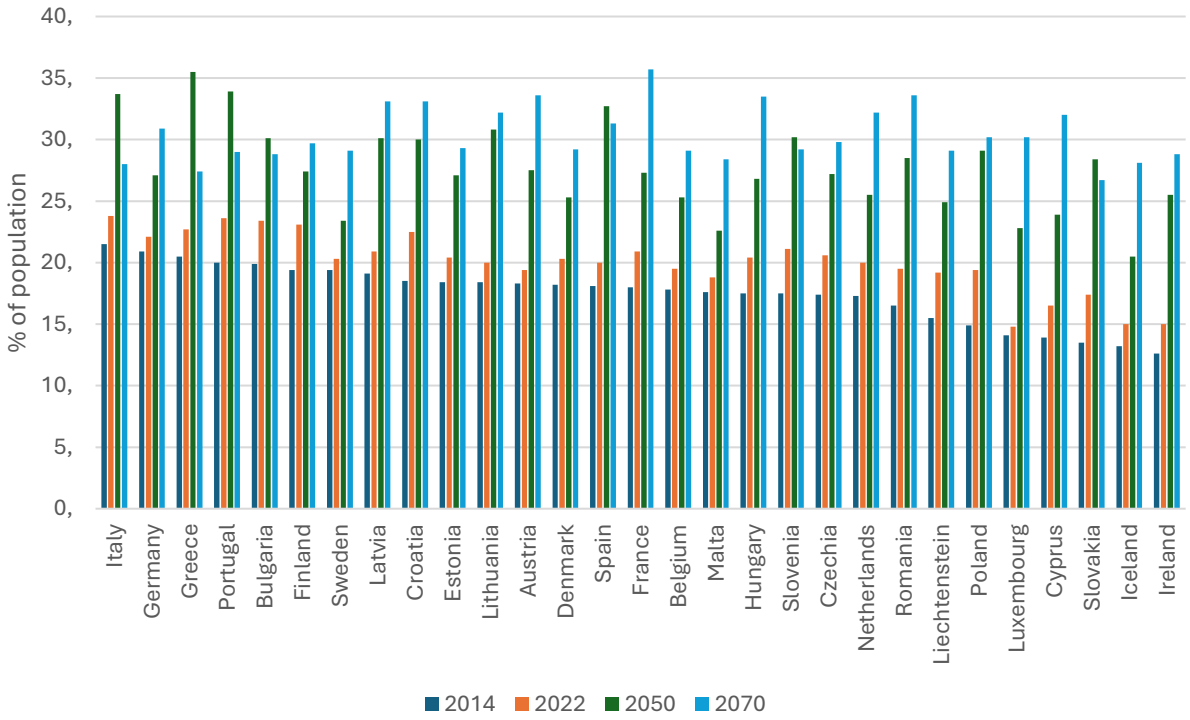
Therefore, it is essential for healthcare systems across the EU to explore new methods for disease prevention and treatment while enhancing their productivity. A shift towards 'spending better' by

[5] avoidable mortality are deaths that, «in the light of medical knowledge and technology or in the light of understanding of the determinants of health at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided through good quality healthcare or by public health interventions in the broadest sense» (EUROSTAT, 2014, p. 1)

[6] Pag. 87

adopting technological and organizational solutions that effectively address increasing healthcare demands seems to be key. In this context, procurement can play a crucial role in improving the quality and effectiveness of healthcare spending, particularly when it employs a more strategic approach based on collaborative relationships with contractors and the adoption of integrated, service-based solutions (Vecchi et al., 2020a).

Figure 2. Share of people aged 65 years-old and older



Source: Eurostat

1.2. The Role of Partnerships

In the healthcare sector, Public-Private Partnerships (PPPs) are often cited as a key strategic approach, particularly in an era where public value—of which healthcare is a fundamental component—is increasingly created through collaboration between the public and private sectors (Crosby et al., 2017; Thabit et al., 2024). The term PPP encompasses various forms of public-private interactions, which have evolved significantly over time and across different jurisdictions (Bovaird, 2004).

In this chapter, we adopt the framework described in (Vecchi et al., 2022a), which analyzes public-private collaborations according to the institutional level (*macro, meso, or micro*) at which they occur. Building on this framework, this chapter explores these partnerships in Europe, with a focus on the meso and micro level. These partnerships are the most likely to play a critical role in healthcare, by optimizing resource use and enhancing efficiency, driving innovation in service delivery, expanding access, and improving quality. PPPs are particularly relevant and pertinent in public healthcare systems with a wide network of public hospitals, where budgetary constraints and

strict procurement procedures often hinder the ability to implement more sophisticated contracts aimed at "*spending better*" and generating societal value (see **Box 1**).

Partnerships at the meso level encompass large supranational, national, or regional programs, often structured with a co-financing approach and involving multiple stakeholders. These partnerships are examined in **Section 2.** Partnerships at the micro level focus on local projects—typically at the hospital level—related to capital assets and the delivery of both core and non-core services. They are analysed in **Section 3**. A more advanced form of micro-level partnership is value-based contracting. Thet are discussed in **Section 4**.

At the macro level, the collaboration between the private and public sectors can be informal or based on memorandum of understandings (MOU) and relies on the convergence of common interests and objectives towards shared public value. In the healthcare sector, this convergence is intrinsic: competitive strategies (i.e., private interests) pursued by market players focus on developing solutions that can enhance the effectiveness, efficiency, and equity of health service delivery (i.e., the public interest). The concepts of shared value creation (Porter & Kramer, 2011) and value-based healthcare (Porter & Teiseberg, 2006), both popularized in the *Harvard Business Review* by Professor Michael Porter and colleagues, have profoundly influenced lobbying efforts in Europe to promote a new approach to healthcare, including public procurement. This public-private convergence is at the core of impact investing, an investment approach that is also growing in Europe. Impact investing directs capital toward initiatives that generate measurable additionality with intentionality and financial returns without compromise. While impact investing spans multiple asset classes—including public and private debt, equity, and real assets— a key mechanism for fostering private sector commitment to healthcare goals is venture capital.

Box 1. Brief overview of healthcare systems in Europe: Beveridge and Bismarck models

Healthcare systems across Europe vary widely, as each country has developed its own approach based on historical, cultural, and economic factors. Healthcare financing is almost universally government-managed, either directly through tax revenues (the Beveridge model) or semi-directly through mandated, managed, and government-subsidized social health insurance (the Bismarck model) (Gaeta et al., 2017; Jakubowski & Busse, 1998; Kozun-Cieslak & Zdrazil, 2021; Montagu, 2021). Supplemental private insurance is common in some countries (e.g., Belgium, the Netherlands, Slovenia) but not in others (e.g., France, Norway), and out-of-pocket expenses are generally limited to less than 20% of total healthcare costs, though this varies by country.

From a healthcare services delivery perspective, private providers and hospitals are typically reimbursed by national health insurance systems or tightly regulated social health insurance schemes (Montagu, 2021). With the rising prevalence of chronic diseases and restricted public budgets, private insurance and private clinics are playing an increasingly important role in managing long waiting times due to centralized budget constraints.

In understanding PPPs in Europe, the public or private ownership status of hospitals is key. According to Montagu's 2021 analysis (Montagu, 2021), the situation is as follows:

- In countries such as Belgium, Germany, Norway, and Switzerland, the majority of hospitals are private;

- In countries like Denmark, Iceland, Ireland, Lithuania, Slovenia, Sweden, and the UK, hospitals are predominantly public;
- Mixed delivery systems are found in Austria, France, Italy, Portugal, and Spain, where public and private hospitals are relatively balanced; in countries such as Czechia, Estonia, Finland, Latvia, Hungary, and Poland, there are more public hospitals than private ones.

