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A. Economics of public markets;
B. Digital e-public procurement;
C. European legal framework;
D. Multicriteria evaluation of tenders and life-cycle costing;
E. Public management of public contracts;
F. Innovative and sustainable public procurement;
G. Performance assessment and evaluation of contracts execution;
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I . Transparency, competition and anti-corruption policies;
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M. Centralization and economies of scale in public contracting;
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On the 6th Issue of the European Journal of Public Procurement Markets

The sixth issue of the European Journal of Public Procurement Markets is published at a particularly challenging and consequential moment. Recent indicators released by the European Commission suggest that progress within the internal market remains uneven, with public procurement showing less encouraging results. At the same time, renewed waves of protectionist policies—particularly those driven by the United States administration through the use of tariffs—pose additional uncertainty for free trade and global economic growth. Against this backdrop, the European Commission is preparing a new set of Directives to update the landmark 2014 legislative package.

According to the information currently available, these forthcoming reforms aim to simplify procedures, expand digitalization—particularly through the Tenders Electronic Daily (TED)—enhance the flexibility and autonomy of contracting authorities, and further promote innovative and sustainable procurement practices. The contributions included in this issue engage directly with these challenges, offering new perspectives and practical approaches to long-standing and persistent problems in public procurement. In particular, they address the following key questions:

A. How can we move beyond traditional assumptions in public procurement—namely, that contracting authorities possess complete information about contracts and that no significant changes will occur after contract signature?
B. How can we navigate the increasingly complex European legal framework governing contract modifications, which has become a veritable minefield, not least due to evolving case law from the Court of Justice of the European Union?
C. How can we develop more meaningful criteria for classifying public contracts, moving beyond the conventional and limited focus on contract value?
D. What are the principal theoretical approaches to fostering innovative procurement, and how can they be effectively applied to research and development institutions and SME-driven markets?

These questions are explored in depth across the five papers featured in this issue:

1. L. Valadares Tavares proposes performance-based contracting as a robust framework to address challenges A and B, following a critical assessment of both traditional procurement models and the current legal framework.
2. A. Aguiar Costa introduces the concept of complexity as a key analytical criterion, enabling contracting authorities to better classify procurement processes and understand their associated challenges.

3. The remaining three papers focus on innovative procurement strategies, particularly in response to the issues outlined in question D.

These contributions are grounded in presentations and discussions from the 7th European Conference on Sustainable and Innovative Public Procurement, organised by APMEP and held on 20 November 2025 in Lisbon.

Finally, I would like to express my sincere gratitude to the referees whose expertise and dedication were essential to the evaluation and selection of the papers published in this issue.

Luís Valadares Tavares

Chief Editor

Lisbon, 5 May 2026

Contract Modification: Circle Squaring or Performance-Based Contracting?

L. Valadares Tavares

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Abstract

The traditional paradigm of public procurement is based on three assumptions: full knowledge by the contracting authority about the contract object, unchangeable internal and external conditions during the contract execution and considering that awarding the contract for the minimal price is the most effective approach to defend the public interest. This article discusses these hypotheses and explains why they are incompatible with the modern challenges of public procurement and that they imply the frequent need of introducing significant modifications throughout the execution of the contract, giving rise to substantial residual rights that always harm the contracting entity, as confirmed by the general increase of additional cost and time overruns.

The author studies the European Union's legal framework governing the legal regime on the introduction of modifications during the execution of contracts, showing that it is based on concepts of complex and subjective interpretation. Unfortunately, the European Court of Justice does not always clarify these concepts, as its interpretation of unforeseeable circumstances is not in line with the existing Risk Theory. In this paper, the important contributions of the European Directives to modernize public procurement avoiding the assumptions of the traditional paradigm are fully discussed and the approach proposed by the author to overcome the contradictions related to contract modification and making use of such contributions is based on the concept of performance- based contracts (PBC). After discussing this concept and its applicability, the author proposes a general model to formulate the reward function and award criterion based on performance scales. A real example of PBC applied to maintenance services for the Municipality of Lisbon is also presented herein.

Keywords

Social public procurement; traditional paradigm; modern challenges; contract modifications; residual rights; cost and time overruns; case law of the European Court of Justice; contingency contracts; performance-based contracts (PBC); reward function; award criterion.

1- The Traditional Paradigm of Public Contracts: Complete Public Contracts

The concept of contract related to the exchange of economic values has been studied in Economic Theory since the Edgeworth Box classical model due to Pareto (see Mc Lure and Montesano, 2019) concerning the exchange of two commodities between two entities at a specific moment, through a long sequence of important developments treating more complex contracts concerning state-contingent items, (Mouzas and Blois, 2013), asymmetric information (Grossman and Hart,1983 and Salanie, 2005) and uncertain incomplete contracts (Maskin and Tirole, 1999). Any contract expresses the agreement between two parties about an economic transaction between them covering the exchange of different types of values (Williamson, 2007) and according to the Market paradigm such agreement is the outcome of a bargaining process between supply and demand. The juridical formulation of such agreement aims to reduce uncertainty during its execution as it was pointed out by (Collins, 2005).

Public procurement contracts are not an exception to this lines of research (Patrucco et al, 2017) and the legal framework developed by the European Union since the sixties aims to reinforce the paradigm of Market Economy (Esposito and Grimolizzi, 2024) and to extend it to all the EU Member States as it is clearly stated in the first recital of the 2024/24/EU Directive (in this paper mentioned by the Directive): *„free movement of goods, freedom of establishment and the freedom to provide services, as well as the principles deriving therefrom, such as equal treatment, non-discrimination, mutual recognition, proportionality and transparency".* The use of public resources should always be subject to additional scrutiny and so a major driving force for most public contracting authorities has been achieving „to increase the efficiency of public spending" (Recital 2 of the Directive) explaining why the adoption of the award single criterion of minimal price is so frequent as it happens in Portugal (IMPIC, 2025). The formulation of the economic transactions behind public contracts has been based on three assumptions very much in the heart of the traditional paradigm of public procurement also stemming from the purpose of price minimization:

A-Omniscient Contracting Authority (OCA)

This assumption concerns the full knowledge of the public contracting authority about the contract object and so the description of the contract object and required activities should be included in the procurement documents without any degree of uncertainty. This assumption is quite common in open and restricted procedures, negotiation without prior publication or direct award, and other procedures introduced by the Directive not requiring such specification (competitive procedure with negotiation, competitive dialogue, and partnership for innovation) are seldom adopted (TED.EUROPA.EU) as it is shown in Table 1.

B-Static World (SW)

This second assumption concerns the absence of any changes after contract award affecting the internal or external conditions related to the contract execution meaning that the world clock connected to the contract object stops when the contract is awarded. This condition justifies considering that the ideal execution of the contract corresponds to the

implementation of the contract documents without changes or exceptions. The concept of contract based on these two assumptions is named in Economic Theory, a complete contract and defined by (Hart, 2016) in his Nobel Prize lecture: "*These are contracts where everything that can ever happen is written into the contract. There may be some incentive constraints arising from moral hazard or asymmetric information, but there are no unanticipated contingencies"*

If the assumptions OCA and SW are accepted, then the "efficient" approach to public contracting implies these two stages:

a) Presentation of the full design and specification of the contract object.

In the case of public works, this design is named "execution design" because it is assumed sufficient to execute the contract and quite often, this design has to be acquired.

b) Evaluation of tenders and contract award to execute the contract after selection of candidates, if it is the case.

Therefore, under these assumptions, the interaction between the contracting authority and the contractors can be modelled by a zero-sum game where the procurement procedure is decided by the price paid by the former to the latter and any gain of the players is equal to a loss of the other player. The unrealistic nature of these two assumptions and the impact of all sources of uncertainty on the legal dimension of contracts is extensively studied by (Seita, 1984), namely about the risk allocation, default rules, contract efficiency and contract breach losses. Thus, extensive studies (see, e.g., Mosrow, 2016) allow the conclusion that public contracts are much more rigida than the private ones.

C- Contract Price Setting by the Contracting Authority (PS)

According to this assumption, the public contracting authority should set up limits to the price of the contract to defend the public interest. This assumption stems from the objective of price minimization coupled with the two previous assumptions and perhaps the best examples are fixing a maximal price as it happens in the Portuguese Law of Public Contracts (Portuguese Government,2008) introducing the concept of *Preço Base* (maximal price, see Tavares, 2017 and Tavares, 2018) as well as fixing minimal bounds according to the Article 69º of the Directive about abnormal low tenders stating the rule: "*Contracting authorities shall require economic operators to explain the price or costs proposed in the tender where tenders appear to be abnormally low in relation to the works, supplies or service."* This rule tends to be expressed by a minimal price defined as a percentage of the maximal price.

The practical consequences are:

a) either the absence of bids if the maximal price is unfeasible as it is happening quite often because the contracting authority is averse to the risk of being criticized for not defending the public interest, or

b) having most the bids quite close to the minimal price to achieve the highest probability of success.

These three assumptions seem to represent a state of mistrust and fear towards the contractor and may be considered as a "blind fear of corruption" (Faustino, 2015).

2- Modern Challenges for Public Contracting

Unfortunately, the previous assumptions are becoming quite unrealistic for several reasons (Tavares, 2019 and Castelli et al, 2024):

c) Full specification of the descriptive nature of the contract object is unfeasible for complex objects, as it happens with contracts including an important technological component or heavily dependent on external conditions, such as geotechnical and environmental conditions, or social and human factors, as it happens in construction or Health, respectively.

   A smartphone is an easy example, as its full description covering more than 200 features is quite unfeasible.

d) The world clock does not stop when the contract is awarded, and the modern world is changing rapidly in terms of many dimensions affecting the contract, such as changes in the supply chains, new social, environmental, and technical restrictions, or even changes in the needs or resources of the contracting authority.

   Some of these changes are also induced by technological progress, as is happening in construction, with significant changes in raw materials and construction processes. For instance, the closure of coal-fired power stations excludes the possibility of using ashes, an important component of some types of concrete. Also, new technological guidelines such as those avoiding the use of asbestos mat be a source of important changes.

The study of the procedures with a contract notice published by TED (TED.EUROPA.EU) during the 1st semester of 2025 shows that about 34% concern the acquisition of technology (namely Information and communication) as goods and services.

An obvious domain of full rejection of the two assumptions, OCA and SW, is the

rehabilitation of buildings and infrastructures, as they are always a source of surprises and new execution challenges, but the Directives do not include any special rules for this growing component of public works.

Another key example is public procurement in Heath as technology is evolving quite rapidly and the interaction with professionals and patients is also a critical dimension for any contract execution.

