Technological transfer and commercialization of public research results through PPI in the Mediterranean region – PPI4MED project

White paper on PPI in Italy: Status quo and policy suggestions

Funding scheme: ENI CBC MED Programme

Project Acronym: PPI4MED

Reference number: B_A.2.1_0136

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Dissemination level: PU

Coding: PPI4MED/CNR/WP5

Summary

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1 Executive summary

Public demand for innovation in Italy is likely sub-optimal. Although there is no consistent measurement system with which to evaluate public procurement of innovation, the analysed data show a lower share of expenditure for the two components of innovation procurement; i.e., public demand for research and development, and public demand for innovative goods and services, than in the richest European countries.

Several indicators that provide a measure of how open a procurement system is to innovation highlight that the procurement system in Italy is still disinclined to support innovation procurement. The participation of SMEs is low; the share of calls for tenders awarded on the simple criterion of price is still too high; the share of recurring contracts is too high; and in calls for tenders the possibility to present changes in the requested good or service is uncommon.

Regulatory actions could certainly help to create a more favourable framework for innovation; these might include:

1. *Intellectual property rights*: standard terms and conditions under national legislation require that, unless specified in the tender conditions, the intellectual property of innovative goods and services remains in the hands of the public contractor. However, allowing suppliers to retain intellectual property rights may incentivize the provision of innovative solutions at the industrial level and reduce the procurement costs incurred by the public sector.
2. *Measures to support the participation of small and medium-sized enterprises*: in Italy, the participation of small and medium-sized enterprises in tenders above the budget limit published in the Official Journal of the European Union is lower than the EU average. This low participation, especially in a country characterized by an industrial framework dominated by small and medium-sized enterprises, may be an indication of a procurement system that is not particularly open and, therefore, not very receptive to new market developments. Action to amend the selection criteria to broaden participation is, therefore, recommended. Public buyers have some flexibility in establishing selection criteria, which may encourage the participation of SMEs. For example, the minimum turnover required according to the financial capacity criteria can be set to correspond to the value of the bid submitted, and not higher. Dividing a tender into lots is another way to attract innovators, as it increases the likelihood that the total value of the bid is proportional to the operational capacities of innovative start-ups and SMEs. They could also encourage prepayment systems, to help cope with the lack of resources needed for the start-up phase of the public contract .
3. Although procurement regulation already contains provisions that favour giving priority to innovative tenders in the award criteria, there is a lack of any *reward systems* aimed at public procurers to encourage innovative procurement and reduce their risk aversion.

***Expenditure targets*:** According to practices carried out in several countries in Europe, we recommend the adoption of spending targets dedicated to innovation procurement. Spending targets cannot be implemented without a structured policy. However, we observe that even countries with advanced policies have not yet adopted spending targets. The difficulty of targeting makes evident at least three criticalities, one ex-ante, related to the logic of setting a target without a prior measurement exercise quantifying the status quo of expenditure on innovation procurement; one in progress, related to the capacity of the public administration to demand goods and services that are innovative, as defined by the Frascati Manual (see Sect. 1); and one ex-post, related to the difficulty of assessing the achievement of the target and measuring the impact of the legislation.

Given these critical issues, the priority issues are:

1. A regulatory intervention providing a spending target for public administrations, not in terms of purchases, but in terms of expression of innovation needs. Public administrations with a purchasing plan above a certain budget (e.g., EUR 20 million per year) could be obliged to allocate a share equal to 2% per year of the total of the expenditure forecasts in the three-year plan for public works and in the two-year plan for the procurement of supplies and services, to a set of internal and external needs. These needs could be expressed in terms of results to be achieved and market challenges.
2. Set up a monitoring, measurement, and impact assessment system. Gathering empirical evidence is essential not only to understand the status quo of innovation expenditure, but also to analyse and capture the needs of public administration, possible administrative gaps that delay the supply of innovation, and the amount of unexpressed demand for innovation. An efficient and structured measurement system is an essential requirement for setting a long-term spending target.

It seems necessary to adopt a **national plan for innovation procurement** that would provide support actions to potentially influence the processes and competences of public administrations, breaking the inertia of contracting authorities and reorienting spending processes. Such a plan, which can be financed with the many resources still to be used from the EU structural funds, could frame the adoption of a spending target (for both central and local administrations) within a broader framework that defines: (i) strategic objectives (both sectoral and horizontal); (ii) financial incentives to public procurers to reduce their risk aversion; and (iii) a monitoring and evaluation system that can help make procurement processes more efficient.

2 Introduction

Over the past decade, the strategic use of public procurement has become a central topic of European innovation policy. In an economic phase characterized by scarcity of available resources, public demand for innovation could improve the delivery of public services by consuming fewer resources as well as addressing complex social challenges by steering the process of technological change towards socially shared goals (European Commission, 2005; Edler et al., 2016). However, despite the growing interest in the issue of innovative procurement within the European and national policy agendas, there is a clear gap in the statistical knowledge and empirical evidence on this topic.

In the second edition of the CNR's Report on Research and Innovation in Italy (2019), it was highlighted that the resources committed to public procurement of research and development still appear modest, especially relative to the total expenditure for ordinary purchases of goods and services. In fact, in 2018, the total value of research and development procurement in Italy amounted to approximately EUR 176 million, less than 0.15% of the total value of goods and services purchased by the public administration.

The aim of this paper is to provide evidence on the state of innovation procurement in Italy, with the purpose of suggesting possible actions that could foster smart public demand. In the first part, we analyse a set of indicators that could provide a measure of how open a procurement system is to innovation. In the second section, we highlight some regulatory and policy interventions that could contribute to a more favourable framework for innovation procurement. Finally, we examine the spending targets set in other European countries, and present some examples of the different types of interventions that could be implemented in Italy.

3 Public procurement of innovation: definitions

Innovation contracts are public contracts in which a public contractor acquires 'innovation'. Article 1.22 of the EU Procurement Directive (2014/24) derives the definition of innovation from the Oslo Manual (p. 146), being:

"the implementation of a new or significantly improved product, service or process, including, but not limited to, production, building or construction processes, a new marketing or organizational method in business practices, workplace organization or external relations..."

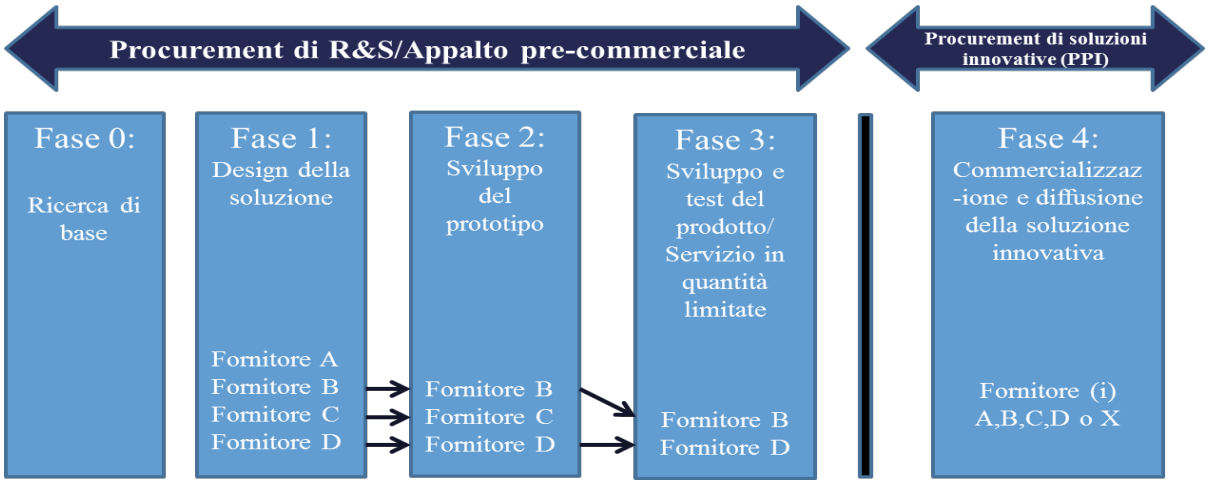
This definition includes any procurement that has one or both of the following characteristics:

I. The procurement of the innovation process, including research and development services (research and development procurement and pre-commercial procurement, or PCP).

II. The procurement of the products of innovation already available (public procurement of innovation, or PPI).

PCP and PPI can be seen as two complementary elements of innovation procurement: the former focuses on the research and development phase prior to commercialization, while the latter (which excludes research and development) focuses on commercialization and dissemination of innovative solutions. The figure below summarizes the procurement procedures and their stages, and makes explicit their complementarity.