2. Healthcare public-private collaborations at meso level: blended finance, research programs and payment schemes.

At the meso level, collaboration between the public and private sectors takes the form of institutions (e.g., promotional banks, mixed companies) or programs. Such programs are quite salient in the healthcare space typically take one of the following four forms.

1. **Blended finance initiatives**. Often supported by national promotional banks, they are designed to provide equity, debt or guarantees for start-ups facing challenges in accessing capital markets. These programs are essential in the healthcare sector, where start-ups—including those led by impact-driven entrepreneurs—play a pivotal role in fostering innovation and addressing pressing healthcare needs (see **Example 1** on the debt financing provided by the European Investment Bank (EIB) to support the development and manufacturing of Covid-19 vaccines during the pandemic).

2. **Public-private research frameworks or programs.** They are fostered by major public institutions, such as the European Commission, which has been one of the largest donors supporting cutting-edge research. These partnerships are primarily based on co-financing schemes, where the EU budget provides grants that can cover up to 100% of research and innovation expenses of public and not for profit research organizations. Such programs often involve industry participation, bringing valuable assets into the research network through in-kind contributions (see **Example 2**).

3. **Global partnerships**. They are mainly financed through corporate philanthropic budgets, they are based on agreements between international organizations and foundation, large corporations, local players and they are devoted to providing access to healthcare, vaccines, medicine etc.

4. **Managed Entry Agreements (MEAs)**. These are contractual arrangements between pharmaceutical manufacturers and drug regulators concerning the pricing and reimbursement of high-cost, innovative drugs. Their aim is to facilitate market entry and patient access while managing uncertainty regarding clinical effectiveness and financial costs. MEAs are widely used across Europe (**Example 3**), and they can operate at the national (e.g., AIFA in Italy, NHS England, CEPS in France), regional (e.g., Spain and Germany), or local level (e.g., the Netherlands and Sweden, where hospitals or health insurers directly negotiate MEAs). Under MEAs, payments for drugs can either be (i) finance-based, which include price discounts, budget caps, or cost-sharing mechanisms to help controlling budget impact,

especially when clinical effectiveness and treatment use are uncertain at launch; or (ii) outcome-based, when reimbursement is tied to the achievement of specific health outcomes, thus ensuring value-based payments to manufacturers (Dabbous et al., 2020; Greco et al., 2025; Thanimalai et al., 2021).

Example 1. EIB's debt financing to support the development and manufacturing of COVID-19 vaccines.

During the pandemic, the European Investment Bank (EIB), in collaboration with the European Commission, supported the development, manufacturing and distribution of COVID-19 vaccines primarily through debt financing agreements with private sector companies, such as CureVac and BioNTech.

In the case of BioNTech, in June 2020, the EIB signed a €100 million agreement with the company to aid the development of its mRNA vaccine. Moreover, the agreement helped BioNTech to conduct clinical trials and expand its manufacturing capacity to supply vaccines fast worldwide. The funding was disbursed in two tranches of €50 million each, following completion of pre-defined milestones, such as positive trial results.

The EIB's venture debt instrument was backed by the European Fund for Strategic Investments, the financial heart of the Investment Plan for Europe, and it also benefitted from InnovFin Risk Sharing for Corporate Research Facility and the InnovFin Infectious Diseases Finance Facility (IDFF), backed by Horizon 2020 - the EU Framework Programme for Research and Innovation.

These are typical blended finace solutions, where the EIB group can finance, with debt or equity, risky innovative projects thanks to the guarantee provided by the European Commission budget.

Example 2. EU research partnership – based programmes

The Innovative Medicines Initiative (IMI) & Innovative Health Initiative (IHI)

One of the most significant examples of a program-based partnership in the healthcare sector is the Innovative Medicines Initiative (IMI). Launched in 2008, IMI was established as a collaboration between the EU and the European Federation of Pharmaceutical Industries and Associations (EFPIA) to accelerate the development of innovative medicines, particularly in areas of high unmet medical need. Over the years, IMI supported nearly 200 research projects, engaging a broad range of stakeholders, including universities, large and small enterprises, patient organizations, and regulatory bodies. The initiative successfully facilitated groundbreaking advancements in drug development and biomedical research, addressing key challenges such as antimicrobial resistance, neurodegenerative diseases, and personalized medicine. Building upon the results of IMI, the EU launched the Innovative Health Initiative (IHI) in 2021, aiming to foster broader cross-sectoral partnerships and enhance Europe's ability to respond to emerging health challenges. Unlike IMI, which primarily focused on pharmaceuticals, IHI integrates diverse healthcare sectors, including medical technologies, biotechnology, and digital health solutions. IHI operates with a total budget of €2.4 billion for 2021–2027, structured as follows: €1.2 billion from the EU budget, allocated through Horizon Europe, €1 billion from industry partners, MedTech Europe, Vaccines Europe, and

EuropaBio, €200 million from additional life science industries and associations. The contribution from industry partners can be committed in cash or in kind. Private organization with a turnover more than €500 million are not eligibile.

The initiative follows the well-established EU funding model, wherein calls for proposals are issued, allowing consortia of European and international partners to apply for research grants. Industry contributions can be provided in cash or in-kind, further reinforcing the collaborative nature of the program.

Horizon Europe: The EU's Flagship Research and Innovation Program

Both IMI and IHI are embedded within the broader framework of Horizon Europe, the EU's primary research and innovation program, which runs from 2021 to 2027. With a total budget of €95.5 billion, Horizon Europe represents one of the largest publicly funded research programs worldwide. The program specifically commit € 8.24 billion to health, but funding is also available under other parts of the program dedicated in promoting new digital and industrial technologies, and further resources managed by the European Technology Institute (EIT health for instance has a budget of more than €200 million).

EU4Health: Strengthening Europe's Health Resilience

Complementing Horizon Europe, the EU4Health program (2021–2027) was launched with a budget of €4.4 billion, making it the EU's largest-ever standalone health program. Designed in response to lessons learned from the COVID-19 pandemic, EU4Health aims to: enhance EU preparedness for cross-border health threats, support the implementation of the EU Beating Cancer Plan, Advance the Pharmaceutical Strategy for Europe. EU4Health primarily supports public and private research institutions, with grants covering up to 60% of eligible expenses. The program funds initiatives aimed at improving health infrastructure, strengthening disease prevention, and fostering international collaboration. For example, at the time of writing, one of its active calls focuses on EU-USA cooperation on lung cancer research, with a dedicated budget of €500,000.

Example 3. AIFA's MEA for Nusinersen - Italy

Nusinersen is an antisense oligonucleotide approved for the treatment of spinal muscular atrophy (SMA), a rare and often fatal neuromuscular disorder. Given the therapy's high cost and the limited clinical data available at the time of its introduction, the Italian Medicines Agency (AIFA) established an outcomes-based MEA with the manufacturer to facilitate patient access while addressing financial and clinical uncertainties (Facey et al., 2021). Under the MEA framework, reimbursement was contingent upon the collection of real-world data to confirm its effectiveness in the Italian patient population. AIFA utilized its national web-based registry system to monitor patient outcomes systematically. This approach ensured that only patients demonstrating a positive clinical response continued to receive treatment, thereby optimizing resource allocation and ensuring that the therapy delivered value commensurate with its cost. The implementation of this MEA highlighted several key benefits (Facey et al., 2021):

- **enhanced data collection**: the systematic gathering of real-world evidence through AIFA's registry provided robust data on Nusinersen's effectiveness, informing future clinical, pricing and reimbursement decisions;
- **financial risk mitigation**: by linking reimbursement to patient outcomes, the agreement protected the healthcare system from potential financial risks associated with uncertain therapeutic benefits;
- **timely patient access**: the MEA facilitated expedited access to a critical therapy for patients with a debilitating condition, balancing the need for prompt treatment with fiscal responsibility.