Furthermore, these two assumptions are also incompatible with a general trend of public contracting called "*servitization,*" (see Chen et al, 2020) meaning that most contracts include a component with the nature of a service because a service always depends on the features and behaviour of the recipient, implying that an a priori full specification of the contract object without uncertainty is quite absurd. The field of Health is an excellent illustration of this new challenge.

According to TED (TED.EUROPA.EU) during the first semester of 2025, almost half of the contracts concerned services and its number is about 2.5 times the number of public works contracts

This why most contracts should be considered as incomplete contracts also defined by (Hart, 2016):*Actual contracts are not like this, as lawyers have realized for a long time. They are poorly worded, ambiguous, and leave out important things. They are incomplete»* and that *« the critical question that arises with an incomplete contract is, who has the right to decide about the missing things? We called this the residual control or decision right».*

The study of incomplete contracts in public procurement has been studied by several authors such as (Bos, 2001) and (Tavares, 2019) emphasizing the study of the residual rights which tend to have very unfavourable outcomes to the public contracting authority as it was proved by the Principal Agent Theory (Salanié, 2005).

It should be noted that there was also an alternative tradition specifying the contract object in terms of a list of unit works, and so contract awarding was based on a weighted average of their unit prices, avoiding the need for full contract object specification. However, this approach implies that the contracting authority does not know how much the final contract price will be when the contract is awarded, and there is no incentive for the contractor to be efficient because their profit will be proportional to the amount of work done corresponding to each price unit. These criticisms explain that this approach has been abandoned, as happened in Portugal after the publication of the Public Contracts Law in 2008 (Tavares, 2017).

The Portuguese national legal framework believes so much in these two assumptions that

the concept of estimated price of the Directives is replaced the Preço Base which maximum price established at the opening of the process of contract formation and that cannot be exceeded by the awarded tender. Thus, the number of open or restricted procedures without any non-rejected tenders is quite high, introducing further delays in public contracting, also affecting the execution of projects supported by European Funds. This is the case of the projects supported by the Recovery and Resilience Facility (see https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html) to be used since 2021 until 2026 and including many public contracts. According to the official scoreboard the accumulated advanced payments during more than 80% of the total duration are just 60% of the total although the value of such payments is much higher than the value of executed contracts. In the case of Portugal, most of the program is based on public contracts because the 25 major beneficiaries are public authorities and, until July 2025, just 8% of the contracts are completed and 24% of the contracts are not delayed (CNA/PRR, Report 1 July 2025).

If the assumptions OCA and SW are accepted, then the "efficient" approach to public contracting implies these two stages:

e) Acquisition of the full design and specification of the contract object.
In the case of public works, this design is named "execution design" because it is assumed sufficient to execute the contract.

f) Evaluation of tenders and contract award to execute the contract after selection of candidates, if it is the case, and, quite frequently, the award criterion is the minimal price despite the recommendation of the Directives to adopt the MEAT criterion (Most Economic Advantageous Tender, Article 67º of the Directive 2024/24/EU).

This approach is also associated to PS and the practical consequences tend to be:

g) either the absence of bids if the maximal price is unfeasible as it is happening quite often because the contracting authority is averse to the risk of being criticized for not defending the public interest, or

h) having most the bids quite close to the minimal price to achieve the highest probability of success.

Even if the maximal price is well defined, it should be noted that the price of the award tender will be the minimal price and this price is lower than the fair price which may be estimated by the average bid according to some authors (see Giat and Mitelman, 2023) and so this criterion tends responsibleth called winner´s curse because the winning bid is underestimating the contract and, therefore, is expected to end

up with a loss. Such loss will be avoided by the contractor through the generation of additional works and so the need to introduce changes during the execution is increased due to the adopted award criterion.

Summing up, the three studied assumptions set up an economic model including the imposition by the public buyer of not just the full specifications of the contract object but also of its price or of a narrow domain of acceptance of the price related to each tender. This model is not just unrealistic but also opposed to the paradigm of Market Economy assuming that the prices should not be established by the public buyer but rather through the market interaction between supply and demand. Therefore, the main paradox of the traditional paradigm of public contracting is contributing to the implementation of a system of prices compatible with centrally planned economies rather than to the Market economy principles so well expressed by the first recital of the Directive.

Therefore, the need to introduce contract modifications during its execution to cope with lack or deficient specifications as well as to cope with uncertainty is growing as it is shown in Section 3 and so the rules included by the Directive to accommodate and manage such changes should be also studied.

3- Contract Modifications: The Dark Side of EU Legislation?

The unrealistic nature of the three assumptions discussed in section 1 is confirmed by the importance of the time and cost overruns of public contracts which has been studied by an endless list of authors across EU (a list of 71 papers is mentioned by Molinari et al, 2025).

Each overrun is a source of residual rights, and they are a common source of litigation and of less favourable outcomes for the contracting authority due to the asymmetric level of information and reduced control by the contracting authority as it has been shown by several authors (see, e.g. Scott and Triantis, 2005, Williamson, 2007 and Epstein, 2015).

Their magnitude in time and cost is a major source of concern of most Governments and of the public opinion as there is the general perception that the final outcomes are more dictated by the contractor rather than by the contracting authority. The study of cost overruns in Belgium (Molinari at al, 2025), Spain (Alonso-Iglesias et al, 2023) and Portugal (Sarmento and Renneboog, 2016 and Catalão et al, 2020) confirm that the average magnitude of cost overruns is increasing along last decades. In the case of Portugal, the authors also concluded that it is higher for Central Administration than for Local Administration and that such average tends to increase during election years perhaps due to the need of timely completion of the contracts.

The preparatory document of the European Commission for the new Directives-"Green Book on Modernization of EU Public Procurement Policy (European Commission, 2015) mentions

the need to regulate the modification of contracts during their execution and the 2014 Directives (see Lichère et al, 2014 and Tavares, 2018) include the Article 72 of the Directive 2014/24/EU stating the legal principles governing this introduction of contracts modifications during contract execution (Villacis and Baquedano,2021, Muzina, 2021 and Lando, 2023). This article allows changes which were anticipated in the initial documents of the contract (Case A) providing that such option clauses, now provided for in Art. 72, para. 1, let. a), of Directive 2014/24 (and corresponding provisions in Directives 2014/23 and 2014/25), need to clear,precise,and unequivocal,and must indicate " the scope and nature of possible modifications or options as well as the conditions under which they may be used~ (Raimundo, 2017).

Similarly, changes are accepted (Case B) if they do not exceed 10 % of the initial contract value for service and supply contracts or below 15 % of the initial contract value for works contracts. However, otherwise they imply quite complex conditions implying subjective judgements which are often a source of extensive litigation, demolishing cooperative strategies and increasing delays and time or cost overruns.

The quoted Article 72-1(b) allows higher changes (with a value not exceeding 50% of contract value) if a change of contractor "cannot be made for economic or technical reasons" (Case C) or "would cause significant inconvenience or substantial duplication of costs for the contracting authority" (Case D), but these arguments are a source of doubts. Nowadays, the diversity and potential of most technologies tend to allow contractor changes, provided that an additional cost is accepted, and the second condition may be considered as a metric guidance because "duplication" is mentioned, but "significant inconvenience" is also added, increasing the fuzziness of this criterion.

The case considered by Article 72-1(c) (Case E) allows changes (with a value not exceeding 50% of the value of the original contract or framework agreement) due to new "circumstances which a diligent contracting authority could not foresee", if "the modification does not alter the overall nature of the contract", and if "any increase in price is not higher than 50% of the value of the original contract or framework agreement". Unfortunately, these conditions depend on the concept of "diligent contracting authority", which is quite debatable. Thus, the eventual litigation due to the application of this paragraph will be based on the subjective interpretation of three concepts: "diligent", "could not foresee", and "nature of the contract".

However, the highest level of uncertainty and risk of litigation are due to the condition of Article 72-1(e), allowing modifications irrespective of their value if they are not substantial within the meaning of paragraph 4 (Case F). According to that paragraph, a modification shall be considered substantial when one or more of the following conditions is met:

A) the modification introduces conditions which, had they been part of the initial procurement procedure, would have allowed for the admission of other candidates than those initially selected, or for the acceptance of a tender other than that originally accepted, or would have attracted additional participants in the procurement procedure;

B) the modification changes the economic balance of the contract or framework agreement in favour of the contractor in a manner which was not provided for in the initial contract or framework agreement;

C) the modification extends the scope of the contract or framework agreement considerably. Conversely, modifications introduced "irrespective of their value" are accepted only if none of the above conditions is met. This raises three immediate questions of interpretation:

a) How can the eventual tenders that would have been presented by other competitors be foreseen? b) How can the economic balance between the contracting authority and the contractor be kept unchanged? c) How can the concept of "considerable extension" of the contract scope be interpreted? Summing up, the acceptance of changes during contract execution depends on the subjective interpretation of the following six concepts:

a) "economic or technical reasons"; b) "significant inconvenience"; c) "circumstances which a diligent contracting authority could not foresee"; d) "nature of the contract"; e) not disturbing the outcome of the competitive award procedure; f) not "extending the scope ... considerably". The author considers that the risk of accepting modifications which will become a source of litigation can be ordered from the lowest to the highest, due to the problems of interpretation already discussed, according to this scale:

Case A (Minimal Risk) → Case B → Case D → Case C → Case E → Case F (Maximal Risk).

Thus, as could be expected:

a) the application of this framework is a source of frequent litigation, increasing the slowness and the lack of efficiency and effectiveness of public contracting;

b) the legal commentaries of several authors assessing this framework are quite critical. This is the case of authors such as (Dragos et al, 2023), discussing "the discord between the transparency of the award of a public contract and the transparency of its implementation" in their volume *Contract Changes: The Dark Side of EU Procurement Law*.

The number of Case Laws of the European Court of Justice (ECJ) concerning contract modifications is rather small (Catela, 2026), and perhaps the most often quoted is Case C-454/06 because it concerns the concept of "material modification" (Bogdanowicz, 2021), which was subsequently incorporated into the Directive. The Court there identified three situations in which a contract modification during its term may be regarded as material. First, if it introduces conditions that, had they been part of the initial award procedure, would have allowed for the admission of tenderers other than those initially admitted, or would have allowed for the acceptance of a tender other than the one initially accepted. Second, if it considerably extends the scope of the contract to include services that were not initially covered by it. Third, if it changes the economic balance of the contract to the service provider's favour in a manner that was not provided for in the original contract.