Figure 1. Complementarity between pre-commercial procurement and PPI



Source: European Commission (2014)

For research and development contracts, Directive 2014/24 refers to public contracts where both of the following conditions are met: (i) the results belong exclusively to the contracting authority for use in the conduct of its business; (ii) the service provision is fully remunerated by the contracting authority. Research and development includes basic research as well as applied research and experimental development. Experimental development may, according to the rules of the World Trade Organization, continue up to the development of a first product or service to incorporate the results of the research into a prototype.

PCP, although aimed at research and development services, is targeted at promoting technological innovation through 'non-exclusive' procurement. The approach involves risk-benefit sharing under market conditions between the public purchaser and procuring entities, whereby different companies are called upon to develop, in a parallel and competing manner, innovative solutions (and therefore not yet available to the market) suited to meet the needs and challenges faced by the public sector (COM/2007/799). The defining elements of the procedure are: (i) risk and opportunity sharing between the procuring entity and the supplier; (ii) sharing of intellectual property rights to the procurement results, with the constraint that they cannot belong exclusively to the procuring entity; and (iii) competitive phased development.[1]

Through the PCP process, public procurers challenge market players through an open, transparent, and competitive process to develop new solutions to meet a technologically demanding challenge that requires new research and development services. It should be emphasized that this procurement is for the purchase of research and development services, but not for the purchase of commercial volumes of goods and services (because research and development is limited to the development of a limited number of products/services required to test whether the solution meets the initial procurement need). Where commercial volumes of goods or services are to be purchased, this should involve a separate procurement procedure.

The third dimension of innovation procurement is the purchase of innovative solutions (i.e., PPI), which occurs when existing public procurement procedures (e.g., open procedure, competitive dialogue, negotiated procedure) are used to purchase innovative solutions that are not yet available on a large-scale commercial basis. In this case, the public contracting authority acts as a 'launch customer' or 'early adopter'.

[1] **(COM/799/2007)**

4 Expenditure on research procurement: a European benchmark

There is a clear gap in the statistical knowledge and empirical evidence on this topic. In the absence of up-to-date information, the data provided by CNR's Report on Research and Innovation in Italy (2019) can give an indication of how open the government's supply system is to innovation. A quantitative framework is essential to fully understand whether there are barriers to optimal demand for innovation, and whether improvements in the supply system can further enhance the competitiveness and growth of the economic system.

The main evidence, quantified by making a comparison with Italy's main European competitors, from the CNR's Report 2019 is as follows:

1. The contract notices, published from 2009 to 2018, which carry a common procurement vocabulary (CPV) code referring to contracts involving research and development services, have been measured. In this specific segment of innovation procurement, except for two years, the United Kingdom had the highest spending commitments, with an average annual expenditure (EUR 199 million) approximately three times higher than that recorded in Italy (EUR 66 million).
2. The same gap exists in the ratio between the number of R&D procurements and the total number of tenders published annually on the TED platform, providing a proxy for the tendency to procure R&D.
3. PCPs have only been implemented in Italy since 2013. Although their number is much smaller than that of R&D procurements (on average, from 2013 to 2018 they account for less than 10% of the total number of procurements), the resources involved are more significant (approximately 20% of the total value of R&D procurements).
4. The total value of procurements in Italy showed an increasing trend between 2010 and 2018, but their value (approximately EUR 176 million) is less than 0.15% of the total value of goods and services purchased by the public administration.
5. The analysis of the data on the two-year programme of purchases of supplies and services published on the Public Contracts Service (SCP) of the Ministry of Infrastructure and Transport shows that in planned spending on innovative goods and services, the average of potential innovation purchases was less than 3%, both for regions and metropolitan cities. The only exception is the City of Milan, in which potential innovation purchases exceeded 6%.

The only statistical, sample-based survey that has collected data about PPI is the Community Innovation Survey. Although the survey is not up to date (the dataset is 2014) and based on a methodology that does not allow exact determination of spending on innovation procurement, it still appears that Italy's performance is lower than the rest of Europe, a potential sign of sub-optimal demand for innovation.

5 We are open to the purchase of innovation

Before analysing the procurement system to understand the degree to which it is open to innovation, it is useful to focus on some of its defining and characterizing elements. The box below (1) lists the key elements of PPI and the criteria that can be used to measure the perimeter of above-threshold purchases by the public administration that are potentially open to innovation.

Box 1. Innovation procurement: definition

Key elements
• Procurement for innovation is the provision of new or significantly improved products, services, or processes, including production, construction or building processes, new marketing or organizational methods in public services and practices: ➢ are not yet available on a large-scale commercial basis; ➢ have better levels of performance than products available on the market. • Innovation procurements include solutions that have generally already been (partially) technically successfully demonstrated on a small scale (or may already be available in small quantities on the market) but due to market risks have not been produced on a large scale. • Innovation procurements include solutions based on existing technologies that are to be used in new and innovative ways. It excludes business development activities such as incremental adaptations or periodic changes to products, services, production lines, processes, or other ongoing operations, even though such changes may constitute improvements.
Additional criteria
• Required solutions not technically prescribed (functional and performance requirements, rather than technical requirements): ✓ performance-based specifications or performance to be provided ✓ minimum required features ✓ minimum efficiency improvements ✓ outcome indicators in relation to materials, production methods etc • Bids include references to interoperability requirements • Contractual agreements for intellectual property rights • Classification other than a 'recurring' procurement • Award criteria aimed at obtaining best value for money over the life cycle ✓ Award criteria giving greater weight to quality ✓ Exclusion in principle of 'lowest price' as an award criterion

Selection criteria

Procurement selection criteria are fundamental in encouraging innovation procurement. Downward pricing, for example, does not give due consideration to the costs related to the entire product life cycle, corresponding to all subsequent and interdependent stages in the purchase of a good, job, or service. Innovative products with higher initial costs may yield savings over time because of their durability, efficiency, and resilience.[2]

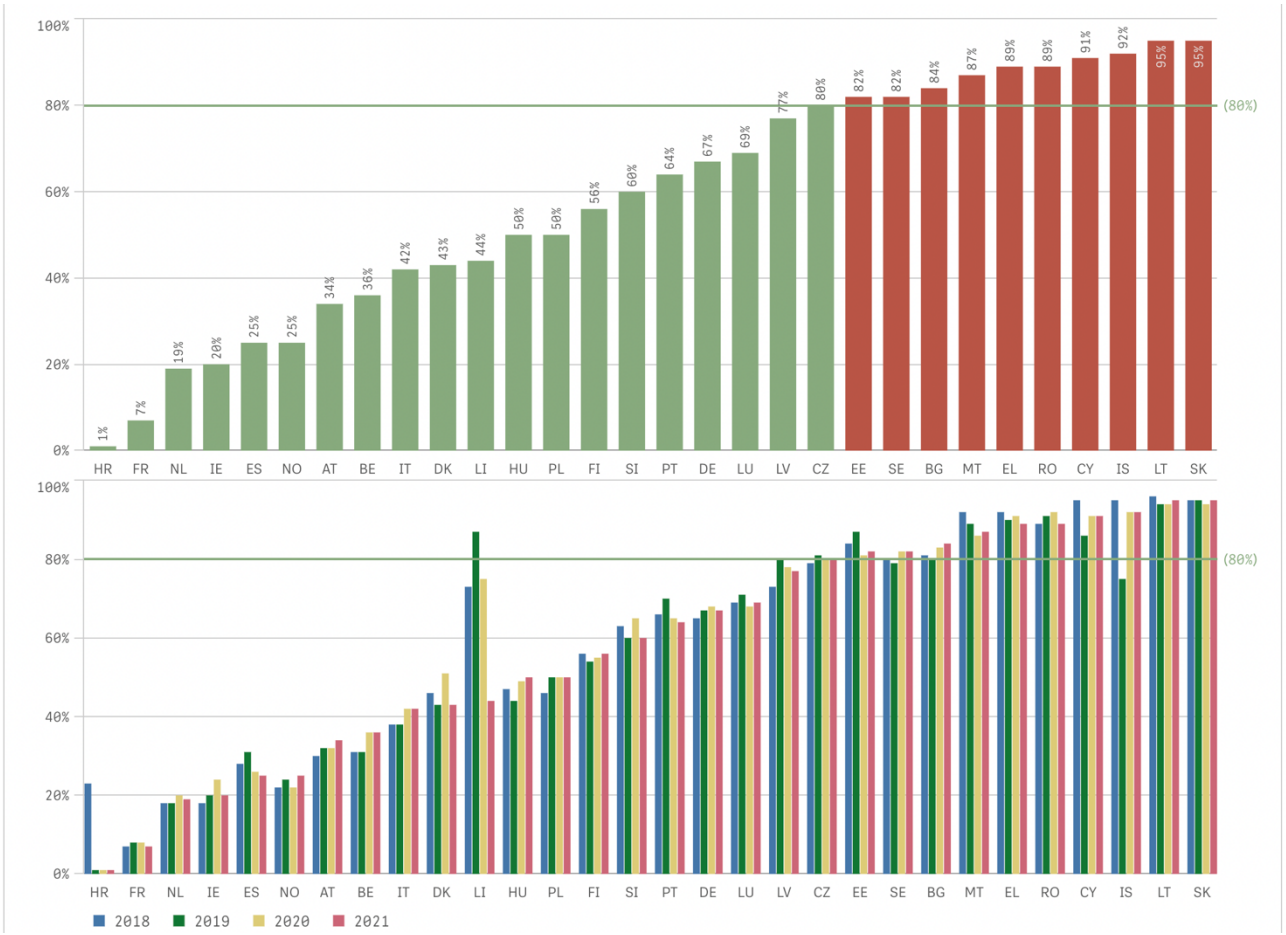
[2] Art. 96 of the Procurement Code provides that life cycle costs include, as relevant, all or parts of the following costs associated with the life cycle of a product, service, or work:

Other award criteria, such as technical merits, quality, performance, aesthetics, and functionality also allow for the detection of innovative bidding. Finally, the criterion that would most likely encourage, to a greater degree than others, steering the public contractor's choice towards innovation is the "innovative nature of the offer." The latter criterion is little used because it is not always easy to clearly define the innovative nature of the required solution prior to bid submission.

Figure 2 shows the proportion of procedures awarded solely because the offer was the cheapest one available. This indicator reflects how public buyers choose the companies they award contracts to. Specifically, it shows whether they decide based on price alone, or whether they also consider quality.

(a) costs incurred by the contracting authority or other users, such as (1) costs related to acquisition; (2) costs related to use, such as energy consumption and other resources; (3) maintenance costs; and (4) end-of-life costs, such as collection, disposal, and recycling costs.
(b) costs imputed to environmental externalities related to products, services, or works over the life cycle, provided their monetary value can be determined and verified. Such costs may include the costs of emissions of greenhouse gases and other pollutants, as well as other costs related to climate change mitigation.

Figure 2 – Award criteria: cheapest offer available (share)



Source: Single Marked Scoreboard (2023)

Technical feature

Precise technical specifications that refer to existing, administration-proven solutions can hold back the development of innovative solutions. Administrations, as well as officials in charge of procurement processes, do not always have the experience or skills to assume what is the best way to meet community needs. A functional description of needs that does not prescribe, in detail, the means or techniques to be implemented but rather the outcome and performance to be achieved should be considered, as a more open approach to innovation. The functional approach seems particularly suitable for meeting emerging needs and the consequent purchase of goods and services in market segments that are constantly changing and are, therefore, characterized by great uncertainty. However, such an approach is also suitable and desirable for more common and recurring purchasing segments.

Variants

Under Art. 95, c. 14 of the Procurement Code, contracting authorities may authorize or require bidders to submit variants. Variants allow, on the one hand, companies to demonstrate their knowledge and capacity for innovation and, on the other hand, administrations to optimize the fulfilment of their needs with alternative products, processes, services, or methods that were not

necessarily foreseen, or foreseeable, when the tender was being prepared. In a comparison of Italy with France, Germany, Spain, and UK the percentage of tender notices that allow variants is around 10%, less than half the percentage recorded in France and slightly less than that recorded in UK (TED, 2019).

Recurring procurements

Recurring procurements should be considered as not particularly open to innovation because the award of a contract gives a firm a comparative advantage over other competitors. Over time, this can lead to reduced competition and foster the locked-in phenomena. In Italy, recurring contracts are around 15% above the EU average (TED, 2019).

Competitive dialogue

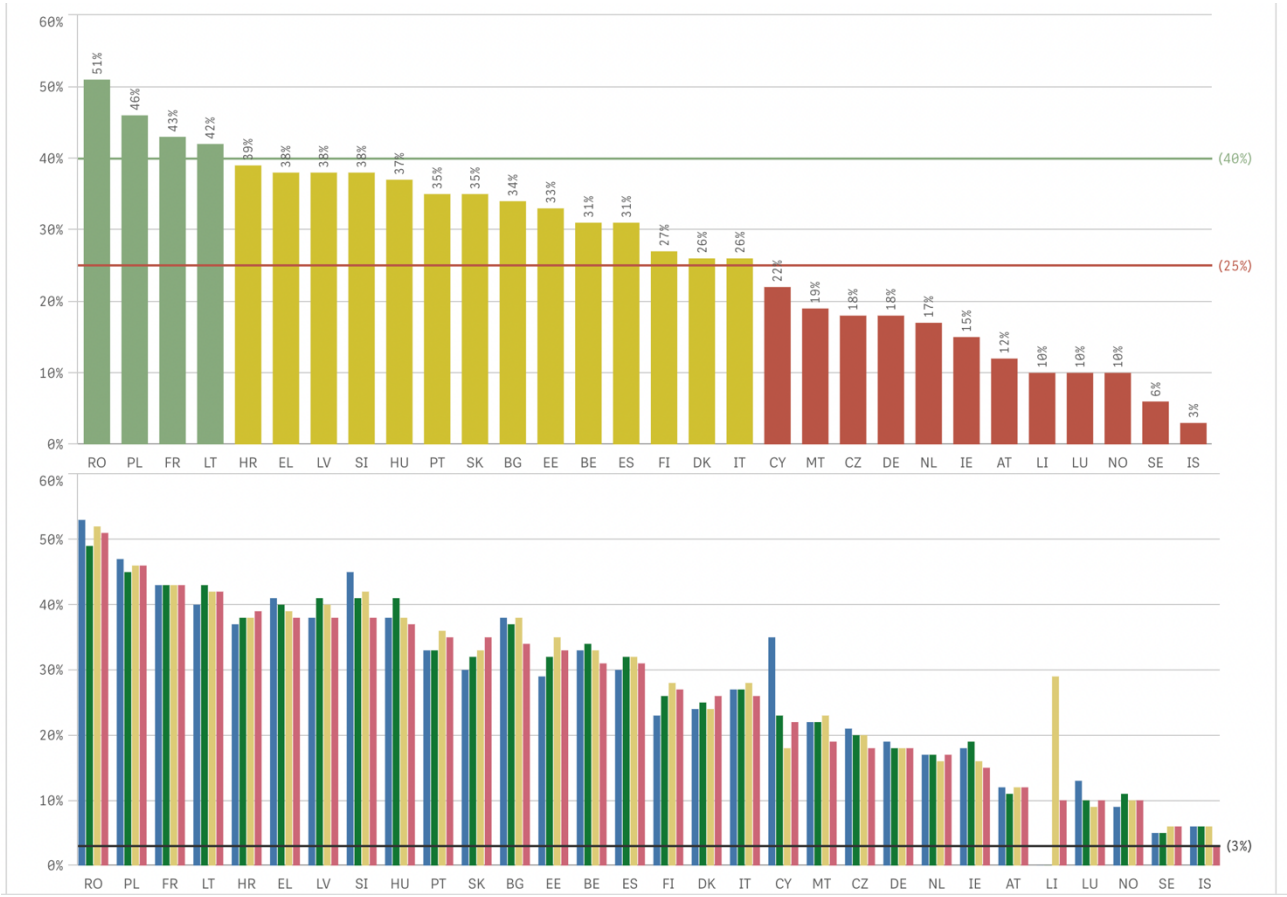
Competitive dialogue is a procedure provided for by Dir. 2004/18/EC and Legislative Decree No. 50/2016 for the award of a contract that is "particularly complex" [...] that is, when the contracting authority: is objectively unable to define, in accordance with Article 68, paragraph 3, letters b), c) or d), the technical means capable of meeting its needs or objectives. This procedure allows local governments to engage with private operators with up-to-date expertise and knowledge about innovation, enabling public entities to receive support in identifying and choosing suitable solutions to meet the needs of the territory and the community. Competitive dialogue allows a comparison to take place that facilitates public administration learning from the market. This is essential in a context where innovations are continuous and where, increasingly, it is the economic operators who are the most informed about the functional characteristics of the works, services, goods, or possible object of the contracts.