3. Healthcare public-private collaborations at micro level

3.1. Overview

At the micro level, the collaboration between the private and the public sector can manifest through different arrangements, depending on the object of the collaboration itself. Such arrangements are much more salient in the Beveridge system due to their budget contraints.

PPP in the healthcare sector have been primarily referred to arrangements for building or renovating the hospital network. This approach, also known as the accommodation model (Barlow et al., 2013), that in the Anglo-Saxon countries was conceived as a policy, was introduced under the New Public Management reforms to finance large investments in context of fiscal pressure. Soon, it was adopted in Europe, including in France, Spain, Portugal and Italy and later in Africa, Latin America and Eastern Europe. The approach was also expanded to medical equipment, within the so-called MES – managed equipment services – contracts.

Today, PPPs play a potentially crucial role in service delivery, covering everything from clinical and complementary health services (e.g. diagnostic services) to ancillary non-clinical services.

In the European context, the European Commission's 2004 *Green Book on PPP* defines a PPP as a long-term contract that involves substantial private capital investment, performance-based payments, and a corresponding allocation of risk to private investors (European Commission, 2004). From a legal perspective, two frameworks apply in Europe: a procurement contract (EU Directive No. 24/2014) or a concession contract (EU Directive No. 23/2014). The primary difference between a concession and a procurement contract lies in the allocation of "operating risk" to the private counterpart (Vecchi et al., 2021)[7]. This is the risk that the economic operator may not recoup the investment or costs associated with a particular contract.

[7] The operating risk is defined by Considerandum 18 of the EU Directive (24/2014). *The main feature of a concession, the right to exploit the works or services, always implies the transfer to the concessionaire of an operating risk of economic nature involving the possibility that it will not recoup the investments made and the costs incurred in operating the works or services awarded under normal operating conditions even if a part of the risk remains with the contracting authority or contracting entity. [..] it should be made clear that certain arrangements which are exclusively remunerated by a contracting authority or a contracting entity should*

Therefore, from a purely legal perspective, a PPP contract is based on the concession's legal framework since the risk transfers from the public authority to the private operator is a founding principle of PPP.

At the project level, we are also witnessing the emergence of value-based contracts, where healthcare payers / buyers pay providers of treatments or suppliers of technologies (devices and/or pharmaceuticals) based on the achievement of defined outcomes, transferring some of the clinical risks. Payments are usually linked to metrics, such as reduction in hospital stays, or readmissions at 30 or 60 days, or the occurrence of complications. Such arrangements are often referred to bundled or capitary payments. From a pure procurement perspective, they imply the shift from the purchase of goods to the purchase of solutions, with the allocation of more responsibilities onto the providers.

3.2. PPP for Hospital Buildings

At the very beginning, PPP for hospital buildings has been mainly used in the form of DBFMO, following the Anglo-Saxon experience, where a special purpose vehicle was in charge of the design (D), building (B), financing (F), maintenance (M) and operation (O) of a wide array of non-core services. More recently, the trend is to make DBFMO contracts "lighter" by exclusively including non-core "hard" services that directly relate to the availability of the facility (i.e., maintenance and energy management). Non-core "soft" services, such as catering and laundry, are instead left out of the contract (Vecchi et al., 2018). In such contracts, the public hospital pays a fee based on the achievement of certain availability indicators (it is called availability charge or fee).

Besides Anglo-Saxon countries, the DBFM(O) model has been adopted by European countries, such as Italy, France, Sweden, Spain and Portugal (Vecchi et al., 2020b) – see **Box 2** on PPP with the Italian context.

For government one advantage of such PPP is represented by the possibility to account off-balance the capital expenditures associated to the investment project. Therefore, such PPP contracts are governed by strict rules set by the European Commission (namely through Eurostat), ensuring proper accounting for availability charges paid by public authorities. While these rules are complex, they revolve around the concept of risk and reward. A contract can be recorded off the public balance sheet only if there is clear and sufficient allocation of construction, availability, and/or demand risks (the latter is rare in the healthcare sector) and if public grants do not exceed 50% of the total capital expenditure.

Box 2. PPP in the Italian context

Italy has widely used PPP for hospital building and renovation. The case is interesting, because since its introduction in the 2000s, PPP has evolved significantly. Initially, PPPs were implemented driven by macroeconomic reasons, mainly to supplement scarce public funds. Although national regulations did not sufficiently incentivize or ensure adequate risk allocation to private

qualify as concessions where the recoupment of the investments and costs incurred by the operator for executing the work or providing the service depends on the actual demand for or the supply of the service or asset

concessionaires, these contracts have achieved better performance than traditional procurement methods, especially in terms of on-time and on-budget delivery (Vecchi et al., 2022b) .

Thereafter, a more streamlined model (PPP light) was adopted to increase flexibility in PPP contracts, allowing non-core services to be procured separately through centralized framework agreements, which became a compulsory option starting from 2014, and making investment remuneration contingent on the payment of an availability charge. Although this model has made PPPs a more sustainable option for public healthcare budgets, traditional procurement is still often preferred to avoid mid-term budget rigidity.

When they must make a choice, decision-makers often overlook factors like intergenerational equity and the likelihood of project success. Intergenerational equity reflects the principle that those who benefit from an investment should contribute to its cost through general taxation. The likelihood of achievement considers the bias in public authorities, who tend to favor traditional procurement as it appears less costly upfront, without accounting for potential delays – and therefore social costs, due to budget constraints.

Consequently, a PPP assessment based solely on a value-for-money approach has led to unsuccessful results and mistakes. On the one hand, value-for-money assessments based on risk transfer pricing may be skewed to favor any preferred solution. On the other, this theoretical comparison overlooks the reality that, considering budget constraints, the traditional option might not be viable *de facto*.

3.3. PPP for Fully Fledged Clinics and Long-term Care

In Europe, there are also examples of the so called “clinic model” by involving the private sector in the delivery of clinic services (Acerete et al., 2012). In such contracts, the private player takes full responsibility for the design, finance, and building of the hospital and the operation of both clinical and non-clinical services and retains, partially or fully, the demand risk. The source of revenues for the private operator might be a capitation fee (e.g., for the Alzira hospital in Spain), a fee for clinical services rendered (based for example on DRGs - Diagnosis-Related Groups) or an availability charge. When the private operator bears the demand risk, the public healthcare authority shall prevent opportunistic behavior, as the private partner might be tempted not to treat the most complex patients, to curtail services by creating artificially long waiting times, or to deliver only those treatments for which high margins are guaranteed by the DRGs/tariff system (Vecchi et al., 2018). The involvement of the private sector for the delivery of clinical services is particularly popular in countries and regions with low capacity to set up a public health system (i.e., in emerging countries), but it can also be used to develop a highly specialized unit (i.e., for cardiac pathologies or cancer treatment) within existing public hospitals.

Apart from delivering new, fully functional hospitals, which have been relatively limited, the use of PPPs to provide specific clinical services is increasingly driven by the need to address budget constraints and staff hiring and management limitations, in the face of rising demand in volume and complexity. As a result, PPPs are playing a crucial role in the construction and operation of Long-Term Care and Residential Care Facilities, as well as in the operation of specific hospital departments - from lower-complexity areas, such as rehabilitation, to high-complexity specialties, like cardiovascular care.

Such PPP contracts can also incorporate elements of payment by results, where the remuneration of the economic operator is contingent on achieving specific outcomes, such as improvements in quality of life following an intervention or a reduced incidence of co-morbidities in long-term care facilities.