Three other cases can also be mentioned after 2014: C-263/19, C-441/22 and C-443/22. Case C-263/19 treats the subject of liabilities when the Directive is not respected, and the other two cases address two further questions:

a) Does the substantial nature of a contract modification imply a written agreement between the contracting authority and the contractor? b) Can regular weather conditions be considered as unforeseeable?

The first answer is negative; and so is the second, if the weather conditions are not mentioned in the procurement documents — implying the surprising conclusion that, according to the ECJ, weather circumstances could be regarded as foreseeable by a "diligent" contracting authority unless they had been expressly mentioned in the procurement documents.

The interpretation of the ECJ of "circumstances which a diligent contracting authority could not foresee" seems to imply that the procurement documents would have anticipated the eventual occurrence of such circumstances; and so, in the two mentioned cases, the ECJ rejects this argument as a basis for contract modifications because the circumstances were not mentioned.

The conclusion 75-2 of Cases C-441/22 and C-443/22 of 7 December 2023 is quite clear, stating that the diligence which the contracting authority needs to have shown in order to be able to rely on that provision requires, in particular, that the contracting authority should have taken into account, during the preparation of the public contract concerned, the risks of the time limit for performance of that contract being exceeded as a result of foreseeable causes of suspension, such as ordinary weather conditions. A similar interpretation is adopted by the ECJ in the Finn Frogne Case (Raimundo, 2017).

Therefore, according to the ECJ, a "diligent" contracting authority needs to be able to anticipate all types of "unforeseeable" conditions that will possibly affect the contract execution if aiming to use them as a legal justification for contract modification. For instance, if the procurement documents mention hurricanes but make no reference to seismic events, then a strong seismic event will not be accepted by the ECJ as justification for contract modifications — although there is unanimous scientific consensus that seismic events are unpredictable even by "diligent" and very competent experts.

The study of projects' and contracts' risks is a major subject of Project Management (see, namely, Tavares et al, 1998 and Tavares, 1998), starting in modern times with the contributions of the RAND Corporation in the USA (see Arrow, 1955). It seems, however, that the ECJ is not familiar with this long literature, since it assumes that a diligent contracting authority can provide an ex-ante list of all relevant risks. The scientific literature shows the opposite, because there is an endless list of factors that can affect project execution as has been demonstrated by many authors such as (Hilson, 2024), (Santos-Olmo et al, 2024) and (Zuzak et al, 2022) in quite diversified areas such as infrastructures, environment, and information systems. Thus, the recommendation of the author is that public procurers should list, as an annex of the procurement documents, the "unforeseeable" but likely risks affecting the execution of the contract — including the main 18 natural hazard risks identified by (Zuzak et al, 2022) — in order to reduce the 19th risk, corresponding to an eventual negative decision of the ECJ about a future contract modification.

Another recent case, C-282/24 of 16 October 2025, illustrates how minor changes can become a source of dispute between several institutions: the contracting authority (Swedish Police Authority), the Swedish Competition Authority and the Swedish Supreme Administrative Court. The changes concerned the payment rules for vehicle towing, implying marginal price changes, but the Competition Authority fined the contracting authority and the Supreme Court referred the question to the ECJ, since there was no applicable case law for a situation where the new price was lower than the contracted one. Finally, the ECJ confirmed that if the total contract value does not change to more than a marginal degree, it must not be regarded as altering the overall nature of the framework agreement; but the time spent between 2021 and 2025, together with all the associated costs, show how inefficient this legal framework is.

Without surprise, then, the appreciation of the ECJ's contributions on contract modifications by authors such as (Bogdanowicz, 2021) is quite negative: a detailed analysis of the CJEU's jurisprudence on contract modification has led to the conclusion that it is riddled with inconsistencies and at times even self-contradictory, with examples of such inconsistencies

concerning the key issues considered by the Court — such as the nature of an amendment and the requirement to provide for the possibility of change.

Furthermore, the restricted interpretations of the ECJ are not in favour of innovation, as was pointed out by (Raimundo, 2017): innovation is characterised by uncertainty and calls for added flexibility, while the Court's approach seems to go in the opposite direction. This, incidentally, is another downside of the judgment.

The Directive includes various regulatory standards on the conduct of negotiations during the contract formation stages (Articles 31-4 and 31-5; Article 32-2; Article 48-2; Article 54-1) but, quite paradoxically, does not include any provisions on negotiations during the execution phase.

Several national legal frameworks, such as the case of Portugal (Government of Portugal, 2008), have been more restrictive than the Directives on contract modification in order to avoid the dissemination of litigation and court disputes — but the negative impact has been the excessive lack of flexibility during contract execution, implying more frequent deadlocks and additional time and cost overruns.

Summing up, attempting to guarantee the useful flexibility for contract execution without introducing subjective judgements and without reducing the validity of the competitive award process seems to be a clear example of Circle Squaring; and so, other methodologies should be studied rather than persisting in the same contradictory and contentious approach.

4- The Contributions by The Directives Of 2014 To Modernize The Public Procurement Paradigm

Fortunately, the Directives of 2014, namely the 2014/24/EU includes quite important contributions to modernize the paradigm of public contribution outdating the three assumptions already discussed (Tavares, 2018) and they promote the development of innovative and sustainable public procurement (Piga and Tátrai, 2016 and Castelli et al, 2021). The assumption of full knowledge (OCA) is excluded by three procurement procedures regulated by the Directive: Competitive Procedure with Negotiation (CPN)-Article 29º, Competitive Dialogue (CD)-Article 30º-, and Innovation Partnership (IP)-Article 31:

a) In the case of CPN, the contracting authority should “identity the subject matter of the procurement by providing a description of their needs and the characteristics of the supplies,Worksservices) (Article specity and requirements)

b) The Article 30º require for CD just the presentation of the needs to be filled up (Nº 3) but the solutions to be contracted are an outcome for CD rather than an input.

c) Again, for IP, the contracting authority should present the need for an innovative procedure and the minimal requirements, but the achieved solutions are an outcome of the process (Article 31º-1)

The procedure requiring minimal knowledge of the contracting authority is CD as the initial procurement documents are just based on needs and objectives. However, the application of these innovative approaches to public procurement is not universal and varies significantly between Member States as the following Table 1 can show it.

TABLE-1 Taxonomy of Contracting Procedures (1)- 1st Semester 2025

Country	Total nº	CD (2)	IP (3)	NP(4)
France	31571	109	7	3334
Netherlands	5540	70	1	85
Finland	3996	55	2	196
Germany	44244	45	9	7704
Poland	26180	43	3	65
Ch. Rep.	9969	22	0	291
Ireland	2733	19	0	214
Slovenia	3079	18	0	180
Belgium	10573	16	0	1585
Italy	8734	12	2	35
Sweden	7389	10	0	626
Latvia	3187	7	0	1113
Denmark	1948	7	0	330
Slovakia	1910	7	0	49
TOTAL	203 210	530 (5)	27	16 204 (6)

(1)-Including contract or concession notices for EU Member States.

(2)-Competitive Dialogue; (3)- Innovation Partnership; (4)- Negotiation with or without prior publication of call and Competitive Procedure with Negotiation

(5)- Other Member States present CD no more than 3 and the following States with zero CD: Romania, Portugal, Bulgaria, Lithuania, Hungary, Estonia.

(6)- The Member States with NP lower than 20 are just: Portugal (5), Cyprus (2) and Malta (1).

The global percentage of procedures adopting DC,IP or NP is just about 8%. The Directive includes also the Article 45º stating that in any procurement procedure, contracting authorities may authorize or require tenderes to submit variants and so the tenderer can propose alternative solutions avoiding the full specification defined by the procurement

documents. Furthermore, this Article 45º-3 allows: In procedures for awarding public supply or service contracts, contracting authorities that have authorised or required variants shall not reject a variant on the sole ground that it would, where successful, lead to either a service contract rather than a public supply contract or a supply contract rather than a public service contract.

This possibility increase the flexibility of the procedure and helps to cope with the trend of servitization already discussed. The second assumption can be overcome through the application of the Article 72º-1 a) stating that contract modifications can be accepted where the modifications irrespective of their monetary value, have been provided for in the initial procurement documents in clear, precise and unequivocal review clauses, which may include price revision clauses, or options. Such clauses shall state the scope and nature of possible modifications or options as well as the conditions under which they may be used. They shall not provide for modifications or options that would alter the overall nature of contract or the framework agreement. This means that the directive providing that such scenarios will be defined in clear, precise and unequivocal review clauses accepts contingency contracts based on a pre-defined set of scenarios*„.*

The third assumption based on the minimal price is also outdated by the approach adopted by the Directive about the award criterion and well expressed by the Article 67º clearly recommending the adoption of an award criterion based on the concept of Most Economically Advantageous Tender (Article 67º-2)- MEAT-rather than on the minimal price. Authority shall be identified on the basis of the price or cost, using a cost-effectiveness approach, such as life-cycle costing in accordance with Article 68, and may include the best price-quality ratio, which shall be assessed on the basis of criteria, including qualitative, environmental and/or social aspects, linked to the subject-matter of the public contract in question.

The minimal price may be even forbidden for some specific cases: "Member States may provide that contracting authorities may not use price only or cost only as the sole award criterion or restrict their use to certain categories of contracting authorities or certain types - 2). Furthermore, the Directive include the Article 68º about the life-cycle cost expressing in quite clear terms how this concept can capture important values and costs outside the narrow term of minimal price (see Sala et al, 2021):

"Life-cycle costing shall to the extent relevant cover parts or all of the following costs over the life cycle of a product, service or works: delivery (a) costs, borne by the contracting authority or other users, such as: (i) costs relating to acquisition, (ii) costs of use, such as consumption of energy and other resources, (iii) maintenance costs, (iv) end of life costs, such as collection and recycling costs."

This means this Article is another tool to avoid the tradition of the minimal price. It should

be also noted that the European Commission has been pursuing a public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same. This strategy also promotes the Circular Economy which is another fundamental paradigm for pursuing sustainability, and the document Circular Economy Plan, 2020 (European Commission, 2020), prioritizes the control of the increase of the rate extraction of raw materials (89Gt in 2019) and the reduction of biodiversity.

Innovative public procurement is also prioritized by the Directive as it is clear from the Recital *Research and innovation, including eco-innovation and social innovation, are among the main drivers of future growth and have been put at the center of the Europe 2020 strategy ...*" The application of all these contributions of the Directive can contribute to innovation in public procurement as shown by (Tavares, 2019) and to replace the traditional zero-sum game by a cooperative game because the contractor can propose changes increasing the value of the contract both to the contracting authority and to the contractor as it was shown by (Tavares, 2023).