In addition, at the time when a need is presented to the market, the public operator is also able to understand the maturity of the market and which procedure is most suitable to meet the procurement needs. For example, the government might judge the market to be 'not mature' and use pre-commercial procurement to allow interested companies to develop an innovative prototype that could then be procured at a later stage via PPI (see Figure 1). In Italy, this procedure is hardly used compared to in the UK, Germany, and France. The numbers presented should prompt reflection on possible regulatory and/or policy actions that could encourage competitive dialogue (TED, 2019).

The participation of small and medium-sized enterprises

There are several arguments in support of the idea that the participation of small and medium-sized enterprises is a favourable condition for the procurement of innovation by public administrations. In fact, many countries, partly because of the provisions of European Directives 23/2014 and 24/2014, have introduced policies aimed at encouraging the participation of SMEs and start-ups in procurement processes. This is achieved, for example, through the introduction of specific targets, by favouring a division of contracts into lots, through the use of e-procurement platforms to facilitate the exchange of information, and, finally, by incentivizing prepayment systems.
Figure 3 below shows the proportion of tenders divided into lots.

Figure 3 – Procedures divided into lots

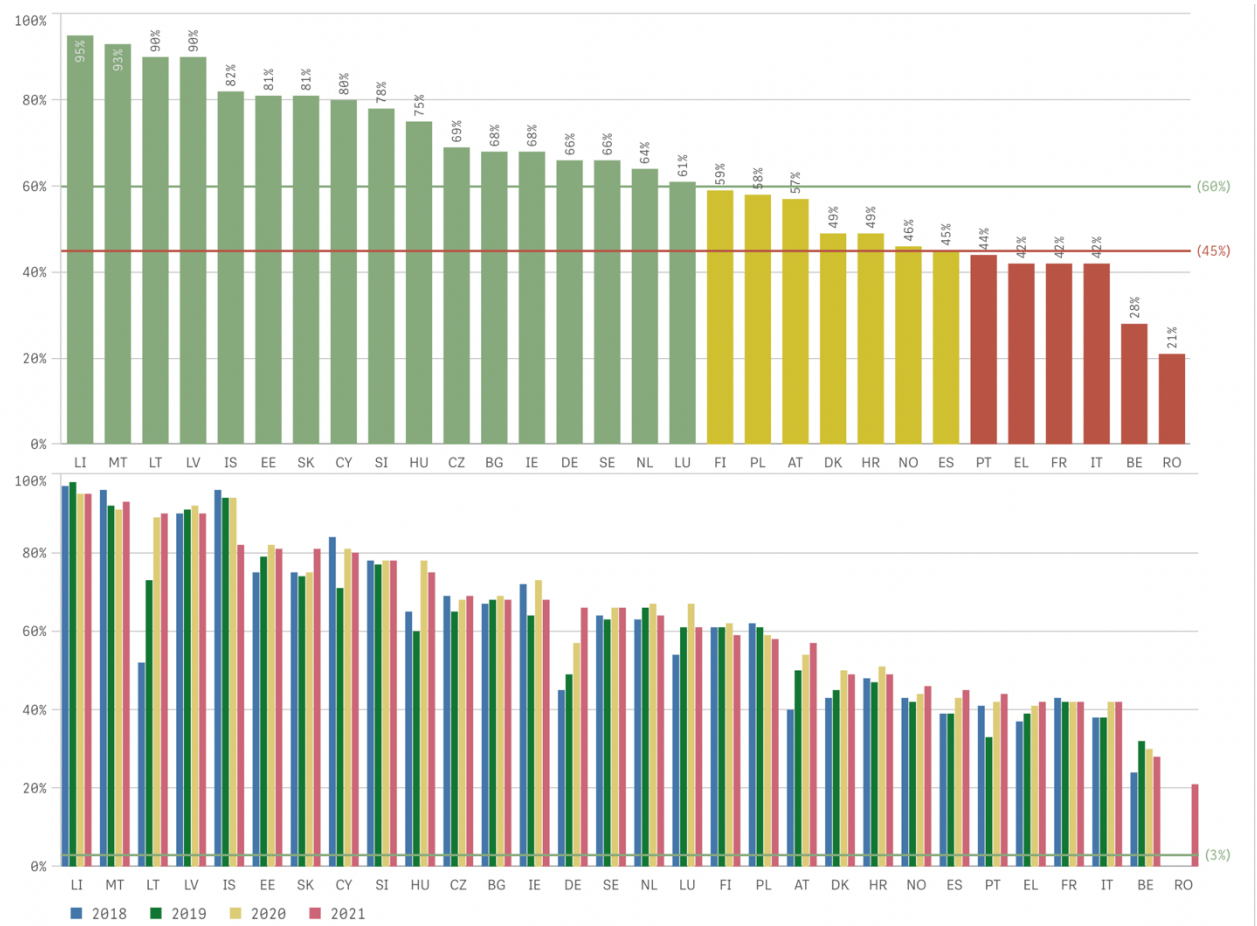


Source: Single Marked Scoreboard (2023)

In Italy, only the 26% of tenders are grouped into lots. This suggests that large companies are able to more easily bid for public contracts. From the other side, this also implies that public buyers are missing opportunities provided by small and medium firms.

Figure 4 reports the share of contractors involving SMEs in 2021. It reveals a significant gap between Italy and most of the EU Member countries in the participation of SMEs in public procurement activities.

Figure 4 – SMEs contractors (share) in 2021. *Source: Single Marked Scoreboard (2023)*



Italy stands at the bottom of the ranking in terms of awarding contracts to SME. This low involvement of SMEs suggests the presence of significant barriers preventing small firms from participating in procurement procedures (e.g. red tape, calls for tender biased against smaller firms, or low capacity among smaller firms to compete). This gap is particularly problematic since Italy is one of the countries in Europe with the largest share of SMEs.

6 Regulatory action: what actions facilitate innovation procurement

6.1. Intellectual property rights

The EU public procurement directives (23, 24 and 25/2014/EU) and state aid rules afford Member States a degree of flexibility in determining the distribution of intellectual property rights between buyers and suppliers. In many circumstances, the standard terms and conditions set out in national legislation do not contain provisions regarding intellectual property or licensing terms and conditions (European Commission, 2005). However, the way the matter is regulated at the national level influences the propensity of suppliers to offer innovation. There are two main options, although some variations of and between the two are also possible. The first option is for the public purchaser to obtain all new intellectual property rights derived from the project. The second option concerns the possibility for the supplier to retain all new intellectual property rights derived from the project. The first is the most common option, in which the procuring entity is entitled to all the results obtained from the project, due to bearing all the costs of the project. In this option, however,

it is possible that suppliers may not be able to reuse or even adapt/improve the product or service in a different context or for a different customer, curbing the propensity to offer an innovative product. In fact, where there is no overriding public interest that drives public purchasers to retain all or some intellectual property rights, such rights may be left to suppliers. In certain circumstances, suppliers may have greater abilities than public purchasers to commercialize innovations derived from a public procurement, to ensure adequate protection of intellectual property, and to defend intellectual property rights in court. In such cases, however, public buyers may find it necessary to retain rights to, free of charge, employ the innovative solutions. Public buyers may also require suppliers to license the rights to certain third parties under fair and reasonable market terms.

However, in most European countries, including Italy, procurers assume full ownership of intellectual property rights although, as mentioned, European procurement directives would allow the transfer of intellectual property to the supplier. Not regulating the distribution of intellectual property rights differently is perceived by companies, SMEs in particular, as a major barrier to procurement of R&D and innovation.[3]

Instead, granting suppliers the ability to retain intellectual property rights can incentivize the commercialization of innovative solutions at the industrial level, and reduce the costs related to procurement incurred by the public sector. The regulatory implication for Italy would be a shift in perspective by automatically granting suppliers intellectual property rights. What is currently the norm would thus become the exception, which, as we see in the Belgian case, would have to be duly justified. At present, several countries in Europe (Belgium, Estonia, Spain, Finland, France, Hungary, Ireland, the UK, Luxembourg, and Sweden) have adopted regulations that give suppliers more options to retain intellectual property rights by securing user rights for government contractors.