This contract type differs from the widely adopted accreditation system in the EU, which allows private providers to operate as independent entities within public healthcare systems by receiving reimbursement from public healthcare budgets. While the boundaries are tight, a PPP can provide greater control over the clinic's features, services and performance. In contrast, accreditation involves oversight through a review of the broader characteristics of the private clinic.

3.4. PPP for Equipment and Technology-based Services/Solutions

When PPP is applied to medical equipment, it is known as MES (*managed equipment services*), which is a bundled contract between a healthcare provider and a private operator (typically, a medical equipment producer or an independent vendor) for the supply, installation, management, maintenance and updating of medical equipment (see **Example 4** on the case of Karolinska Hospital). MES contracts have been mostly used for diagnostic technologies, chemical analytical laboratories and IT systems. Where appropriate or necessary, they might include the supply of consumable and/or execution of the works for the installation of the medical equipment (Vecchi et al., 2018).

MES contracts might include not only the management of the new equipment installed, but the operator could also "step in" for the maintenance and management of existing equipment, which is then upgraded during the life of the contract based on the agreed investment plan. Even though the most used payment mechanism is the availability charge, the contractor could also be remunerated based on a fee that considers the service rendered, therefore transferring (full or partial) demand risk and creating an incentive to maximize treatment or volumes and/or to meet key objectives for the health institution (Vecchi et al., 2018).

Example 4. The MES of the Karolinska Hospial

Karolinska hospital in Sweden chose to use a MES contract with a fixed service fee to achieve the following advantages:

1) Installation of more than 170 pieces of equipment on time and on budget, with a vendor independence of 60%, to ensure the full availability of the new Karolinska hospital (built with an accommodation model);
2) Refreshment of the equipment after 8 years (with a flexibility of +/- 2 years) at a fixed price (except for the the A – star technologies, for which the private operators retain the risk of a +/- 10% on the purchasing costs; over or below there is a 50/50 losses/margins sharing);
3) Full functionality of the equipment, with quick and certain intervention and fixing time, in order to ensure an up-time between 97% and 99% depending on the level of criticality of the equipment.
4) To drive continuous innovation and improvement in day-to-day delivery of health services, the hospital set up an innovation partnership with the vendor, bringing scientific research and clinical practice closer together and developing innovative solutions with an impact on KPIs relevant for

the patient care flow. For example, they are working on a mobile communications tool to help different specialists share information about stroke patients more quickly as patients are brought into the hospital. The aim is to reduce the door-to-needle-time (i.e., the time it takes to get stroke patients from the door of the hospital to treatment).

5) Moreover, in 2017, this joint innovation program won two Horizon 2020 grants from the EU Framework Programme for Research and Innovation, worth 22.7 million euros and offering new resources to nurture innovation efforts.

Source: based on (Philips, 2019)[8] and on the interviews conducted by the the Authors to the managers of the Karolinska hospital.

Given the pressing need of public healthcare systems, mainly to attract and retain nurses and doctors, a shortage that significantly impacts waiting lists, MES bundles have recently been expanded to include staffing. This adjustment marks a shift in the payment mechanism; moving from an availability charge to a tariff structure, where investor returns are linked to performance targets, such as reducing waiting times. Examples include PPP contracts for operating diagnostic services, radiation therapy, nuclear medicine, and other specialized treatments.

MES-like contracts have also been applied to other service areas, where moderate technological investments, often based on IT solutions, enhance efficiency and quality in ancillary activities such as logistics and sterilization. In the EU legal framework, unlike traditional procurement, a PPP contract is designed to ensure the achievement of strategic goals that may not be attainable through standard procurement. A PPP is well-suited to transfer the risk associated with achieving specific performance targets. For example, in Italy, such PPP contracts bind the concessionaire to meet objectives such as:

- Reducing expenditure on medical devices and pharmaceuticals when applied to logistics (see **Example 5**); in this case, the private operator might improve service delivery to control and optimize costs.
- Reducing bacterial load when applied to sterilization, because of investments and services provided under the contract. Full responsibility for infection reduction, however, would be inappropriate, as this outcome is only partially within the PPP's control.

Example 5. PPP for the logistics of medical devices – Bologna, Italy

The PPP contract covers the introduction and management of tools for automation and digitalization of processes in two public hospitals in Bologna with the objective of:

1. Improving the traceability of single-use and implantable medical devices down to the patient-level;
2. Minimizing logistics and administrative burden for healthcare professionals.

The PPP contract had a duration of 15 years and included a capital investment of €6 million

Payment mechanism & risk-transfer

[8] Patient first: how Karolinska University Hospital is transforming - Case study | Philips

- The annual fee paid to the economic operator amounts to €3,224,000 and covers investment and management costs;
- In the investment phase, a lower transitional fee is applied, increasing as investments are delivered.
- Moreover, 80% of the fee is indexed to inflation to account for rising management costs and dividends.

In order to guarantee an effective transfer of risks to the economic operator, therefore nurturing his incentive to perform at standard, the payment mechanism envisaged the application of deductions if certain KPIs were not met. The KPIs are the following:

- Coverage of managed medical devices (100% target in 4 years).
- Availability of stock replenishment lists.
- Reduction in expired medical devices.
- Inventory turnover ratio (percentage variation).
- Optimization of operating room warehouse.
- Uptime of automatic RFID detection systems.

A sensitivity analysis was performed demonstrating that a 2% annual reduction in the availability fee (equivalent to a 98% performance index) would lead to a negative net present value of €250,000, demonstrating the project's financial risk exposure.

Beneficts achieved: cost savings

Before the PPP contract was in place, the two hospitals were spending more than €60 million, on an annual base, for medical device. The PPP contract guaranteed cost savings equal to:

- €2-4 million per year due to reduced medical device waste.
- €1.7 million in non-monetary savings from staff time optimization.

Source: Authors

Another area of application is energy efficiency, particularly through **Energy Performance Contracts** (EPC), where investments are repaid through savings in energy consumption. These contracts often involve significant infrastructure upgrades, with energy savings complemented by availability charges and upfront grants to ensure the return on investment.

In **Table 1** below, we provide a synthesis of the main PPP contracts implemented across Europe.

Table 1. A synthesis of the main PPP contracts implemented across Europe

Type of PPP	***Focus***	***Contract boundaries***	***Payment***	***Goal***	***Other issues***
PPP for supporting investment	Investments	DBFMO with a shift towards lighter DBFM (without non-clinical services)	Avaiailabity Charge Often an upfront grant	On time On budget Macroeconomic reasons	Eurostat rules applied

s and services	Medical equipment	MES and IT investments (telemedicine infrastructure)	Availability Charge	Technology upgrade/innovation in the context of capital needs	
	Noncore services	Sanification/sterilization Logistics Energy efficiency	Service charge	Cost optimization Achivement of critical results in contexts of need for more resources (e.g., reduced bacterial load)	
PPP for clinical services	Investment + core clinical services	Clinic model (greenfield) Operation of a specific hospital department (brownfield project)	Capitation fee, DRG tariff or Availability charge	Expand healthcare coverage in situations of market failure and need for more public sector capacity	Rarely used in Europe, where private clinics operate and can provide healthcare treatments reimbursed through public funding
	Medical equipment	Delivery of diagnostic services or specific therapies	Mainly tariff	Reduction of waiting list, reduction of passive patient mobility	
	Other healthcare low-complexity services	Building and operation of hospices and other facilities for long-term care	Mainly tariff Opportunity to apply outcome-based payments	Cost optimization and in-sourcing of productive capacity in the context of needed operational resources	

Source: Authors

4. Value based contracts for medical device

In 2006, M. Porter and E. Teisberg officially introduced the concept of *value-based healthcare*, fundamentally reshaping healthcare delivery by shifting the focus from volume to value, where value is defined as patient health outcomes relative to the costs sustained to deliver the treatment (Porter & Teiseberg, 2006). Such a paradigm change also challenged traditional procurement models, which historically prioritized lowest price over long-term cost-savings and clinical effectiveness (Matinheikki et al., 2024; Meehan et al., 2017; Prada, 2016). In the medical device sector, value-based procurement (VBP) redefines purchasing criteria, moving beyond unit price considerations to assess total lifecycle value, clinical performance, and patient-centered outcomes (Meehan et al., 2017; Posnett, 2022; Stanberry et al., 2021). Unlike traditional procurement, which often favors low-cost, short-term solutions, VBP promotes partnership-based contracting models, such as risk-sharing agreements and outcome-based contracts, where payment is contingent on clinical

success**.** These "value-based contracts" are typically applied in high-cost, high-impact areas (e.g., implantable technologies, surgical materials, and diagnostic tools) and often integrate bundled “service+product” solutions (Pedroso et al., 2022; Struijs, 2015; Vecchi et al., 2023; Zanotto et al., 2021).