This new strategy promoting sustainable and innovative public procurement has been studied by many authors (see, Tavares, 2022 and Castelli et al, 2021) and also by a series of European Conferences on Innovative Public Procurement organized by the Portuguese Society of Public Markets (APMEP, www.APMEP.PT).

Innovation implies leaving degrees of freedom to the tenderers and so it is incompatible with the first two assumptions and sustainable public procurement implies considering a spectrum of criteria besides the price so that all relevant variables (environment, energy, recycling, etc) will be considered. Some of these criteria may be expressed in terms of requirements but such restrictions are not sufficient to model the value of the tender, and this is why MEAT and the Life-cycle cost award criteria should be adopted to evaluate tenders.

Unfortunately, the traditional paradigm is still the prevalent one being the minimal price the award criterion most often adopted as it is the case of Portugal (more than 90% of cases in 2024, IMPIC, 2025 page 76) and so the possibility of introducing contract modifications during its execution remains an issue of paramount importance demanding new approaches to avoid the presented limitations.

5- From Incomplete Contracts to Contingency Contracts

The limitations and lack of security stemming from the six concepts already underlined recommend alternatives to the contracting approach based on the two traditional paradigms.

A successful approach can be based on the concept of contingency contract based on the Article procedure in accordance with this Directive in any of the following cases: (a) where the modifications, irrespective of their monetary value, have been provided for in the initial procurement documents in clear, precise and unequivocal review clauses, which may include price revision clauses, or options. Such clauses shall state the scope and nature of possible modifications or options as well as the conditions under which they may be used. They shall not provide for modifications or options that would alter the overall nature of the contract or the framework agreement. therefore, this article allows the design of contingency contracts but requires the inclusion of revision clauses stating:

a) The nature of modifications or options. The distinction between modifications and options is important because modifications correspond to changes introduced into the existing terms of the contract to adjust the contract terms to its execution, but the concept of options can cover the possibility of adopting alternative scenarios in terms of the occurrence of exogeneous events such as storms, financial crises, etc. Examples of such scenarios can be given:

   -Scenario B: occurrence of sea storms during the duration of public works on commercial seaport quays contrasting with non-occurrence (Scenario A).

   -Scenario C: impossibility of using ashes to improve the production of concrete because they are a by-product of an important coal-thermal power station and such station was shut down contrasting with the possibility of using such ashes because the station is not shut down (Scenario D).

b) The conditions under which they may be used. This restriction is quite relevant because it implies a decision mechanism justifying the required changes.The recommendation of the author is adopting the well known approach adopted in contract management for the private sector: establishment of a mediation board including a representative of the contracting authority, another of the contractor and an independent expert to monitor project execution and approving eventual modifications or the application of an alternative scenario under full respect for the objectives of the contract but taking into consideration anticipated risks and scenarios.

This approach implies the inclusion in the procurement documents of the description of the alternative scenarios and of eventual risks that may affect the contract execution. The list of risks should consider the major types:

A- Exogeneous factors such as environmental extreme conditions or labour strikes

B- Contracting authority changes of conditions such as financial restrictions

C- Contractor changes such as Human Resources drop-outs or financial deficits

D- Material unexpected changes in the contract context such as different geological conditions or supply chain disruptions

E- Technological changes due to recent innovations or limitations on the adoption of previous options and patents

Unfortunately, contingency contracts have not been received much attention in Public Procurement, but they can reduce the rigidity of traditional public contracts through additional flexibility (Beuve, 2023), avoiding the interpretation doubts stemming from the Article 72º of the Directive.

6- From Incomplete Contracts to Performance-Based Contracts

6.1 What are Performance-based Contracts (PBC)?

PBC have been studied by many authors as shown by the compilations and reviews presented by (Selviaridis and Wynstra, 2015) and (Mouzas and Blois, 2023) and applied to most sectors of activities such as construction (Ang et al, 2005), Defense (Algahtani et al, 2023), Infrastructures (Manogaran, 2021), Health (Ashton et al, 2004), Personal Services (Martini, 2007) and Smart City Management (Wolniah et al, 2024), respectively. Special attention has been given to the successful application to public administration (Brinkerhoff and Wetterberg 2013) and its evaluation is showing quite positive results (Patrucco et al, 2016). PBC can be defined as "*the contractual approach of tying at least a portion of supplier payment to performance. The key characteristic of PBC is an emphasis on specification and evaluation of outputs or outcomes rather than required inputs, activities or processes*" (Martin 2007).

The main purpose of PBC is pursuing the goal of any contract well expressed by the Economic Theory of Contracts: maximizing the shared value created by the contract (see Williamson, 2007 and Scott and Triantis, 2007) and balancing the risk allocation between the contracting entity and the contractor as it is studied by (Gardner, 2008). The development of blockchain technologies is also supporting the application of PBC (see Hunhevicz et al, 2022) and special attention is given to the area of energy(Nour El- Dun et al, 2024). Obviously, PBC stimulates the innovation because the contractor will be paid off if better results are achieved and so PBC can be studied as non-zero sum game as the generated value is not fixed contrasting with the game behind the contracts studied in Section 1 where the total generated value is fixed and competition is just applied to determine the value share between the contracting authority and the contractor (Zero-sum game).

6.2 Why Performance- based contracts are compatible with the Directives?

6.2.1 the contributions of the Directives

The analysis of the contributions of the Directives to modernize public procurement already discussed in section 2 show clearly that PBC are allowed in most public procurement procedures because:

A- There is not the concept of maximal price, but the alternative concept proposed is " the best price-quality ratio " -1) and the rejection of tenders should consider "whose - 4b).

B- The award criterium should consider the MEAT value and the life-cycle cost if possible and the minimal price criterion may be even forbidden for some classes of procurement

C- The adoption performance scales in the award criterion are allowed for all procedures

D- There is no need to fully specify the contract object if the Article 46º of the Directive is applied because then alternative specifications are allowed and so some components of the contract object cannot be fully prespecified leaving such degree of freedom to the tenderers

E- The competitive procedure with negotiation does not imply a full list of specifications because according to the Article 29º:

«In the procurement documents, contracting authorities shall identify the subject- matter of the procurement by providing a description of their needs and the characteristics required of the supplies, works or services to be procured and specify the contract award criteria. They shall also indicate which elements of the description define the minimum requirements to be met by all tenders»

F- Obviously, the Partnership for Innovation and the Competitive Dialogue do not require full object specifications but just minimal specifications as it is clear from the Article 31-1:*"In the procurement documents, the contracting authority shall identif*

the need for an innovative product, service or works that cannot be met by purchasing products, services or works already available on the market. It shall indicate which elements of this description define the minimum requirements to be met by all tenders»

G- Finally, the Competitive Dialogue is just based on a document fulfilling the presented by the Article 30-2: *«Contracting authorities shall set out their needs and requirements in the contract notice and they shall define these needs and requirements in that notice and/or in a descriptive document»*

6.2.2 On national restrictions: the case of Portugal

Unfortunately, the possibilities permitted by the Directive can be restricted by national legal frameworks as happens in Portugal because the Portuguese Code of Public Contracts (Portuguese Government, 2008) assumes the three assumptions of the traditional public procurement paradigm as it is clear from the need of setting up a *"preço-base"* (Article 47º, with a few exceptions),has not transposed the Article 45º-3 already quoted and includes serious restrictions concerning the opening of an integrated competition to acquire the design and the construction of public works. Actually, the Article 43º-1 of the Public Contracts Law requires the presentation of the execution design in any procedure to award a construction contract. The number 3 of this Article accepts a few exceptions, but the interpretation of the Tribunal de Contas has been quite rigid.

Recently, a new Law (Law 30/2021) has included several articles to simplify public contracting, and a new Article (Article 2º A) is now permitting procedures to award a design-build contract but, unfortunately, the presentation of a preliminary design (*"estudo prévio"*)is required and so its applicability is quite doubtful.

It should be noted that these measures to simplify public procurement have preserved the traditional paradigm and so their impact is quite small as it is confirmed by the last report of the Committee in charge of monitoring their application, CIMEC-*Comissão Independente de Acompanhamento e Fiscalização das Medidas Especiais de Contratação Pública*) showing that during the 2nd semester of 2024(CIMEC,2024)they were used in less than 1% of procedures:

A) just 74.2 M euros were awarded using these special measures (CIMEC, 2024 page 3) over a total of about 9218 M euros (around 0.8 %, IMPIC, 2025, page 8)

B) the Article 2ºA was just applied in 3 cases (!) with a value of 15.9 M euros (CIMEC, 2024 page 85) over a total of public works with an estimated value of 2659 k M euros (about 0.5%, IMPIC, 2025, page 8).

These results lead to the conclusion that a new approach based on an alternative culture of public procurement must be developed to modernise and simplify public procurement in Portugal.

6.2.3 How can be applied Performance-based Contracts?

Any PBC implies a previous analysis and discussion about the following six key questions:

1- Which are the needs to be filled up by the contract?

2- Which are the expected outcomes of the contract to fill up such needs?

3- Which milestones can be defined for the contract associated to the expected outcomes?

4- Which are the measuring scales of performance for each outcome?

5- How such scales can be measured for the outcome of each milestone?

6- Which are the rewarding functions related to the performance scales?

7- Which is the risk allocation between contracting entity and contractor?

8- How should be defined the value function to define the award criterion?

These questions can be formulated not just for the contract execution period but also for the life cycle of the outcomes of the contract.

Obviously, there is no need to adopt the full specification of the execution terms but just key required conditions such as the respect for legal and regulating rules, accepted types of technologic options, social and environmental requirements, etc.

This means that PBC solve the problem of contracts modification through the contracting terms based on performance and also the issue of residual rights of incomplete contracts

The application of PBC tends to favour integrated contracts as it is the case of design- build or even the design-build-operate-transfer in the case of housing or infra-structures. For instance, for housing and adopting a design and build contract and the previous eight questions lead to:

1- The list of outcomes including the building, their surroundings and accesses, as well as sustainability dimensions such as percentage of renewable energy consumption.

2- The specification of the contract milestones, for instance, the execution of location plan, foundations and earth movements, completion of housing blocks 1 to N, energy certification according to EU rules, etc

3- The performance scales related to the fulfilment of each milestone in terms of accomplishing their functional roles, their levels of quality and of sustainability.

4- The formulation of their reward functions expressed in terms of the performance scales and using appropriate weights.

5- A risk safeguard for each scale if its achieved results are below expectations.

6- The award criterion expressed as a multi-attribute value function expressed in terms of the reward functions and their weights corresponding to their relative importance. Several methods can be used to estimate these weights such as the OptionCards method also applied to the problem of selection of tenderers (Tavares and Arruda, 2022).