Box 2. The Belgian case

Belgian case

In Belgium, national public procurement legislation stipulates that intellectual property rights always remain with the suppliers, while the buyer is entitled to the rights of use. Exceptions are made in duly justified cases where the supplier cannot be allowed to market the goods and services offered to the public administration (e.g., due to confidentiality reasons, as in the cases of internal evaluation services). If the developer wishes to use the copyrighted work, they must request this in the technical specifications by providing for fair treatment for the transfer or assignment of rights, or use of the licence. Intellectual property rights also protect scientific work (product design, product, specifications, tests, etc.).

Specifically, the Royal Decree of January 14, 2013, establishes the implementation rules for public procurement, which applies the principle that the public procurer does not automatically acquire ownership of the intellectual rights to goods and services created, used, or developed as a result of a public contract. The decree defines that the default scenario is for contractors to retain intellectual property rights in the provision of goods, or during the execution of works or services, by granting the necessary licences to the public procurer to allow the results to be used.

[3] Public Consultation on Respect for IPR and Trade Secrets in Public Procurement in Europe, 2016, http://ec.europa.eu/growth/content/consultation-respect-intellectual-property-publicprocurement-procedures_it

The Royal Decree assigns intellectual property rights, by default, exclusively to the public buyer for designs, distinctive emblems, and domain names created during a public procurement contract. In principle, a public purchaser can depart from this scenario by explicitly requiring that intellectual property rights arising from the contract be transferred to itself rather than to the contractor (as described in Article 53 §1 of the Belgian Public Procurement Act). The exception notes that such a transfer should never be necessary because a licence to use is sufficient for the public purchaser. A transfer of intellectual property rights for the public contractor may be justified, for example, when the result of a procurement is not reusable by the contractor but only by the public purchaser, for example a sensitive/confidential study (e.g., an internal evaluation) or a communication campaign unique to the public procurer (e.g., a logo design).

6.2. Measures to support the participation of SMEs

As we have seen in the previous sections, in Italy the participation of SMEs in the above-threshold calls for tenders published in the *Official Journal of the European Union* is lower than the EU average. This low participation, especially in a country characterized by an industrial fabric dominated by small and medium-sized companies, may be indicative of a procurement system that is not especially open and, therefore, not particularly receptive to market innovations. One of the main challenges of innovation procurement is to attract innovators, most of whom may be start-ups in high-tech sectors and innovative SMEs.

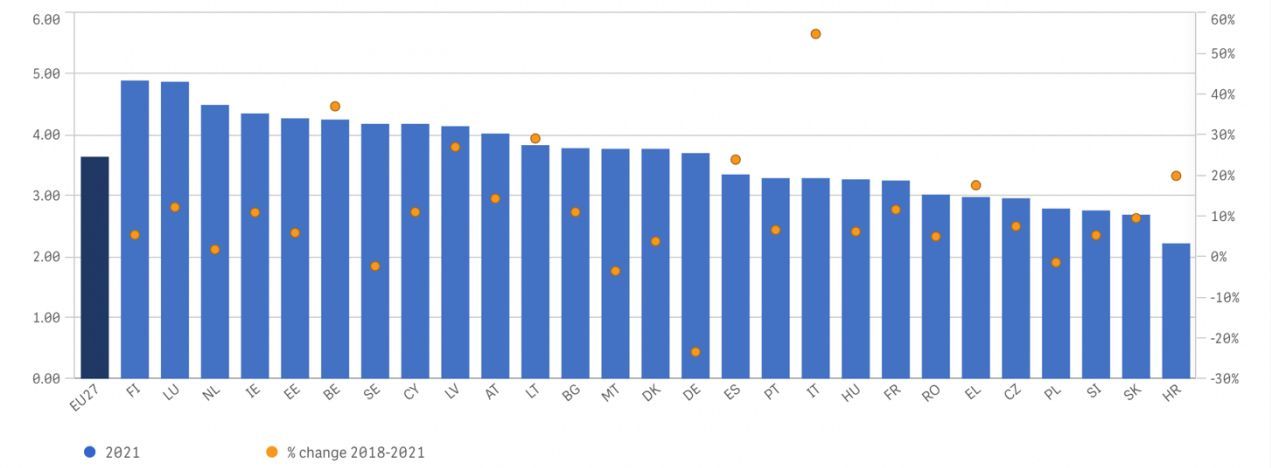
However, there are several obstacles to the participation of SMEs in public tenders that put them at a disadvantage compared to larger competitors. Among the biggest obstacles are the high costs faced by SMEs in terms of risks and administrative burdens, as well as the more limited options for accessing the credit market. Moreover, most often start-ups and SMEs lack the proven skills and experience generally required by public buyers. To encourage SME participation, there are several desirable policy interventions.

6.2.1. Reduce the administrative burden

The administrative burden often deters SMEs and start-ups from participating in public procurement procedures. Very often, public tenders require prospective suppliers to provide administrative certificates proving their legal standing and economic and financial capacity. New European Union directives (24/2014 and 25/2014) have simplified these requirements. Currently, bidders can submit a self-declaration documenting compliance with all administrative prerequisites, accompanied later by certificates attesting to their validity only if the bid submitted is considered the best. The introduction of an electronic version of this self-declaration – the Single European Tender Document (DGUE) – has further facilitated the procedure. The DGUE is a self-declaration of the financial status, capacity, and suitability of companies to participate in a public procurement procedure. It is taken as preliminary evidence of compliance with the conditions required in the call for tender.
Currently, Agency for digital Italy (AgID) coordinates a group of Italian public institutions – ANAC, Consip, Intercent-ER, the Ministry of Infrastructure and Transport, and Unioncamere – for the implementation, deployment, and integration of DGUE on the main e-procurement platforms.

Figure 5 reports the burden of government regulation by tracking responses to the survey question: "In your country, how easy is it for companies to comply with government regulation and administrative requirements (e.g., permits, reporting, legislation)?" (1 = Overly complex; 7 = Extremely easy). For this indicator, higher values indicate a better performance (i.e., less burdensome regulation) and vice versa. The right axis of the chart indicates the percentage change since 2018. The Italian performance is below the UE average.

Figure 5 – Burden of government regulation



Source: World Economic Forum

6.2.2. Adjustment of selection criteria, lot division and payment systems

Economic operators are frequently asked to provide high financial guarantees to prove their financial capacity and, often, the required turnover may be significantly higher than the value of the contract in question. This requirement, however, does not necessarily guarantee the proper execution of the contract and, moreover, excludes all potential bidders who, despite having smaller turnovers, may have the required capacity and, more importantly, a better solution. Under the new European rules, public buyers cannot require a turnover that exceeds twice the estimated value of the contract, except in specific, duly justified circumstances. This rule facilitates the participation of start-ups and innovative SMEs that are most likely to be newly established and may have a relatively small turnover.

Public purchasers enjoy greater flexibility in establishing selection criteria, which can further encourage the participation of SMEs. For example, the minimum turnover required in accordance with the criteria regarding financial capacity may be set as corresponding to (and not exceeding) the value of the bid submitted, while the bidder's average annual turnover for the past three years with a closed financial year may exceed the value of the bid. Such arrangements would encourage the participation of SMEs.

Where this is not sufficient, the procurement could be divided into lots, which is another way to attract innovators. The rationale for this can be found in the possibility that the value of each lot