Value-based contracts for medical devices draw on experiences from Managed Entry Agreements (MEAs) in the pharmaceutical sector - discussed above - and bundled payment systems implemented in the US, following the Affordable Care Act (also known as Obamacare) in 2010 (Boriani et al., 2022; Lopez et al., 2020; Messori et al., 2017) The latter have been trialed also in Bismarck healthcare systems, where insurances reimburse providers (e.g., hospitals) for specific treatments. Available studies indicate generally positive results, primarily in terms of cost containment and, in some cases, improved quality of care. As highlighted by (Zanotto et al., 2021), savings metrics are predominantly used, which may also serve as an indirect proxy for efficacy, considering that savings might result from fewer readmissions and reduced hospital stays. The concept of value-based contracts has thus been extended to traditional procurement where providers entrust their suppliers with the responsibility to deliver and attain pre-defined results.

Value can be embedded in procurement through four key elements that influence the quality of a good or service (often solution) being purchased: participation criteria, functional requirements, award criteria, and contractual mechanisms. These steps define what has been termed the Value-Based Procurement Process (VBPP) (Vecchi et al., 2023).

The core idea behind VBPP is that purchasing value is not limited to outcome-based payment; rather, it requires a comprehensive and structured approach tailored to the specific procurement context.

These are the four key elements of the Value-Based Procurement Process (VBPP):

1. Participation Criteria
   These define the entry requirements for bidders, considering factors such as experience, geographic presence, sustainability profile, and investment in innovation. However, EU procurement regulations emphasize openness and competition, making overly restrictive participation criteria problematic.

2. Functional Requirements
   These specify that the solution being procured meets defined needs, ensuring that high-value and/or appropriate solutions are selected. This step is critical in guaranteeing that procurement focuses on quality and effectiveness rather than solely on cost.

3. Award Criteria
   These establish the framework for evaluating quality and price, typically using the "most economically advantageous" approach, commonly referred to as value for money.
   Increasing the weight assigned to innovation and quality in the scoring system is one of the most effective ways to filter the market and ensure high-quality products are prioritized over the lowest price.

4. Payment Structures
   Payments can be structured based on key results or outcome indicators, enabling risk-sharing mechanisms when introducing innovative solutions. Different models include:

- Premium pricing models, where a higher price is paid only if specific outcomes are achieved;
- Reimbursement (payback) mechanisms, where part of the payment is refunded if the product does not meet predefined performance criteria

Furthermore, the VBPP recognizes the central role of demand analysis—specifically, identifying the needs of clinicians and the requirements necessary to improve patient health outcomes. This step is crucial in ensuring that procurement decisions align with actual healthcare needs and drive meaningful improvements in care delivery.

While outcome-based payments can be an effective tool, they also present challenges, as clinical outcomes are often influenced by multiple factors beyond the medical device itself. Additionally, such payment models require extensive data collection, which can be both complex and costly to obtain.

Some initial experiences have been developed within public procurement, for example by ESTAR[9] in Italy, AQuAS[10] in Catalonia, and in Denmark.

4.1. ESTAR - Italy

ESTAR HTA Unit has been conducting for a long time a research activity on methodologies for the assessment of medical devices (MDs) value and it has promoted the use of cost-effectiveness methods and value-based pricing in device procurement and contracting (Messori & Trippoli, 2018). Grounding on the principle that, especially in an National Healthcare System (NHS), the selection of MDs should be guided by the clinical benefit for patients (Messori & Trippoli, 2017, 2018; Trippoli, 2017), ESTAR applied the Net Monetary Benefit (NMB) as award criteria instead of the evaluation of products' technical characteristics (Cusumano et al., 2022). This is one of the main pharmacoeconomic parameters that have been used over the past decades in evaluating the cost-effectiveness of therapeutic interventions. Furthermore, a payment system linked to the achievement of health outcomes is used to tie the contractor to the promised effectiveness. The main features of one of the tenders are summarized in **Example 6**.

[9] ESTAR is the Technical and Administrative Support Agency for Healthcare for Tuscany Region. It is part of the health system and provides technical and administrative support. Most relevantly, it is the regional procuring body in Tuscany, and it is in charge for procurement of pharmaceuticals, medical devices, technologies and equipment. It is also one of the most advanced contracting authorities in Italy for green and sustainable public procurement, as well as for value-based healthcare procurement.

[10] AQuAS is the Agency for Health Quality and Assessment of Catalonia, and it aims at promoting innovation and improving healthcare quality though its involvement in public procurement processes. AQuAS focuses on initiatives for value-based procurement and public procurement of innovation. It collaborates on European and Catalan projects to identify and implement innovative solutions for unmet healthcare needs, such as technologies for antimicrobial resistance. Additionally, AQuAS assists decision-makers by conducting HTA and leveraging real-world data to inform decisions. Its activities aim to align procurement with broader goals like sustainability, patient-centered care, and system efficiency.

Example 6. ESTAR's Pilot Value-Based Tender for Biologic Meshes in Hernia Repair

In an effort to integrate value-based procurement into healthcare purchasing, ESTAR launched a pilot value-based tender for biologic meshes used in hernia repair. The tender, published in December 2018, aimed to acquire porcine cross-linked and non-cross-linked biologic meshes, ensuring high clinical value and cost-effectiveness. The contract was awarded in November 2019, with an overall value of €1,386,000 (+ VAT), reduced from the original estimated cost of €1,870,000. The agreement covered a four-year period (01/31/2020 – 12/31/2023).

Outcome-Based Approach & Award Criteria

A panel of surgeons identified two key outcome indicators to assess the effectiveness of the meshes:

- Infection rate within 30 days post-surgery.
- Recurrence rate at 24 months post-surgery.

The contract was awarded based on the Most Advantageous Economic Offer, ensuring the best value for money. Quality accounted for 70% of the evaluation, and the Net Monetary Benefit (NMB) approach was applied to measure two the outcomes offered.

Contract Execution & Performance Monitoring

The project emphasized real-world outcome monitoring, requiring the establishment of a regional registry to track patient data. Payment conditions were directly linked to clinical performance:

- If infection and recurrence rates exceeded 20% of the figures stated in the technical offer, an investigation into root causes was triggered.
- If the biologic mesh was found to be ineffective, the contractor was obligated to refund 50% of the purchase price.

This value-based approach ensured that payments were contingent on actual health outcomes, promoting high-quality surgical materials while mitigating financial and clinical risks. This approach was then extended to other contracts for Cryoablation and Carotid stents.

Source: (Cusumano et al., 2021)

The experience of ESTAR, which is relatively unique in Europe, demonstrates an innovative approach in which HTA (Health Technology Assessment) criteria are incorporated into the design of tender specifications, especially in setting functional requirements. Moreover, outcome-based payments – as a contractual mechanism, strengthen provider's accountability for the expected outcomes, as projected by HTA.