6.2.4 The proposed general PBC model

The proposed general PBC model is based on the previous specification of the key N milestones of the contract (i=1,..., N) and on:

a) the specification of descriptors measuring the accomplishment by the contractor and for each milestone, in terms of functionality (X(i)), quality (Y(i)) and sustainability(Z(i)).

b) The performance scales for X(i), Y(i) and Z(i) defined by FX(i),FY(i) and FZ(i) with lower and upper bounds mX(i), mY(i), mZ(i) and MX(i),MY(i) and MZ(i), respectively. These performance scales can be linear or nonlinear and with a positive or negative derivative if higher or lower X(i),Y(i) or Z(i) is better or worse, respectively.

c) A reward function R defined for FX (i), FY(i) and FZ(i), RX(i),RY(i) and RZ(i), respectively and expressed in monetary units.

d) A reward component just dependent on contract execution according to the award contract, C, independent of the achieved performances and without considering any cost overruns.

e) The global reward function, G, is given by G= C+ SUM(RX(i)+RY(i)+RZ(i)) over It should be noted that:

a) The upper bounds of RX(i),RY(i) and RZ(i), MRX(i),MRY(i) and MRZ(i), respectively should be set up by the contracting authority and their lower bounds can be defined in terms of such upper bounds: mRX(i)= a(i).MRX(i); mRY(i)=b(i). MRX(i) and

mRZ(i) =c(i).MRZ(i) being a(i), b(i) and c(i) positive and lower than1.

+mRY(i)+mRZ(i) is denoted by mR.

b) C and the parameters a(i),b(i) and c(i) can be subject to competition between specified bounds.

c) The award criterion can be defined by an expected total cost adding up C to the expected performance cost, EPC=SUM((1+ a(i)).MRX(i)/2+ (1+b(i)).MRY(i)/2+ (1+c(i)).MZ(i)/2)

d) The risk function for the contractor can be estimated by the function

RISK=1- (mR +C)/(EPC+C) as (mR +C) is the reward related to the worst scenario of all performances being at their lowest limits.

e) The lower bounds of C and a(i),b(i) and c(i) set up by the contracting authority should take into account the corresponding value of RISK considered appropriate for each contract and usually, the adopted RISK does not exceed 0.30.

6.5 The Performance based model for a contract of maintenance of the Municipality of Lisbon

In cases with a single dimension performance, easier formulations can be adopted as it happened with a contract for the Municipality of Lisbon concerning the maintenance of

traffic lights equipment with documents prepared by the author and Prof J A Antunes Ferreira.

There were many complaints due to a slow and late process of repair increasing the risk of traffic accidents and so the author contributed to a new contract following the principles of PBC with the following answers to the five questions:

1- Fast and prompt repair of traffic lights

2- Provision of an effective service or repairing

3- The measuring scale is defined by the average time, T, lapsed between the need to repair and the conclusion of the service

4- The rewarding function is given by

R= V if T«= m

R= v+ (M-T). a if m«=T«=M

With a= (V-v)/(M-m) and

R= v if T»=M

Where:

m and M are the minimal and maximal values of T

v and V are the minimal and maximal contract reward and V should not exceed V*.

Obviously, another bound can be set up for T, M*, higher than M and corresponding to a minimal compliance level and so if T»M* the Municipality considered that there was a contract breach and so a penalty will be imposed to the contractor.

5- The risk balance can be achieved by an appropriate discussion on the parameter a because higher a means higher risk for the contractor. Assuming that a, V and m are constants, then M will be the control variable for the contractor risk because if higher the risk is lower and vice-verse.

6- The award criterion was defined as weighted average of v and V but it might be also expressed in terms of M with a negative impact in the value function.

The award criterion of the described case just considered v and V, the contract was awarded, there was no litigation, and the contract execution has been quite successful.

7- Final Considerations

The presented analysis of the assumptions adopted by the traditional paradigm of public procurement explains why they are not compatible with the modern challenges of innovative and sustainable public procurement and why residual rights, and cost overruns are growing

across EU. The presented discussion of the European Union legal framework ruling the acceptance of contracts modification identifies serious limitations which have increased due to a few case laws of the European Court of Justice and so attempting to facilitate its adoption without conflicting with competition principles and increasing the risk of future litigation seems to be an exercise of square circling. Fortunately, the Directives have included important Articles allowing public contracting authorities to avoid the traditional paradigm such as those allowing variants, recommending the MEAT award criterion and presenting less traditional procedures: Competitive Procedure with Negotiation, Competitive Dialogue and Innovation Partnership. A statistical analysis of TED is presented showing that these procedures are not often adopted and that such frequency is particularly low in some southern States such as Portugal.

The approach based on Performance Based Contracting (PBC) is proposed to overcome the identified problems and a general model is also presented. This approach is illustrated with a successful case study related to the Municipality of Lisbon.

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Project Complexity and Public Procurement Design: A Construction Procurement Framework under EU Directive 2014/24/EU and the Portuguese Public Contracts Code

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Abstract

Public procurement systems in the European Union are primarily structured around contract value thresholds and standardised procedures designed to safeguard transparency, competition and equal treatment. Although these mechanisms perform an important regulatory function, they do not always reflect the governance demands of complex public projects, particularly in construction and infrastructure, where technical interdependence, organisational fragmentation, informational heterogeneity and solution uncertainty are often pronounced. Despite the extensive treatment of project complexity in the project management literature, and despite the availability under EU procurement law of procedures tailored to complex procurement situations, the relationship between project complexity and procurement strategy remains insufficiently operationalised in practice. Contracting authorities continue to rely predominantly on value-based thresholds and administrative routine rather than on structured assessments of project characteristics. This article examines how insights from project complexity research can inform procurement design under Directive 2014/24/EU and the Portuguese Public Contracts Code (CCP). Drawing on interdisciplinary scholarship in project management, procurement governance and construction management, it argues that procurement procedures should be understood as governance mechanisms through which different forms of project complexity are managed across the procurement lifecycle. On that basis, the article develops a conceptual framework linking complexity assessment to procurement strategy and proposes a Construction Procurement Complexity Index (CPCI) as a decision-support tool for evaluating the complexity profile of construction projects. The CPCI is designed to support the alignment of procedural choice, governance arrangements and information-management mechanisms with project characteristics while remaining consistent with the principles of EU public procurement law. The article contributes to the emerging dialogue between public procurement law and project governance by showing how project complexity can be translated into a structured framework for procurement design.

Keywords: project complexity; public procurement governance; construction procurement; Construction Procurement Complexity Index (CPCI); Building Information Modelling (BIM).

1. Introduction

Public procurement systems across Europe operate within legal frameworks designed to guarantee transparency, competition and equal treatment among economic operators. Within this regulatory architecture, contract value thresholds traditionally play a central role in determining the procurement procedures and regulatory obligations applicable to public contracts. While these mechanisms provide an effective structure for many procurement situations, they do not always capture the governance challenges associated with complex public projects, particularly in sectors such as construction and infrastructure.

Projects in these sectors frequently involve multiple interdependent technical systems, diverse stakeholder networks and evolving design requirements. Research in project management has demonstrated that project complexity cannot be explained solely by project size or financial magnitude, but rather emerges from the interaction between technical systems, organisational structures and environmental uncertainty (Baccarini, 1996; Williams, 2002; Geraldi, Maylor and Williams, 2011). From this perspective, contract value alone becomes an insufficient proxy for the coordination and governance challenges associated with complex projects (Maylor, Vidgen and Carver, 2008; Bosch-Rekveldt et al., 2011).

Recent literature on project governance and public procurement increasingly recognises that project complexity plays a decisive role in shaping procurement outcomes. Complex projects are more prone to cost overruns, delays, coordination failures and contractual disputes, particularly when procurement strategies are not adequately aligned with the underlying characteristics of the project. Despite this growing recognition, procurement practice in many jurisdictions continues to rely predominantly on value-based thresholds and standardised procedural categories rather than on structured assessments of project complexity.

This article explores the proposition that project complexity should play a more explicit role in structuring public procurement strategies. Drawing on insights from project management literature, complexity theory and procurement law, the article develops an analytical perspective in which procurement procedures are interpreted as governance mechanisms designed to address different levels of project complexity. The discussion focuses particularly on the construction sector, where complexity is especially pronounced and where procurement design can significantly influence project performance.

Against this background, the article addresses three research questions. First, how is project complexity conceptualised in the project management and construction governance literature, and which dimensions of complexity are most relevant for public procurement? Second, to what extent do EU procurement law and the CCP recognise project complexity as a factor influencing the choice of procurement procedures? Third, how can project complexity be operationalised in

procurement practice through structured analytical tools capable of supporting procurement design decisions?

Methodologically, the article adopts an exploratory conceptual approach combining legal analysis with an interdisciplinary review of the literature on project complexity, construction governance and procurement strategy. Rather than testing hypotheses empirically, the objective is to develop an analytical framework capable of linking project complexity with procurement design within the legal framework established by Directive 2014/24/EU and the CCP. The analysis integrates insights from project management theory with the procedural architecture of EU procurement law in order to identify how existing legal instruments may be interpreted and applied in ways that better reflect the governance challenges associated with complex public projects.

Building on this interdisciplinary perspective, the article proposes a complexity-oriented framework for procurement design and introduces the CPCI as a decision-support tool for assessing the complexity profile of construction projects during the project preparation phase. The purpose of the CPCI is not to establish a rigid rule for procedural choice, but rather to provide a structured analytical method for aligning procurement strategies with the technical, organisational and informational characteristics of the project.

By integrating insights from project complexity theory, procurement regulation and digital construction governance, the article contributes to the emerging dialogue between public procurement law and project governance. It also highlights the potential role of structured information management and digital tools, particularly Building Information Modelling (BIM), in supporting complexity-oriented procurement approaches.

The remainder of this article is organised as follows. Section 2 reviews the literature on project complexity and its relevance for public procurement. Section 3 examines the specific characteristics of complexity in construction projects. Section 4 discusses existing approaches to measuring project complexity and considers their implications for procurement decision-making. Section 5 analyses the relationship between project complexity and the role of negotiation within public procurement procedures. Section 6 explores how complexity considerations can be accommodated within the procedural framework of EU procurement law and the CCP. Section 7 introduces the proposed Construction Procurement Complexity Index (CPCI) as a framework for aligning procurement strategy with project characteristics and discusses its implications for procurement governance and digital information management. Section 8 concludes.