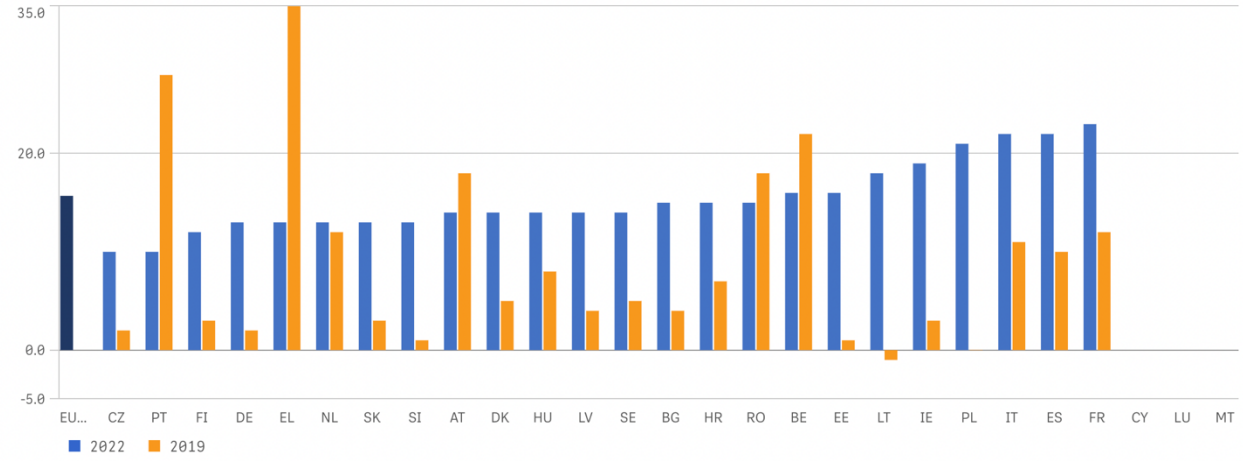
could be proportional to the operational capabilities of start-ups and innovative SMEs. Where there has been a competitive dialogue, or other procedures that allow a good knowledge of the market, the procurer would have the opportunity to recognise whether the most innovative suppliers might be SMEs and whether they could be encouraged to bid through the subdivision of the tender. The use of lots is also aimed at reducing dependence on a single supplier. Indeed, governments can establish interoperability and/or open standards requirements to link the different blocks of a product, service, or activity that contractors deliver into various lots. Under new EU rules, public administrations are expected to consider the division of all public procurement into lots, precisely to benefit SMEs and, consequently, competitiveness and innovation.

It should be pointed out, however, that the use of lots to facilitate the participation of smaller innovative suppliers should be offset by minimizing the administrative burden that would result from engaging a single contractor. This trade-off could be offset by public incentives to procurers who express an interest in having SMEs participate (see Incentives section).

Finally, to broaden participation to include innovative start-ups and SMEs, advance payment systems should be provided to address the lack of the resources that are needed for the start-up phase of the public contract. There are several examples in Europe of payment systems for start-ups and SMEs depending on whether the latter is a direct contractor or a subcontractor. In the case of a direct contractor, providing advance payments could be a decisive factor in enabling SMEs to participate. In the case of being a subcontractor, it is possible for Member States to require public purchasers to make direct payments to subcontractors. By shortening the payment chain, subcontractors, such as start-ups and innovative SMEs, would be able to be paid upfront, thus ruling out the risk of late payments due to any shortcomings on the part of the main contractor.

Figure 6 shows the delays by public authorities in making payments to businesses. The indicator shows the number of days by which public authorities missed contractual payment deadlines. Data for 2019 and 2022 are compared. Here, lower values indicate a better performance, since the goal is to reduce payment delays. In this case, the Italian performance is worse than the EU average, as the delay values are higher; moreover, the delays increased significantly from 2019 to 2022.

Figure 6 – Payment delays by public authorities



Source: Intrum, European Payment Report 2022. Survey-based indicator by asking businesses about payment delays.

The boxes below show two examples of interventions that can be easily implemented in Italy.

Box 3. Payment systems in favour of start-ups and SMEs

Payment systems in favour of start-ups and SMEs: the case of Paris
Following a study conducted on the procurement system of the city of Paris, it was found that the usual payment schemes, characterized by small interim payments and large payments made at the end of the procurement process, were an obstacle to the participation of SMEs. To overcome this obstacle and enable the participation of start-ups and innovative SMEs in public procurement, in 2017 the Paris authorities decided to increase the rate of advance payments from 5% to 20%; this led to a 25% increase in their participation.

Box 4. Disincentivizing deferred payments

Disincentivizing deferred payments: the case of Madrid
The Spanish Public Procurement Code allows contracting authorities to include among the criteria for assessing financial capacity, the average time taken to pay subcontractors the payments due. In 2016, the city of Madrid included in a waste collection contract a penalty for failure to pay subcontractors that amounted to 50% of the amount due.

Finally, several countries have adopted spending targets to allocate a share of public procurement to contracts with SMEs. In the United States, for example, policies to encourage the participation of SMEs in the procurement system date back to the introduction of the Small Business Act in 1978. Currently, all government agencies are bound to allocate 23% of the value of all new contracts to SMEs. In South Korea, an incentive policy was implemented in 1996, when the government stipulated that certain government departments should purchase technology-intensive goods and services produced by SMEs. The policy, which was not particularly successful due to several

administrative and technical limitations, was revised in 2005 and purchases in this segment more than tripled after 2005 (Uyarra, 2016). Finally, in the Netherlands, the Ministry of Economic Affairs' SME Cooperation Agenda 2016–2017 (MKB Samenwerkings agenda 2016–2017) provides for local government support for SMEs and start-ups to participate in innovation procurement.

6.3. Incentives for public procurers

Several countries in Europe have provided direct incentives to public procurers aimed at encouraging the procurement of innovation. The rationale for such interventions lies in the fact that, often, the procurement of innovation requires complex procedures, long lead times, and risks related to the uncertainty that characterizes the outcomes of an innovative demand. A regulatory intervention, or an action plan, could include a reward system for public administrations, for example in the form of financial coverage for innovation tenders, or through personal incentives to public administrators who purchase innovation. Among the most interesting practices in Europe are the cases of Finland and the Lombardy region.

Box 5. Finland, the Tekes Smart Procurement Programme

The Tekes Smart Procurement Programme in Finland
The Tekes Smart Procurement Programme in Finland requires the innovation funding agency, Business Finland, to provide grants to public administrations through disbursement of funds. All public administrations are eligible for funding. The grant covers 40–50% of the total expected costs in the preparation phase of a procurement. The public purchaser is expected to use the grant to obtain additional expertise, build collaborations, undertake market consultations, and carry out pilot or R&D projects to strengthen cooperation with potential providers of innovative solutions. Between 2013 and 2016, the programme funded more than 70 innovation procurement projects on a range of horizontal topics such as digitization, energy efficiency, transportation, safety, health, and the environment.

Box 6. The case of incentives in the Lombardy region

Employees incentives in Lombardy
In Lombardy, there is an incentive system for public employees in the form of bonuses linked to the achievement of regional policy goals in innovation procurement. In addition, administrative office managers have specific career goals linked to the demand for innovative public goods.

7 Spending targets

In the CNR's Report on Research and Innovation in Italy (2019), it is calculated that an innovation public procurement spending target set at 1% of the total value of public administration purchases would result in an annual increase in public demand for R&D of about EUR 1.35 billion. The direct impacts would be significant, with multiple indirect benefits also. The share of R&D procurement in total public R&D spending funded by universities and public institutions alone would rise from 1.8% to approximately 16%, increasing its value from 8.4 to about EUR 10 billion; total R&D spending would raise the ratio of R&D to GDP from 1.35% to 1.5%.

At present, six countries in Europe have spending targets, either centrally or regionally, for public procurement of innovation. In no case are there different targets for different components of smart public demand (i.e., R&D procurement; public procurement of innovation; and pre-commercial procurement).

The table below provides a review of the spending targets.

Table 1. Spending targets in Europe.

Country Target	Target	Level of Government	Action Plan	Separate goals
Belgium (Flemish Government)	3% of total spending on public procurement of goods and services	Regional	YES	Valid for PCP, PPI, and R&D procurement
Finland	5% of total spending on public procurement of goods and services	Central government	YES	Valid for PCP, PPI, and R&D procurement
Lithuania	5% of total spending on public procurement of goods and services.	Central government	NO	Valid for PCP, PPI, and R&D procurement
The Netherlands	2.5% of total spending on public procurement of goods and services.	Applicable to national entities that have signed the Action Plan	YES	Valid for PCP, PPI, and R&D procurement
France	2% of total spending on public procurement of goods and services	Central government (only hospitals and ministries)	NO	Valid for PCP, PPI, and R&D procurement
Italy (Lombardy region)	5% of total spending on public procurement of goods and services	Regional	NO	Valid for PCP, PPI, and R&D procurement

As the table shows, the highest spending targets (5%) were set in Lithuania and Finland, but in both countries they apply only to central government authorities and not to local governments (regions and municipalities). In Finland, the target is defined in the Finnish Government programme 2015–2019 and is applicable to all central governments.[4] It is also worth mentioning that the Finnish Ministry of Transport, a key player in the innovation market, has committed to allocate 10% of its spending to PPI.