Leveraging these experiences, representatives from ESTAR contributed to developing the Italian National Program for HTA for Medical Devices, acting as a working group focused on integrating HTA results into procurement decisions (Callea et al., 2017, 2020; Tarricone et al., 2021).

4.2. Other Experiences in Europe

AQuAS, the Agency of Health Quality and Assessment of Catalonia has a long-standing experience in innovative procurement projects, including the MITMEVA project led by the Hospital Clínic in Barcelona for the complete, transversal and multidisciplinary management of aortic valve stenosis. In this case, the Hospital implemented a pilot tender, where the contract tied up 5% of the payment to the achievement of certain results measured by a system of indicators agreed upon with the market during the preliminary consultation. In addition, the award criteria were strongly aligned with the outcomes that the Hospital wanted to achieve: 96 points were allocated to qualitative criteria including, for example, educational measures targeting citizens and patients, the optimization of patient referral program, the support system for planning of transcatheter aortic valve implantation, the follow-up and monitoring for the evaluation of the purchase through data collection and calculation of indicators for the evaluation of the service, among others (Callea, 2023; Vecchi et al., 2023).

Another interesting example is the case of the Vejle Hospital in Denmark that has implemented an outcome-based contract for total knee replacement (see **Example 7**). For this tender, the most important enabling factors were the availability of pre-existing and up-and-running data collection and register for the outcomes to which the payment was tied (Catena et al., 2024).

Example 7. Vejle Hospital in the Region of Southern Denmark: outcome-based contracts for knee replacement

In 2017, Vejle Hospital renewed its contract for knee replacement implants, experimenting with a value-based procurement (VBP) approach. This strategy introduced price adjustments for suppliers based on performance metrics tied to clinical outcomes, patient well-being, and satisfaction. The initiative encouraged suppliers to showcase their most innovative solutions, fostering product development and innovation (Catena et al., 2024).

The tender process was structured in three key phases:

1. **Pre-tender analysis and engagement**: the hospital's procurement team conducted a comprehensive analysis of market demand and supply for total knee replacement implants. A technical dialogue followed with six pre-selected suppliers to share the hospital's goals, understand market trends, and pinpoint critical tender aspects. User groups—including physicians, nurses, and healthcare professionals—collaborated to set the minimum requirements for the implants, ensuring alignment with clinical needs. Suppliers contributed further by providing written feedback and engaging in discussions about draft tender documents. This open dialogue helped clarify and timely communicate the hospital's objectives, refine priority criteria, and assess the risks inherent in an outcome-based model.
2. **Tender process**: the competitive tender process prioritized price as a key award criterion. Although six suppliers participated in the technical dialogue, only three submitted bids. The selection process aimed to identify a partner capable of meeting the hospital's innovative procurement objectives.
3. **Implementation with an innovative payment system**: the payment system envisages rewards or penalties that reflect percentage improvement over the baseline. For example, a 5% increase

in the proportion of patients who are very satisfied 1-year after surgery is rewarded with a 0.5% increase in prices. Similarly, every percent decrease in outcome performance leads to a percent decrease in price. This system allows for an overall price adjustment of up to ±17%.

The outcomes covered are the following:

- length of stay (patient hospitalization);
- number of readmissions, revision rates (years 1-2-5);
- patient reported satisfaction (PROMs);
- functional lift (Oxford-score)

Table 2. Outcomes and instruments to collect data

Outcome	Data collection	Comment	Baseline (year 2018)
Average length of stay	CROM		51.6 hours
Average readmission rates w/in 30 days after discharge	CROM		5.0%
Average revision rates after 2nd postoperative year	CROM		2.0%
Overall patient satisfaction (based on experience with health status factors)	PROM	EQ-5D-5 L questionnaire - 5 severity levels (no problems to extreme problems) to assess today's mobility, selfcare, usual activities (incl. work), pain/discomfort, and anxiety/depression; 5 = worst health to 1 = best health; 1 yr. after surgery	Overall experience: • 65% w/ score 1 • 85% w/ score 1 to 3 after 1 yr.
Functional lift	PROM	Oxford Knee Score (to assess 5 severity levels over past 4 weeks associated with 12 separate conditions of pain or function)	Functional lift (scale 0 to 48): • 65% w/ score 39 to 48 • 85% w/ score 19 to 48 after 1 yr.

*CROM = clinically reported outcome measure; PROM = patient-reported outcome measure

Such outcomes had been collected and measured since 2000 within the hospital and they were publicly available via the Danish Knee Arthroplasty Register (DKR). This data could be also consulted by suppliers to see how their product was performing on the selected quality indicators compared to their competitors'.

To the risks transferred to the supplier, this value-based procurement model

- does not apply to knee replacements by surgeons who have limited experience in using the supplier's knee implant system (i.e., fewer than 25 knee replacements). This is meant to reduce the supplier's risk associated with personnel turnover.
- excludes revisions due to infections above the average infection level in the DKR to reduce the supplier's risk associated with infection levels.

A critical success factor behind this real-case example is the multi-disciplinarity of the team created by the buyer and supplier. With the support of the hospital leadership, the Region of Southern Denmark created a team of about 15 members, with clinicians and nurses from the hospital's

orthopedics ward, procurement managers, and legal support staff. These profiles reflect the need to include not only the input of frontline health care workers, but also input from procurement and legal experts. The suppliers included in their team general and country managers, marketing executives, and finance, legal, and compliance experts. Similarly, this team includes a diverse set of skills. The presence of general managers to support the local managers highlights the relevance of this initiative for the whole supplying organization.

Source: (Catena et al., 2024)

5. Concluding Remarks

In this chapter, we have explored various forms of healthcare partnerships in Europe, analyzing those that occur at the meso level and those at the local or hospital level. Meso-level partnerships focus on developing public-private co-financing schemes, which are essential for bridging the funding gap typically associated with innovation. At the micro level, particularly in countries with an extensive network of public healthcare providers, partnership models are evolving towards more sophisticated procurement contracts that enhance efficiency and value in healthcare delivery.

Historically, the term Public-Private Partnership (PPP) was primarily associated with hospital construction projects, aimed at addressing fiscal constraints and limited public budgets. However, in recent years, the focus of these agreements has shifted from infrastructure investments to service-oriented partnerships, particularly in areas such as clinical services, non-clinical services, and medical devices.

In this evolving landscape, the term partnership often refers to bundled contracts that integrate goods and services with the objective of achieving specific clinical results and/or outcomes, which may be tied to payment mechanisms. This shift underscores a growing emphasis on optimizing service delivery, fostering innovation, and enhancing overall healthcare effectiveness.

These bundled agreements—often referred to as "turn-key" solutions—are frequently categorized as PPPs due to their defining characteristics:

- Long duration, necessary to amortize investments or achieve intended outcomes.
- Private investment and expertise, which bring significant capital and know-how to public systems.
- Risk allocation, whereby private operators assume certain risks through payment mechanisms tied to performance targets, such as improved quality, cost efficiency, or clinical outcomes.

These elements align with the key features of PPPs as defined in the literature and by the European Commission's 2004 Green Paper on Public-Private Partnerships.

It is important to note that in Europe, when a public contract transfers operational risk to a private partner, it is classified as a concession rather than as standard procurement. However, from a legal perspective, a concession contract is not applicable to contracts that predominantly involve goods, such as medical devices.

However, the term PPP itself is still associated with DBFMO (Design, Build, Finance, Maintain, Operate) contracts, whose mixed performance in Anglo-Saxon countries has made policymakers skeptical about expanding the PPP model to new domains, such as services and medical devices. A rebranding or shift in terminology might help overcome these perceptions and facilitate broader adoption.