2. Complexity in Projects and Public Procurement

The concept of complexity has long been examined in fields such as systems theory, engineering and project management (Baccarini, 1996; Williams, 2002). In the context of projects, complexity generally refers to the presence of multiple interdependent elements whose interactions generate

uncertainty, coordination challenges and dynamic project environments. Early project management literature often associated complexity primarily with project size and technical difficulty. However, subsequent research demonstrated that complexity is better understood as a multidimensional phenomenon encompassing technical, organisational, informational and institutional dimensions (Maylor, Vidgen and Carver, 2008; Bosch-Rekveldt et al., 2011).

One of the earliest systematic conceptualisations of project complexity was proposed by Baccarini (1996), who distinguished between technological complexity, referring to the number and interdependence of technical elements within a project, and organisational complexity, relating to the number and diversity of actors involved in project delivery. Later research expanded this perspective by incorporating additional sources of complexity, including uncertainty, novelty and dynamic change throughout the project lifecycle (Williams, 1999; Williams, 2002).

Subsequent studies further developed this multidimensional understanding of complexity. Geraldi, Maylor and Williams (2011) emphasise that complex projects involve interacting dimensions such as technical interdependencies, stakeholder diversity, informational intensity and informational diversity. In procurement and construction governance, the latter is particularly relevant because complexity is shaped not only by the volume of information to be processed, but also by the heterogeneity of information types, formats, disciplines and compliance requirements that must be coordinated within the same project environment. In the context of large infrastructure projects, research on megaproject governance has shown that projects frequently combine technical, political and institutional complexities, creating governance environments that challenge traditional project management approaches (Flyvbjerg, 2014; Davies and Mackenzie, 2014). Recent literature reviews in construction management confirm that project complexity continues to be characterised by interdependent technical systems, diverse stakeholder networks and significant uncertainty (Lafhaj et al., 2024).

These developments in project complexity research have increasingly influenced discussions on procurement design. In the procurement literature, scholars have explored how contractual structures and procurement strategies affect the ability of public authorities to manage complex projects effectively. In particular, research on relational contracting, collaborative procurement models and early contractor involvement suggests that rigid procurement structures may be poorly suited to projects characterised by strong interdependencies and high levels of uncertainty (Walker and Lloyd-Walker, 2015; Eriksson, 2017).

From this perspective, procurement procedures should be understood as governance mechanisms structuring how complex public projects are organised, coordinated and delivered. Procurement design influences the degree of interaction between contracting authorities and market participants, the allocation of risks and the capacity to adapt project solutions as new information emerges (Lahdenperä, 2012; Walker and Lloyd-Walker, 2015). Recent research has also

highlighted how increasing complexity in procurement systems may lead to differentiated procedural practices across EU member states, reinforcing the need for analytical frameworks linking project characteristics to procurement design (Loxbo and Pircher, 2025).

Within the European Union, the procurement framework has gradually incorporated mechanisms acknowledging the challenges posed by complex procurement situations. Directive 2014/24/EU provides procedures that allow greater interaction between contracting authorities and economic operators, including competitive dialogue and the competitive procedure with negotiation. These procedures are intended for situations in which contracting authorities cannot fully define the technical or legal solution at the outset, or where the nature and complexity of the project require structured interaction with the market.

EU procurement law also explicitly recognises that procedural requirements should reflect the complexity of the contract. Directive 2014/24/EU requires contracting authorities to consider the complexity of the contract when establishing deadlines for the submission of tenders, ensuring that economic operators have sufficient time to prepare technically demanding proposals. Similar provisions appear in the EU directive governing concession contracts (European Parliament and Council, 2014).

At the national level, these principles are reflected in the CCP (República Portuguesa, 2017, as amended by República Portuguesa, 2021), which transposes the European procurement directives into the Portuguese legal system. The CCP similarly recognises that complex procurement situations may justify procedures involving negotiation or dialogue, particularly where the nature of the contract, associated risks or legal and financial structure make standard competitive procedures impractical. Portuguese law also requires contracting authorities to consider the nature and complexity of procurement documentation when determining deadlines for submission of bids.

Furthermore, the CCP recognises that complex contracts may require enhanced governance mechanisms during contract execution. In particular, contracting authorities must designate a contract manager responsible for monitoring contract performance. In contracts involving particular technical or financial complexity, the contracting authority may also establish performance indicators and monitoring mechanisms to support effective contract management.

Despite these legal provisions, empirical research suggests that procurement practice in many jurisdictions still relies heavily on standard open procedures, even in sectors such as construction where project complexity may justify more selective or interactive procurement models. One possible explanation is that procurement systems often lack structured analytical frameworks linking project characteristics with procurement strategy.

In other words, although both EU procurement law and national legislation provide procedural instruments capable of addressing complex procurement situations, these instruments are not always systematically deployed based on explicit complexity assessments. This gap between legal possibilities and procurement practice suggests the need for a more explicit integration between project complexity analysis and procurement strategy, particularly in sectors characterised by strong technical interdependencies and organisational coordination challenges such as construction and infrastructure development.

2.1 Complexity in Procurement Design

Although both the project management literature and procurement law recognise the importance of complexity in project delivery, an important gap remains between conceptual recognition and operational implementation. In project management, complex projects are distinguished from routine projects not only by size, but by the interaction of technical interdependencies, stakeholder diversity, uncertainty, and information heterogeneity. These characteristics affect governance requirements across the full project lifecycle and often demand more adaptive decision-making structures than those associated with standardised projects.

EU procurement law reflects part of this logic by allowing procedures that introduce greater flexibility and structured interaction between contracting authorities and economic operators. Directive 2014/24/EU provides, in particular, for competitive dialogue and the competitive procedure with negotiation in situations where the contracting authority cannot fully define the technical solution in advance or where the nature and complexity of the project require prior interaction with the market. National procurement frameworks, including the Portuguese Public Contracts Code, reflect the same logic by allowing more flexible procedures and by recognising that complex contracts may require enhanced governance mechanisms during both procurement and execution.

However, while both the academic literature and the legal framework acknowledge the relevance of complexity, procurement systems rarely provide structured methods for assessing complexity at the project preparation stage or for tracing its implications across the successive phases of the procurement process. In practice, decisions regarding procurement procedures continue to be based primarily on contract value thresholds or administrative convention rather than on systematic evaluations of the project's technical, organisational, informational and institutional characteristics.

This creates an important gap between theoretical understanding and practical procurement design. Contracting authorities may formally have access to procedures suited to complex projects, but they often lack analytical tools capable of identifying when such procedures are appropriate and how complexity should be reflected in procurement documentation, bid evaluation, contractual design and execution governance. Addressing this gap requires conceptual

frameworks capable of linking project complexity analysis with procurement strategy in a structured and operational manner. Such frameworks can help contracting authorities move beyond purely value-based decision criteria and adopt procurement models better aligned with the governance demands of the project.

2.2 Complexity in Construction Projects

The construction sector provides one of the most prominent examples of complex project systems in the public sector. Construction projects represent one of the clearest examples of complex socio-technical systems within public procurement (Miller and Lessard, 2000; Flyvbjerg, 2014). Unlike the acquisition of standardised goods or services, construction projects involve the temporary integration of multiple disciplines, organisations and technologies within a single project environment (Winch, 2010; Davies and Mackenzie, 2014).

Complexity in construction projects can be understood as arising from the interaction of several dimensions. First, technical complexity relates to the number and interdependence of engineering systems involved in the project (Baccarini, 1996; Bosch-Rekveldt et al., 2011). Large infrastructure or building projects often integrate structural, mechanical, electrical, environmental and digital systems whose interactions must be carefully coordinated. Failures in one subsystem may have cascading effects on others (Geraldi, Maylor and Williams, 2011). Second, organisational complexity stems from the number and diversity of actors involved in the project. Public construction projects typically involve contracting authorities, designers, contractors, subcontractors, consultants, regulators and end users. Each of these actors may operate under different incentives, contractual arrangements and governance structures (Miller and Lessard, 2000; Davies and Mackenzie, 2014). Third, informational complexity arises from the volume, diversity and interdependence of technical documentation, design iterations and regulatory requirements associated with construction projects. Managing this information effectively is a central challenge for project governance (Whyte, 2019; Succar, 2009). Fourth, temporal complexity reflects the long duration of many public construction projects and the uncertainty that accompanies changing economic conditions, technological developments and policy priorities over time (Flyvbjerg, 2014). Finally, institutional and legal complexity is particularly relevant in public projects, where procurement regulations, accountability mechanisms and political oversight create additional layers of decision-making and control (Arrowsmith, 2014; Sanchez-Graells, 2017). The combination of these factors means that construction projects often behave as complex adaptive systems, where outcomes emerge from interactions between multiple actors rather than from linear planning processes (Geraldi, Maylor and Williams, 2011; Davies and Mackenzie, 2014).

These insights have increasingly influenced research on procurement strategy and project governance. Studies in construction management have shown that procurement design can

significantly influence the ability of project actors to manage complexity effectively. In particular, research on relational contracting, collaborative procurement models and early contractor involvement has demonstrated that rigid procurement structures may be poorly suited to projects characterised by strong interdependencies and high levels of uncertainty (Walker and Lloyd-Walker, 2015; Eriksson, 2017; Lahdenperä, 2012). Procurement procedures therefore function not merely as legal mechanisms for selecting contractors but also as governance structures shaping how complex projects are organised, coordinated and delivered.

3. Measuring Project Complexity

The recognition that project complexity should influence procurement strategy raises an important methodological question: how can complexity be measured in a systematic and operational manner? While the concept of complexity is widely used in project management and organisational studies, translating it into practical decision-making criteria remains a challenge.

Over the past three decades, several analytical frameworks have been proposed to capture different dimensions of project complexity. These models typically converge on the idea that complexity is multi-dimensional, arising from the interaction between technical systems, organisational structures and environmental uncertainty.

3.1 Structural Complexity: Interdependence and System Architecture

One of the earliest systematic attempts to conceptualise project complexity was proposed by Baccarini (1996), who distinguished between organisational complexity and technological complexity. In this framework, complexity arises primarily from the number of elements involved in a project and the degree of interdependence between them.

Technological complexity refers to the number of technical components or subsystems that must be integrated to deliver the final project outcome. In construction projects, this may include structural systems, mechanical and electrical installations, digital infrastructure, environmental systems and architectural elements. The greater the number of interacting subsystems, the higher the coordination requirements and the potential for cascading failures.

Organisational complexity, by contrast, relates to the number and diversity of actors participating in the project. Public construction projects often involve contracting authorities, designers, contractors, subcontractors, consultants, regulatory bodies and end users. Each actor operates within a distinct institutional and contractual framework, which can increase coordination challenges and generate conflicting incentives.