[4] Finland, a land of solutions - Strategic program of Prime Minister Juha Sipilä's Government, May 29, 2015

However, the spending target is only one component of a structured policy on procurement for innovation, which includes support activities for central and local governments as well as the development of tools to facilitate the implementation of smart public demand calls. This policy is defined in the Action Plan, adopted in December 2017, dedicated to procurement for innovation, which was initiated by the Ministry of Economy and Employment.[5] The overall purpose of the Action Plan is to promote a more strategic approach to innovation procurement at the government level and to improve the management and preparation of procurement in different sectoral areas. The specific objectives of the Action Plan are to:

- promote a more strategic approach to innovation procurement;
- promote better procurement management and preparation in administrative branches;
- create a systematic development process for cooperation between representatives of industry sectors and government administrations;
- support the government's goal of increasing the innovation procurement share of all government contracts to 5%.

In addition, the achievement of expenditure targets is verified by a monitoring and evaluation activity that also involves universities and research centres, such as the VTT Technical Research Centre of Finland Ltd. In particular, the latter was tasked with establishing a monitoring and evaluation programme, beginning with formulating a definition of PPI to understand how to identify innovation procurement.

In the Netherlands, the central government, through a Communication from the Minister of Economy and Finance to the Representatives of the Chambers (2011),[6] set a target for spending on innovation procurement at 2.5% of total spending on public procurement of goods and services. The target applies only to central governments and is non-binding in nature. Only a few authorities, including the Directorate General for Public Works and Water Management (Rijkswaterstaat) have formally committed to the 2.5% target. The text of the Communication mentions a few actions that would encourage innovative procurement. Specifically, it envisages the creation of supply and demand matching platforms, so-called 'sectoral tables', aimed at facilitating the emergence of public administration's innovation needs and the exchange of information between the market and academia.

[5] https://tem.fi/documents/1410877/2132296/IJH+Toimenpidesuunnitelma.pdf/3fe413eb-0fd5-4dc3-9797-74ce98694503

[6] https://zoek.officielebekendmakingen.nl/kst-32637-15.html

BOX 7. Target Spending. The Dutch Case.

Letter from the Minister of Economic Affairs, Agriculture and Innovation and the Secretaries of Finance and State, Education, Culture and Science, to the President of the Lower House of the States General
[...] The government is committed to spending 2.5% of the government's procurement budget on innovation-oriented procurement. Alternatives that have innovation-oriented procurement as a structural anchor have also been explored: • EL&I, BZK, and I&M bring together government clients and the business community in leading sectors at so-called industry-oriented tables. At these tables, EL&I, BZK, and I&M reach performance agreements within their own organizations and with government administrations. The first performance agreements will be concluded in early 2012, whereby alignment will be sought with the knowledge and innovation contracts of the leading sectors and the needs of the government. • Through market meetings and a digital "meeting point" for supply and demand to be developed in conjunction with the Ministry of Infrastructure and Environment, companies are quickly informed of other sustainable and innovative procurement needs from central and regional government. The meeting point will be ready in early 2012.

In France, the National Pact for Growth, Competitiveness, and Employment (2012) set a target for innovation procurement spending to be achieved by 2020. However, the spending target was set only for ministries and hospitals; furthermore, there is no formal commitment to reach the 2% target (partly because of the absence of monitoring and data collection activities).

In Italy, the Lombardy region has committed to allocating at least 3% of the purchase of goods, services, and works to innovative solutions and products of research. The provisions set out in the Regional Law – Nov. 23, 2016, No. 29 – "Lombardy is research and innovation" aims to "strengthen, also through the lever of public demand for innovation, regional investment in research and innovation, in order to foster the competitiveness of the economic-productive system, the growth of human capital, sustainable development and to contribute to raising social welfare and the quality of services provided to citizens and businesses."[7]

Box 8. Target spending: the Lombardy region

Art. 2. (Governance of the regional research system) *4. The strategic programme referred to in Paragraph 2 defines a minimum spending target, not less than 3% of the resources annually allocated for the purchase of goods, services, and works by the region and the regional system referred to in Article 1 of Regional Law December 27, 2006, no. 30 (Legislative provisions for the implementation of the regional economic-financial planning document, pursuant to Article 9b of Regional Law March 31, 1978, No. 34 'Rules on the procedures of planning, budgeting and accounting of the Region' – connected 2007), to be allocated to the purchase of innovative solutions and research products, including through pre-commercial procurement and green procurement. The strategic programme also contains the indication of priority areas for which to use precommercial procurement.*

[7] http://normelombardia.consiglio.regione.lombardia.it/NormeLombardia/Accessibile/main.aspx?exp_coll=lr002016112300029&view=showdoc&iddoc=lr002016112300029&selnode=lr002016112300029

In addition, it is worth mentioning that in Italy an amendment was proposed in the 2020 national budget law that suggested introducing a spending target for all regional governments, at 1%.

Box 9. Amendment submitted to the finance bill. Art. 71. BIS

Amendment submitted to the finance bill. Art. 71. BIS

1. *In order to promote the efficiency of public spending, the contracting governments, referred to in the next paragraph, shall allocate a share, calculated over the two-year planning period for services and supplies and the three-year period for works, of not less than 1% of the total commitment of the same spending period through:*
(a) procurement of research and development services for new solutions not found in the market;
(b) procurement of innovative solutions and products.
2. The Administrations subject to the obligation under the preceding paragraph are:
(a) contracting authorities whose two-year programme of supplies and services referred to in Article 21, paragraph 1, of Legislative Decree No. 50 of April 18, 2016, as amended and supplemented, provides for a total expenditure of more than 20 million euros;
(b) contracting authorities whose three-year works programme referred to in Article 21, paragraph 1, of Legislative Decree No. 50 of April 18, 2016, as amended and supplemented, provides for a total expenditure of more than 50 million euros.
3. For the purchases referred to in paragraph 1, contracting authorities are required to use the procurement procedures referred to in Articles 64, 65, and 158, paragraph 2 of the Public Contracts Code.
4. For the purposes of the implementation of this article, the Contracting Administrations shall consider the possibility of entering into specific understandings or programme agreements with the Digital Italy Agency, due to the expertise acquired in the sector and the tasks identified with Article 19 of DL 179/2012, and with aggregator entities.

By expanding the target to all national governments, the leverage effect that would be produced in the economic system would go even further than the increase of EUR 1.35 billion per year in R&D investment predicted in the Research and Innovation Report. However, European countries with structured policies on PPI have not yet adopted specific spending targets (among others, Austria, Sweden, and the UK). This is mainly attributable to the fact that, partly because of the measurement and identification problems mentioned earlier in this report, it is not always easy to recognize innovation procurement. The difficulty of objectification makes clear at least three critical issues: one ex-ante, attributable to the logicality of setting a target without a prior measurement exercise that quantifies the status quo of spending on innovation procurement; one in progress, related to the ability of the public administration to demand goods and services that are actually innovative, as defined in the Frascati manual; and one ex-post, related to the difficulty of assessing the achievement of the target and measuring the impact of the legislation.

A regulatory intervention could provide for a spending commitment by public administrations, not in terms of purchases but in terms of innovation needs. For example, regulation could bind public administrations (perhaps those that have planned a total expenditure of more than EUR 20 million) to allocate a share of the total purchases planned in the two-year supply and services procurement programme to a set of needs and critical issues that can be expressed in terms of results to be achieved and as market challenges. (See Annex 1 for examples of needs expressed by the Italian public administration).

A timely and appropriate needs identification and assessment exercise would require that government departments initiate an understanding of both internal and target user needs in good time. Moreover, the identification of needs in a planning document would ensure proper information about the market is obtained, which would consequently be oriented towards the needs and challenges posed by the public administration.

8 The importance of measurement

As mentioned earlier, a measurement, monitoring, and evaluation exercise is essential not only to understand the status quo of innovation spending but also to analyse and capture the needs of the public administration, any administrative gaps limiting innovation procurement, and the amount of unexpressed demand for innovation, held back by the risk aversion of public administrations, which manifests as an inertia that characterizes some procurement practices and the locked-in phenomena. Monitoring and evaluation systems are being tested and defined in several European countries to enable measurement of spending.

Box 10. Examples of monitoring and measurement activities

In **Austria**, public procurement for innovation has been a priority under the federal research, technology, and innovation strategy since 2011. An action plan was adopted to put this strategy into practice and to strengthen synergies with other policy areas. A monitoring system was established in 2014 to measure Austria's annual spending on innovation procurement.
In **Germany**, the new regulation for statistical data (§98 and §99 Law against Restrictions on Competition – Gesetzgegen Wettbewerbsbeschränkungen, GWB) requires contractors to provide specific information on the type of procurement, including information on procurement categories such as innovation and environment. There have also been other measurement exercises in the country.
A good practice for data collection is the system designed in **Estonia** to measure innovation procurement. The monitoring system allows contracting authorities to directly mark potentially innovative bids on the e-procurement system. The information provided by the contracting authorities is then verified with a sample survey.