In Italy, for example, the legal procedure for awarding service-based PPPs is the same as for infrastructure-based PPPs, as both fall under the concession contract framework. However, regional and national policymakers are hesitant to adopt PPPs for service innovation and cost optimization, largely due to concerns over the challenges faced in the past for the long-term (30 years) hospital building PPP contracts. Furthermore, they still primarily view PPPs to mobilize capital, focusing on macroeconomic benefits rather than microeconomic ones. As a result, the lexicon itself becomes a significant barrier, compounded by a lack of leadership, skills and incentive to innovation in the public sector. Fostering the adoption of sophisticated healthcare procurement contracts requires substantial investments in capacity building also in the private sectors, where private managers must learn to adapt their offerings to meet the specific needs of public hospitals.

The development of pilot projects focused on co-learning, measurement, and adaptation could play a crucial role in consolidating these advanced procurement strategies.

Bibliography

Acerete, B., Stafford, A., & Stapleton, P. (2012). New development: New global health care PPP developments—a critique of the success story. *Public Money & Management*, *32*(4), 311–314. https://doi.org/10.1080/09540962.2012.691315

Barlow, J., Roehrich, J., & Wright, S. (2013). Europe Sees Mixed Results From Public-Private Partnerships For Building And Managing Health Care Facilities And Services. *Health Affairs*, *32*(1), 146–154. https://doi.org/10.1377/hlthaff.2011.1223

Baumol, W. J. (1993). Health care, education and the cost disease: A looming crisis for public choice. *Public Choice*, *77*(1), 17–28. https://doi.org/10.1007/BF01049216

Baumol, W. J., de Ferranti, D., Malach, M., Pablos-Méndez, A., Tabish, H., & Wu, L. G. (2012). *The Cost Disease: Why Computers Get Cheaper and Health Care Doesn't*. Yale University Press. https://www.jstor.org/stable/j.ctt32bhj9

Boriani, G., Vitolo, M., Svennberg, E., Casado-Arroyo, R., Merino, J. L., & Leclercq, C. (2022). Performance-based risk-sharing arrangements for devices and procedures in cardiac electrophysiology: An innovative perspective. *EP Europace*, *24*(10), 1541–1547. https://doi.org/10.1093/europace/euac045

Bovaird, T. (2004). Public–Private Partnerships: From Contested Concepts to Prevalent Practice. *International Review of Administrative Sciences*, *70*(2), 199–215. https://doi.org/10.1177/0020852304044250

Callea, G. (2023). Dall'innovazione di prodotto, all'innovazione organizzativa, all'appalto innovativo: Il progetto pilota di gestione della stenosi valvolare aortica dell'Hospital Clínic de Barcelona. *Teme*. https://www.sdabocconi.it/upl/entities/attachment/Callea_TEME_gare_europee_05_06_23.pdf

Callea, G., Armeni, P., Marsilio, M., Jommi, C., & Tarricone, R. (2017). The impact of HTA and procurement practices on the selection and prices of medical devices. *Social Science & Medicine (1982)*, *174*, 89–95. https://doi.org/10.1016/j.socscimed.2016.11.038

Callea, G., Federici, C., Ciani, O., Amatucci, F., Tarricone, R., Borsio, L., & Marletta, M. (2020). Integrating HTA Principles into Procurement of Medical Devices: The Italian National HTA Programme for Medical Devices | Request PDF. In *XV Mediterranean Conference on Medical and Biological Engineering and Computing – MEDICON 2019* (pp. 1777–1782). https://www.researchgate.net/publication/336025527_Integrating_HTA_Principles_into_Procurement_of_Medical_Devices_The_Italian_National_HTA_Programme_for_Medical_Devices

Catena, R., Kirkegaard, K., Nayak, D., & Tomini, S. M. (2024). A Novel Value-Based Procurement Agreement to Improve Outcomes for Patients Undergoing Knee Replacement. *NEJM Catalyst*, *5*(6). https://doi.org/10.1056/CAT.23.0327

Costa, C., & Santana, P. (2021). Trends of amenable deaths due to healthcare within the European Union countries. Exploring the association with the economic crisis and education. *SSM - Population Health*, *16*, 100982. https://doi.org/10.1016/j.ssmph.2021.100982

Crosby, B. C., 't Hart, P., & Torfing, J. (2017). Public value creation through collaborative innovation. *Public Management Review*, *19*(5), 655–669. https://doi.org/10.1080/14719037.2016.1192165

Cusumano, di N., Vecchi, V., & Callea, G. (2021). Acquisti sanitari: La pandemia e il consolidamento del mercato. L'urgenza di traiettorie evolutive. In *Rapporto OASI 2021*. https://cergas.unibocconi.eu/sites/default/files/media/attach/Capitolo%2017%20Rapporto%20OASI%202021_0.pdf?VersionId=ITx1px447UfloQSICv7Zvxcvg17bxtzt

Cusumano, N., Vecchi, V., Brusoni, M., & Callea, G. (2022). Procurement sanitario: Aggiornamento sullo stato della centralizzazione degli acquisti e tendenze emergenti nell'attuazione del PNRR. In *Rapporto OASI 2022: Vol. Parte Quarta: Funzioni Strategiche e Innovazione Digitale*.

Dabbous, M., Chachoua, L., Caban, A., & Toumi, M. (2020). Managed Entry Agreements: Policy Analysis From the European Perspective. *Value in Health*, *23*(4), 425–433. https://doi.org/10.1016/j.jval.2019.12.008

European Commission. (2004). *Green Paper on public-private partnerships and Community law on public contracts and concessions*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52004DC0327

European Commission. (2024). *2024 ageing report: Economic & budgetary projections for the EU Member States (2022 2070)*. Publications Office. https://data.europa.eu/doi/10.2765/022983

Facey, K. M., Espin, J., Kent, E., Link, A., Nicod, E., O'Leary, A., Xoxi, E., van de Vijver, I., Zaremba, A., Benisheva, T., Vagoras, A., & Upadhyaya, S. (2021). Implementing Outcomes-Based Managed Entry Agreements for Rare Disease Treatments: Nusinersen and Tisagenlecleucel. *PharmacoEconomics*, *39*(9), 1021–1044. https://doi.org/10.1007/s40273-021-01050-5

Gaeta, M., Campanella, F., Capasso, L., Schifino, G. M., Gentile, L., Banfi, G., Pelissero, G., & Ricci, C. (2017). An overview of different health indicators used in the European Health Systems. *Journal of Preventive Medicine and Hygiene*, *58*(2), E114.

Greco, A., Frederix, G. W. J., Hooft, L., & Ten Ham, R. M. T. (2025). A Systematic Review of Challenges and Opportunities in the Implementation of Managed Entry Agreements for Advanced Therapy Medicinal Products. *Clinical Therapeutics*, *47*(2), e16–e26. https://doi.org/10.1016/j.clinthera.2024.11.019

Jakubowski, E., & Busse, R. (1998). *Health care systems in the EU: A comparative study—Introduction*. https://www.europarl.europa.eu/workingpapers/saco/101/default_en.htm

Kozun-Cieslak, G., & Zdrazil, P. (2021). Efficiency of Healthcare Systems in the European Union States – Who Performs Better – Bismarckians or Beveridgeans? *European Research Studies*, *XXIV*(Special 4), 397–411.