From this perspective, project complexity can be partially approximated through structural indicators, such as: the number of disciplines involved in the project; the number of contractual

interfaces; the number of organizations participating in project delivery; the degree of technical integration required between systems.

Although these indicators do not capture all aspects of complexity, they provide an initial basis for distinguishing between relatively simple projects and those requiring sophisticated coordination mechanisms.

3.2 Uncertainty and Dynamic Complexity

While structural approaches focus on the number of project elements, later research emphasised that complexity also arises from uncertainty and dynamic change. Williams (1999; 2002) argued that complex projects are characterised not only by large numbers of interacting components, but also by uncertain and evolving relationships between these components. In such environments, project plans must adapt to changing circumstances, making linear planning models less effective.

Construction projects are among the most prominent examples of complex project systems in the public sector (Miller and Lessard, 2000; Flyvbjerg, 2014). Infrastructure and building projects frequently involve multiple technical disciplines, fragmented supply chains and complex stakeholder environments. As a result, these projects often exhibit high levels of technical interdependence, organisational fragmentation and informational intensity (Miller and Lessard, 2000; Flyvbjerg, 2014). Managing such projects, therefore, requires governance structures capable of coordinating diverse actors and integrating large volumes of technical information across the project lifecycle.

From this perspective, complexity is closely linked to the degree of predictability of project outcomes. Projects with stable requirements and well-known technical solutions tend to exhibit lower levels of complexity, even when they are relatively large in scale.

Conversely, projects involving novel technologies or evolving stakeholder requirements may exhibit high complexity even when their financial value is moderate. Innovation occupies an ambivalent position within complexity-oriented procurement. On the one hand, innovative solutions may increase solution uncertainty, reduce ex ante specification and complicate tender evaluation because bids become less directly comparable. On the other hand, innovation may reduce downstream complexity where it improves constructability, integration, lifecycle performance or information coordination. The relationship between complexity and innovation is therefore not linear: innovation may increase procedural complexity before award while reducing technical or operational complexity during execution.

In procurement terms, uncertainty is not a unitary concept and should be distinguished according to its source and legal relevance. A useful analytical distinction may be drawn between: (i) technical uncertainty, concerning the adequacy of alternative engineering or design solutions; (ii) design-development uncertainty, concerning the maturity of project definition at the time of

launch; (iii) organisational uncertainty, concerning the behaviour and coordination of multiple actors; (iv) regulatory and institutional uncertainty, concerning permits, approvals and compliance conditions; and (v) execution uncertainty, concerning the conditions that may emerge during contract performance. This taxonomy is particularly relevant because different forms of uncertainty affect different stages of procurement and may justify different governance responses, including procedural flexibility before award and contractual adaptation mechanisms during execution.

This dimension of complexity is particularly relevant to procurement design, as high levels of uncertainty often justify more flexible procurement procedures, including those that allow dialogue or negotiation between contracting authorities and economic operators.

3.3 Complexity as a Multi-Dimensional Construct

Subsequent research has further developed the multidimensional understanding of project complexity. Geraldi, Maylor and Williams (2011) emphasise that complex projects involve interacting dimensions such as technical interdependencies, stakeholder diversity and informational intensity. More recent reviews in construction and megaproject research have reinforced this view, highlighting the continuing importance of organisational, environmental and governance-related dimensions of complexity (Lafhaj et al., 2024; Zani, Denicol and Broyd, 2024).

These approaches recognise that projects are embedded in broader institutional environments that influence decision-making processes and stakeholder behaviour. In large public infrastructure projects, for example, complexity may arise not only from engineering challenges but also from political pressures, regulatory requirements and public scrutiny.

From this perspective, complexity can be understood as emerging from the interaction of several domains: Technical complexity, relating to the architecture and integration of engineering systems; Organisational complexity, relating to the number and diversity of actors involved; Informational complexity, relating to the volume and heterogeneity of project information; Temporal complexity, relating to long project durations and evolving conditions; Institutional complexity, relating to regulatory frameworks, governance structures and accountability mechanisms.

The interaction between these domains can generate non-linear project dynamics, in which small changes in one element of the system may produce disproportionate effects elsewhere.

Informational complexity should therefore not be understood solely in terms of information intensity or the volume of documentation generated by a project. It also depends on information diversity, that is, the variety of data types, technical formats, disciplinary languages, regulatory inputs and lifecycle information requirements that must be integrated and interpreted coherently. In construction procurement, this diversity may include drawings, models, specifications,

performance criteria, compliance reports, scheduling information and asset-related data. The greater the diversity and interdependence of these informational elements, the greater the challenge of structuring procurement requirements and evaluating compliance in a transparent and coherent manner.

3.4 Practical Approaches to Complexity Assessment

Over the past decades, several practical frameworks have been developed to support the ex ante assessment of project complexity in large engineering and infrastructure projects. While theoretical models provide conceptual insight into the nature of complexity, public organisations require operational tools that allow complexity to be identified and discussed during the early stages of project preparation.

Research on large engineering projects shows that project complexity can be assessed through structured frameworks capturing technical, organisational and environmental dimensions and linking them to governance responses adapted to project-specific conditions (Bosch-Rekveldt et al., 2011). More recent tools used in infrastructure planning and project governance similarly rely on predefined indicators, structured evaluation criteria and categorisation logics in order to support planning, decision-making and resource allocation (ICCPM, 2025; SOURCE, 2023).

In practice, these frameworks typically assess projects by reference to observable characteristics such as project scale, number of technical interfaces, design maturity, degree of technological novelty, stakeholder diversity, regulatory exposure and operational criticality. These criteria may be examined through qualitative or semi-quantitative scoring models that allow projects to be classified into broad complexity categories rather than measured with false precision. The purpose of such tools is not to generate exact numerical representations of complexity, but to provide a transparent basis for comparing projects and identifying the governance demands likely to arise.

For public procurement, the value of such approaches lies in their capacity to translate project characteristics into governance implications. Rather than treating complexity as an abstract attribute, structured assessment tools allow contracting authorities to identify how technical interdependence, stakeholder diversity, design maturity or regulatory exposure may affect the specification of requirements, the evaluation burden, the allocation of risk and the intensity of contract management. From this perspective, complexity assessment can operate as a practical bridge between project management theory and procurement governance.

3.5 Implications for Public Procurement Strategy

Incorporating complexity assessment into procurement strategy would allow contracting authorities to move beyond a purely value-based approach to procurement regulation. While contract value remains an important indicator for regulatory thresholds, it does not necessarily capture the organisational and technical challenges associated with delivering the project. Two

contracts with similar financial value may differ significantly in terms of coordination requirements, stakeholder involvement and technological uncertainty.

A complexity-oriented approach to procurement would therefore involve aligning procurement procedures with the underlying characteristics of the project. Projects classified as low complexity could be procured through standard open procedures with limited administrative requirements. Projects classified as highly complex, by contrast, might justify procedures involving prequalification stages, competitive dialogue or negotiated procedures.

Such an approach would not require fundamental changes to the legal architecture of EU procurement law. Directive 2014/24/EU already provides a range of procedures capable of addressing complex procurement situations. The key challenge lies in developing analytical frameworks that help contracting authorities identify when these procedures are appropriate.

In this sense, complexity measurement tools could serve as a bridge between project management theory and procurement law, enabling more informed and context-sensitive procurement decisions.

4. Complexity and the Role of Negotiation in Public Procurement

One of the most significant implications of project complexity in public procurement concerns the appropriate role of negotiation within procurement procedures. Traditional procurement systems, particularly those influenced by classical administrative law principles, have historically emphasised procedural rigidity, strict formalisation, and limited interaction between contracting authorities and bidders. These features were designed to safeguard fundamental principles such as transparency, equal treatment and non-discrimination.

However, in the context of complex projects, especially in sectors such as construction, infrastructure and technologically advanced services, strictly linear procurement procedures may prove insufficient to address the inherent uncertainty and interdependence of project components. As project complexity increases, the assumption that the contracting authority can fully define the technical solution before launching the procurement procedure becomes increasingly unrealistic.

In such circumstances, negotiation may serve not as an exception to competitive procurement but rather as a necessary governance mechanism for managing uncertainty and incomplete information.

4.1 Complexity and Incomplete Contracting

The relationship between complexity and negotiation can be understood through the lens of incomplete contract theory, which has been widely discussed in economic and legal studies (Hart, 1995; Williamson, 1985). According to this perspective, contracts cannot fully specify all possible future contingencies when the environment in which they operate is uncertain or rapidly evolving.

In simple procurement situations, such as the acquisition of standardised goods, contracting authorities are typically able to define precise technical specifications and evaluation criteria before initiating the procedure. The procurement process can therefore follow a relatively straightforward structure, where economic operators submit offers that can be compared based on predefined parameters.

Complex projects, however, rarely conform to this model. In construction projects, for example, contracting authorities may have difficulty specifying all technical requirements in advance, particularly when projects involve innovative design solutions, complex interfaces between engineering systems, or evolving user requirements. Under such circumstances, procurement procedures based exclusively on rigid technical specifications may lead to several inefficiencies. Economic operators may submit proposals that technically comply with the formal specifications but fail to provide optimal solutions. Alternatively, overly prescriptive specifications may limit the ability of bidders to propose innovative approaches that could improve project performance.

Negotiation mechanisms allow contracting authorities and economic operators to refine the definition of the project and the contractual framework through structured interaction, reducing the risk of misalignment between public objectives and the final contractual arrangement. From the perspective of incomplete contract theory, this is significant because complex projects frequently involve contingencies that cannot be fully specified ex ante. The issue is therefore not merely whether negotiation improves the initial tender, but whether procurement design acknowledges the limits of ex ante specification in projects characterised by uncertainty, technical interdependence and evolving requirements.

4.2 Negotiation as a Mechanism for Managing Uncertainty

In complex projects, negotiation performs several important governance functions. First, negotiation allows contracting authorities to explore alternative technical solutions that may not have been fully anticipated at the initial design stage. This is particularly relevant in projects involving innovative technologies or integrated engineering systems. Second, negotiation can facilitate the allocation of risks between contracting parties. Complex construction projects often involve risks related to geological conditions, regulatory approvals, technological integration and coordination between multiple contractors. Negotiated procurement procedures provide an opportunity to clarify how these risks will be distributed contractually. Third, negotiation may contribute to improving project feasibility and market participation. When project requirements are uncertain or poorly specified, potential bidders may face high costs in preparing proposals. A structured negotiation phase can reduce these uncertainties and improve the quality of the proposals ultimately submitted.