In Italy, AgID carries out a monitoring activity of innovation procurements, focusing on all procurements that are currently measurable and identifiable, such as pre-commercial procurement (for which AgID also plays the role of central purchasing body or contracting station). However, there is no structured monitoring and evaluation system in Italy that is aimed at measuring innovation procurement as a whole.

The CNR, also based on the measurement systems implemented and tested in other countries, could develop a system for monitoring innovation procurement that would involve defining a metric to measure PPI and a series of pilot surveys to understand the actual spending of administrations. For example, a questionnaire could be sent out to a sample of contracting stations at the time of publication of a call for tenders, with the aim of identifying the public contracts that led to innovation procurement. The questionnaires could ask public administrations whether the goods and services purchased:

• have been recently developed for the organization, including R&D services (development initiator);
• were, for the first time, purchased by the government (first buyer);
• were new to the market and new to public administration (diffusion accelerator).

The results would then be analysed to verify the responses in terms of the outcome of the procurement. This process could provide useful recommendations to devise an automatic detection system on countries' e-procurement portals, which would include, among the publication obligations on the part of the contracting stations, the possibility of indicating on the centralized public procurement platform the type of innovation procurement: PCP or new PPI.

9 PNRR[8] and public procurement

The need to improve the performance of public procurement in Italy is so evident that a special chapter of the PNRR is dedicated to reforming the national public procurement system, particularly through the measure called the 'Recovery Procurement Platform'. The initiatives planned in this area aim, on the one hand, to simplify the rules and strengthen the capacity of the public administration sector, and, on the other hand, to digitize the administrative procedures.

Reducing the number of rules and starting a programme of re-training in the contracting authorities are the two key elements of the 'simplification plan'. The measures in this area include the reduction of red tape currently in place with reference to the integrated procurement and subcontracting, as well as training and support activities for operators through an articulated programme of professional training and mentoring.

The goal of the plan is to ensure full interoperability between public bodies and their information bases, enabling streamlined public procedures through the full realization of the 'once only' principle (and EC goal/standard) – an e-government concept whereby citizens and businesses should be able to provide their information 'once only' to the authorities and the various administrations.

The evolution of public procurement processes also includes important innovations in the e-procurement system, through end-to-end digitization of the procurement process. This includes some forms of Smart Procurement, leading to the complete digitization of procurement procedures; the interoperability of the eProc System with the management systems of public administrations, economic operators, and other parties involved in public procurement processes (control and monitoring bodies, procurement aggregators, etc.); and the use of artificial intelligence and machine learning systems for the observation and analysis of trends in the use of procurement tools.

The plan is highly ambitious, and only at the end of the activities planned for 2026 will it be possible to understand whether public procurement has become a strategic objective of public policies in

[8] The National Recovery and Resilience Plan (Piano Nazionale di Ripresa e Resilienza, NRRP) is part of the Next Generation EU (NGEU) programme, namely the €750 billion package – of which about half is in the form of grants – that the European Union negotiated in response to the pandemic crisis.

Italy. Furthermore, it remains to be seen whether, and to what extent, the plan has succeeded in upgrading the skills of the personnel and in broadening the opportunities for experimentation in pre-commercial and innovation procurement.

10 Conclusions

Italy needs a coherent, long-term action plan that precisely defines goals, tools, and strategic priorities. It is essential that innovative public procurement become a strategic objective in all policy documents, both sectoral and horizontal, of central and regional governments. In line with what is being done in several countries in Europe, we recommend the adoption of spending targets dedicated to innovation procurement. However, these spending targets must be accompanied by data collection and monitoring.

Finally, a key lever for increasing spending on innovative procurement lies in strengthening the skills of public administration, especially regional and local government. The complex nature of pre-commercial and innovation procurement requires skills and space for experimentation that are often lacking. Hence there is a need to design and invest in, drawing on the resources provided by the Programmes co-financed by the European Structural and Investment Funds, a facilitation, support, training, and coordination initiative that affects the innovation procurement processes of public administration by strengthening the work already done by the Digital Italy Agency.

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1. Annex 1

Examples of Needs

Sector	Promoter	Issue
Energy and environment	Calabria Region	NEW TECHNOLOGIES FOR PROCESSING SECONDARY RAW MATERIALS FOR THEIR REUSE In the context of reducing environmental risks and impacts, the issue of new energy technologies and the reuse of waste and scrap has emerged with relevance.
Healthcare	Policlinico "Vittorio Emanuele" University Hospital Company of Catania	MINIMIZING THE RISKS OF INFECTION IN PATIENTS UNDERGOING CVC The treatment of patients in the oncology and haematology areas may require the implantation of a central venous catheter system. The problem to be solved is related to the occurrence of infections in the above-mentioned patients.
Tourism and culture	Museum and Real Bosco of Capodimonte	TRIP EXPERIENCE: MAKE YOUR TOUR - CAPODIMONTE MUSEUM AND REAL BOSCO OF CAPODIMONTE The challenge launched by the Capodimonte Museum and Real Bosco of Capodimonte consists of using the geolocation function on electronic devices to compose one's own personalized visit to the Reggia and park area.
Health and quality of life	Calabria Region	ALTERNATIVE AND ECONOMIC SOLUTIONS TO REPLACE THE USE OF GLYPHOSATE IN AGRICULTURE The Region of Calabria intends to strengthen the production system starting with the ability of research to produce patentable innovations with high economic impact, meet the challenges posed by H2020 and have a major impact on the quality of life.
Energy and environment	Calabria Region	SOLUTIONS FOR MONITORING WATER QUALITY BEFORE AND AFTER CHANNELIZATION In the context of reducing environmental risks and impacts, the issue of new technologies for land monitoring has emerged with relevance.
Digital Agenda and Smart Communities	ACEA	CLICK ENERGY: A SERVICE THAT ALLOWS NEW CUSTOMERS TO LEARN ABOUT COSTS AND DETAILS OF THE BEST SUPPLY OFFER AVAILABLE
Health and quality of life	Enna provincial health agency	DEVELOPMENT OF AN INNOVATIVE HOSPITAL ASSET MOBILITY SYSTEM Is looking for an innovative movable goods transportation system in order to: - Reduce the waiting times currently observed for travelling long distances, sorting and allocation of tubes, reports, consumables, drugs etc;

		- Reduce manual handling; - Reduce expenditures for optional auxiliaries at the external cleaning company; - Reduce clinical risk intercepted through pathways; - Free up human resources for internal care needs.
Tourism and culture	Calabria Region	INNOVATIVE COVERS FOR ARCHAEOLOGICAL SITES The Calabrian tourism system has experienced a significant increase in attendance over the past twenty years, registering a growth of 231 percent since 1990, greater than that recorded in other regions of southern Italy and Italy as a whole.
Health and quality of life	Campania Region	INFLUXAPP: SEASONAL INFLUENZA SURVEILLANCE SYSTEM The goal of the challenge promoted by the Campania Region, SoReSa and Azienda Ospedaliera dei Colli is to create a smartphone and web-based seasonal flu surveillance system that makes the "affected" citizen an active part of the monitoring system itself, being able to derive information about contacts they have had with other potentially infected or infectious individuals, engaging them in a kind of epidemiological information social network.
Transportation	State railways	GIVING VALUE TO TIME: INNOVATIVE SOLUTIONS TO IMPROVE THE TRAIN TRAVEL EXPERIENCE Identify solutions that enrich service offerings, improve the traveller's customer experience and foster the creation of "traveller communities"
Digital agenda and smart communities	AGID, SORESA; CAMPANIA Region	A SEARCH ENGINE FOR OPEN INNOVATION PROCUREMENT PLATFORMS Development of a solution for "automatic" correlation of challenges published in public and private open innovation platforms.
Tourism and culture	State railways	SMAQ: USER EXPERIENCE IMPROVEMENT CHALLENGE Trenitalia, to offer customers new features to support travel planning or intermodal routes, is setting as a challenge the development of new components that can be integrated into apps and digital channels in order to improve the user experience from a seamless perspective, directly aiding sales and in the moments before and after sales, and also offering the company customer profiling services.
Energy and environment	Eni	SOLUTIONS FOR THE REUSE OF TREATED WATER Challenge aimed at developing systems for the efficient reuse of water used by Syndial S.p.A.