Lippi, G., Mattiuzzi, C., & Cervellin, G. (2016). No correlation between health care expenditure and mortality in the European Union. *European Journal of Internal Medicine*, *32*, e13–e14. https://doi.org/10.1016/j.ejim.2016.02.025

Lopez, M. H., Daniel, G. W., Fiore, N. C., Higgins, A., & McClellan, M. B. (2020). Paying For Value From Costly Medical Technologies: A Framework For Applying Value-Based Payment Reforms. *Health Affairs (Project Hope)*, *39*(6), 1018–1025. https://doi.org/10.1377/hlthaff.2019.00771

Matinheikki, J., Kenny, K., Kauppi, K., Raaij, E. van, & Brandon-Jones, A. (2024). Realising the promise of value-based purchasing: Experimental evidence of medical device selection. *International Journal of Operations & Production Management*, *44*(13), 100–126. https://doi.org/10.1108/IJOPM-09-2023-0779

Meehan, J., Menzies, L., & Michaelides, R. (2017). The long shadow of public policy; Barriers to a value-based approach in healthcare procurement. *Journal of Purchasing and Supply Management*, *23*(4), 229–241. https://doi.org/10.1016/j.pursup.2017.05.003

Messori, A., & Trippoli, S. (2017). The results of a pharmacoeconomic study: Incremental cost-effectiveness ratio versus net monetary benefit. *Heart*, *103*(21), 1746–1746. https://doi.org/10.1136/heartjnl-2017-311816

Messori, A., & Trippoli, S. (2018). Incremental Cost-Effectiveness Ratio and Net Monetary Benefit: Promoting the Application of Value-Based Pricing to Medical Devices-A European

Perspective. *Therapeutic Innovation & Regulatory Science*, *52*(6), 755–756. https://doi.org/10.1177/2168479018769300

Messori, A., Trippoli, S., & Marinai, C. (2017). Handling the procurement of prostheses for total hip replacement: Description of an original value based approach and application to a real-life dataset reported in the UK. *BMJ Open*, *7*(12), e018603. https://doi.org/10.1136/bmjopen-2017-018603

Montagu, D. (2021). The Provision of Private Healthcare Services in European Countries: Recent Data and Lessons for Universal Health Coverage in Other Settings. *Frontiers in Public Health*, *9*. https://doi.org/10.3389/fpubh.2021.636750

Nixon, J., & Ulmann, P. (2006). The Relationship between Health Care Expenditure and Health Outcomes: Evidence and Caveats for a Causal Link. *The European Journal of Health Economics*, *7*(1), 7–18.

Okunade, A. A., & Osmani, A. R. (2018). Technology, Productivity, and Costs in Healthcare. In *Oxford Research Encyclopedia of Economics and Finance*. https://doi.org/10.1093/acrefore/9780190625979.013.64

Pedroso, C. B., Beaulieu, M., Allerup, L. D., & Rebolledo, C. (2022). Fostering Innovation through Procurement in the Healthcare Sector: The Danish Experience. *Healthcare Quarterly (Toronto, Ont.)*, *24*(4), 22–26. https://doi.org/10.12927/hcq.2022.26715

Philips. (2019). *Patient first: How Karolinska University Hospital is transforming to meet future demands of healthcare*. https://www.philips.se/a-w/about/news/archive/standard/case-studies/20190128-patient-first-how-karolinska-university-hospital-is-transforming-to-meet-future-demands-of-healthcare.html

Porter, M., & Kramer, M. (2011). Creating Shared Value. *Harvard Business Review*, *89*, 62–77.

Porter, M., & Teiseberg, E. (2006). *Redefining Health Care: Creating Value-Based Competition on Results*. https://www.hbs.edu/faculty/Pages/item.aspx?num=21319

Posnett, J. (2022). Value-based procurement in wound care – Wounds UK. *Wounds UK*, *18*. https://wounds-uk.com/journal-articles/value-based-procurement-wound-care/

Prada, G. (2016). Value-based procurement: Canada's healthcare imperative. *Healthcare Management Forum*, *29*(4), 162–164. https://doi.org/10.1177/0840470416646119

Stanberry, B., Bothma, G., & Harrison, K. (2021). Using the MEAT VBP Framework to analyse and understand the value of surgical gloves: An explanatory case study. *Health Economics Review*, *11*(1), 23. https://doi.org/10.1186/s13561-021-00325-z

Struijs, J. N. (2015, October 12). How Bundled Health Care Payments Are Working in the Netherlands. *Harvard Business Review*. https://hbr.org/2015/10/how-bundled-health-care-payments-are-working-in-the-netherlands

Tarricone, R., Amatucci, F., Armeni, P., Banks, H., Borsoi, L., Callea, G., Ciani, O., Costa, F., Federici, C., Torbica, A., & Marletta, M. (2021). Establishing a national HTA program for medical devices in Italy: Overhauling a fragmented system to ensure value and equal access to new medical technologies. *Health Policy (Amsterdam, Netherlands)*, *125*(5), 602–608. https://doi.org/10.1016/j.healthpol.2021.03.003

Thabit, S., Sancino, A., & Mora, L. (2024). Strategic public value(s) governance: A systematic literature review and framework for analysis. *Public Administration Review*, *n/a*(n/a). https://doi.org/10.1111/puar.13877

Thanimalai, S., Choon, W. Y., & Lee, K. K.-C. (2021). Stakeholder views of managed entry agreements: A literature review of national studies. *Health Policy OPEN*, *2*, 100032. https://doi.org/10.1016/j.hpopen.2021.100032

Trippoli, S. (2017). L'analisi costo-efficacia come strumento per il procurement dei dispositivi medici. Percorsi operativi che incorporano il beneficio clinico nel punteggio di gara. *Recenti Progressi in Medicina*, *108*(9), 374–378.

Vecchi, V., Callea, G., Cusumano, N., Zurlo, F. L., Amatucci, F., Brusoni, M., Longo, F., & Mauroc, C. (2023). Acquisti sanitari: Stato dell'arte e percorsi evolutivi verso logiche di valore. In *Rapporto OASI 2023: Osservatorio sulle aziende e sul Sistema sanitario italiano* (1. ed). Egea.

Vecchi, V., Casalini, F., & Cusumano, N. (2022a). *Public-Private Collaborations for Long-Term Investments*. Edward Elgar Publishing. https://econpapers.repec.org/bookchap/elgeebook/21190.htm

Vecchi, V., Casalini, F., Cusumano, N., & Leone, V. M. (2021). Public-Private Partnerships for Infrastructure and Service Delivery: An Introduction. In V. Vecchi, F. Casalini, N. Cusumano, & V. M. Leone (Eds.), *Public Private Partnerships: Principles for Sustainable Contracts* (pp. 1–17). Springer International Publishing. https://doi.org/10.1007/978-3-030-65435-1_1

Vecchi, V., Casalini, F., Cusumano, N., & Leone, V. M. (2020b). PPP in Health Care—Trending Toward a Light Model: Evidence From Italy. *Public Works Management & Policy*, *25*(3), 244–258. https://doi.org/10.1177/1087724X20913297

Vecchi, V., Cusumano, N., & Boyer, E. J. (2020a). Medical Supply Acquisition in Italy and the United States in the Era of COVID-19: The Case for Strategic Procurement and Public–Private Partnerships. *The American Review of Public Administration*, *50*(6–7), 642–649. https://doi.org/10.1177/0275074020942061

Vecchi, V., Cusumano, N., & Casalini, F. (2022). *Investigating the performance of PPP in major healthcare infrastructure projects: The role of policy, institutions, and contracts*. https://doi.org/10.1093/oxrep/grac006

Vecchi, V., Hellowell, M., & Cusumano, N. (Eds.). (2018). *Public-Private Partnerships in Health*. Springer International Publishing. https://doi.org/10.1007/978-3-319-69563-1

Zanotto, B. S., Etges, A. P. B. da S., Marcolino, M. A. Z., & Polanczyk, C. A. (2021). Value-Based Healthcare Initiatives in Practice: A Systematic Review. *Journal of Healthcare Management / American College of Healthcare Executives*, *66*(5), 340–365. https://doi.org/10.1097/JHM-D-20-00283