In this sense, negotiation should not be understood merely as a mechanism for adjusting prices or contractual details. Rather, it can function as a collaborative problem-solving process, enabling

contracting authorities and market participants to jointly identify solutions that meet public objectives while remaining technically and economically viable.

4.3 Negotiation in EU Procurement Law

EU procurement law has progressively incorporated procedures that allow varying degrees of negotiation. Directive 2014/24/EU recognises that certain procurement situations require greater procedural flexibility, particularly where contracting authorities are unable to define the technical or legal solution in advance. The directive therefore provides several procedures that allow interaction with economic operators, including the competitive dialogue procedure, the competitive procedure with negotiation, and the innovation partnership.

The competitive dialogue procedure is particularly suited for projects in which the contracting authority is unable to specify the technical means capable of satisfying its needs. In this procedure, shortlisted candidates participate in a structured dialogue phase during which potential solutions are discussed and progressively refined before final offers are submitted. Similarly, the competitive procedure with negotiation allows contracting authorities to negotiate with bidders after the submission of initial tenders, enabling adjustments to technical, financial or contractual aspects of the proposal.

These procedures reflect an implicit recognition that complex procurement situations require iterative processes of solution development, rather than purely transactional exchanges of predefined offers. Nevertheless, despite their potential advantages, negotiated procedures remain underused in many Member States. Contracting authorities often prefer traditional open procedures due to concerns regarding procedural complexity, administrative burden or potential legal challenges.

4.4 Complexity as a Criterion for Procedural Choice

One of the central arguments of this article is that project complexity should play a more explicit role in determining when negotiation-based procurement procedures are appropriate. Rather than treating negotiated procedures as exceptional or extraordinary mechanisms, procurement systems could benefit from adopting a framework in which the choice of procedure is explicitly linked to the complexity profile of the project.

Under such an approach, relatively simple procurement situations, characterised by standardized requirements and low uncertainty, could continue to rely primarily on open procedures with minimal interaction between contracting authorities and bidders. Projects exhibiting higher levels of complexity, however, would justify procurement procedures that incorporate prequalification, dialogue or negotiation stages. These procedures would allow contracting authorities to identify technically capable operators, explore alternative solutions and progressively refine the contractual framework before final award decisions are made.

Importantly, such an approach would remain fully compatible with the fundamental principles of EU procurement law. Transparency and equal treatment can be preserved through clearly defined procedural rules, structured dialogue processes and appropriate documentation requirements.

4.5 Complexity, Contract Execution and Modification

The implications of complexity do not end at contract award. In many construction projects, uncertainty continues to unfold during contract execution, particularly where projects involve evolving site conditions, regulatory change, operational constraints, design development or coordination failures between interdependent systems. In such contexts, the problem is no longer limited to the selection of the appropriate procurement procedure, but extends to the legal governance of contract performance and contractual adaptation.

This point is particularly significant because, under EU public procurement law, post-award modifications are not treated as an unrestricted managerial response to project uncertainty. Article 72 of Directive 2014/24/EU allows the modification of contracts during their term without a new procurement procedure only in circumscribed situations, including where the possibility of modification has been provided for in the initial procurement documents through clear, precise and unequivocal review clauses. The Directive further distinguishes between admissible modifications and substantial modifications, the latter being those that render the contract materially different in character from the one initially concluded, notably where they would have altered competition, changed the economic balance in favour of the contractor, considerably extended the scope of the contract, or replaced the contractor outside the permitted cases.

A similar logic is reflected in the Portuguese Public Contracts Code. Under Articles 311 to 314 of the CCP, contracts may be modified on the grounds provided for in the contract and in the Code itself, including clear review clauses, abnormal and unforeseeable changes in circumstances, and reasons of public interest. However, such modifications remain subject to strict legal limits under Article 313: they may not amount to a substantial alteration of the object of the contract, may not restrict or distort competition, and are not permitted where the changes introduced would, had they formed part of the procurement documents, have demonstrably altered the ranking of tenders or allowed the admission of other proposals. The CCP also establishes quantitative limits for certain categories of modification and regulates the financial consequences of unforeseeable circumstances and public-interest modifications, including rebalancing mechanisms.

This execution-stage dimension is closely related to the logic of incomplete contracting. Even where the procurement procedure is well designed, complex construction contracts cannot always specify ex ante all contingencies that may become relevant during implementation. As a result, contract execution may require clarification, coordination adjustments, reallocation of responsibilities or, in some cases, formal contract modification. The legal significance of this point is that complexity should not lead contracting authorities to rely informally on ex post

renegotiation; rather, it reinforces the importance of ex ante contractual design capable of anticipating foreseeable contingencies through lawful review clauses, structured risk allocation and appropriate governance mechanisms for contract administration.

For this reason, a complexity-oriented procurement framework should distinguish clearly between two legally different phenomena: negotiation before contract award, which is procedurally framed by procurement law, and contractual adaptation after award, which is governed primarily by the rules on execution and modification of contracts. In complex projects, this distinction is analytically and legally important because it shows that procurement complexity must be addressed not only through procedural choice, but also through legally disciplined contractual architecture and execution governance from the outset.

5. Complexity-Oriented Procurement Frameworks: Implications for EU and Portuguese Procurement Law

The recognition that project complexity should influence procurement strategy raises an important question: how can procurement systems incorporate complexity considerations while remaining consistent with the fundamental principles of public procurement law?

Both EU procurement law and national procurement frameworks, including the CCP, already provide a variety of procedural instruments capable of accommodating different types of procurement situations. However, these instruments are not always deployed through a systematic analytical framework linking project characteristics with procedural choice.

A complexity-oriented approach to procurement does not require a fundamental transformation of the existing legal architecture. Instead, it involves interpreting and applying existing procedural mechanisms in light of the intrinsic characteristics of the project, particularly its degree of technical, organisational and informational complexity.

5.1 Procedural Diversity in Directive 2014/24/EU

Directive 2014/24/EU provides contracting authorities with a range of procurement procedures designed to accommodate different procurement contexts. These include the open procedure, the restricted procedure, the competitive procedure with negotiation, the competitive dialogue, and the innovation partnership. Although the directive does not explicitly frame these procedures in terms of project complexity, the structure of the directive implicitly reflects the idea that different procurement situations require different levels of procedural flexibility.

The open procedure represents the most straightforward form of procurement. All interested economic operators may submit tenders, and the contracting authority evaluates these tenders according to predefined criteria. This procedure is particularly well-suited to situations where the contracting authority can define the technical specifications and contractual conditions with

sufficient precision before launching the procedure. The restricted procedure introduces an initial prequalification phase, allowing contracting authorities to select a limited number of candidates who will subsequently be invited to submit tenders. This structure reduces the administrative burden associated with evaluating many complex proposals and allows contracting authorities to focus on candidates with demonstrated technical capacity. More flexible procedures, such as the competitive procedure with negotiation and the competitive dialogue, are designed for situations in which contracting authorities are unable to fully define the technical, financial or legal aspects of the project in advance. These procedures allow structured interaction with bidders to refine potential solutions and develop an appropriate contractual framework.

From the perspective of project complexity, these procedures can be interpreted as forming a continuum of procedural flexibility, ranging from highly standardised processes to procedures that allow extensive dialogue and iterative solution development. However, the directive provides only general guidance on when each procedure should be used. As a result, contracting authorities may face uncertainty when deciding which procedure is most appropriate for a particular project.

5.2 Complexity and the Choice of Procurement Procedure

A complexity-oriented procurement framework would seek to bridge this gap by linking the selection of procurement procedures to the complexity profile of the project. In relatively simple procurement situations, where technical requirements are standardised, interfaces are limited, and uncertainty is low, the open procedure may provide the most efficient solution. Its simplicity promotes competition while minimising administrative costs for both contracting authorities and economic operators.

As project complexity increases, however, the limitations of purely open procedures become more apparent. When projects involve multiple technical interfaces, high levels of design uncertainty or substantial proposal preparation costs, unrestricted participation may generate large numbers of proposals that are difficult to evaluate and may not adequately reflect the technical challenges of the project. In such situations, procedures incorporating prequalification mechanisms, such as the restricted procedure or limited tenders with prior qualification, may provide a more efficient governance structure. By allowing contracting authorities to identify technically capable candidates before requesting detailed proposals, these procedures can improve the quality of competition while reducing transaction costs. At higher levels of complexity, procurement procedures that incorporate dialogue and negotiation phases become particularly relevant. In these cases, the contracting authority may not be able to define the optimal technical solution without engaging with market participants. Competitive dialogue and negotiated procedures allow the project solution to emerge through structured interaction between the contracting authority and potential contractors.

This perspective suggests that procurement procedures should be understood not merely as legal categories but as governance mechanisms tailored to different levels of project complexity.

5.3 Implications for the Portuguese Public Contracts Code

The CCP transposes the main procedural options established by EU procurement law, including open procedures, limited procedures with prior qualification, and procedures involving negotiation.

In practice, however, Portuguese procurement has traditionally relied heavily on open procedures, particularly in the construction sector. While open procedures offer important advantages in terms of transparency and accessibility, their use in highly complex projects may present certain limitations. Complex construction projects often require significant technical work during the preparation of bids, including preliminary design development, integration of multiple engineering systems and detailed cost modelling. When a large number of bidders participate in such procedures, the costs associated with preparing and evaluating proposals can become substantial for both contracting authorities and economic operators.

The limited procedure with prior qualification (CLPQ) provides an institutional mechanism for addressing these challenges. By allowing contracting authorities to select a limited number of candidates based on technical capacity and experience before requesting detailed proposals, the procedure can help ensure that competition takes place among operators capable of delivering complex projects.

Similarly, procedures involving negotiation or dialogue may be particularly appropriate for projects involving high levels of technical uncertainty or innovation. Such procedures allow contracting authorities to refine project requirements and contractual structures through interaction with market participants.

However, the practical use of these procedures requires institutional capacity and procedural clarity. Contracting authorities must possess the technical and legal expertise necessary to conduct dialogue or negotiation processes in a manner that remains consistent with the principles of transparency and equal treatment.

5.4 Complexity-Oriented Procurement Governance

Integrating complexity assessment into procurement decision-making could contribute to a more strategic use of the procedural instruments already available within EU and Portuguese procurement law. Under such an approach, contracting authorities would conduct a preliminary assessment during the project preparation phase, evaluating factors such as technical interfaces, design maturity, stakeholder diversity, informational heterogeneity, regulatory exposure and project criticality. The relevance of that assessment lies not only in supporting procedural choice,

but also in informing the broader governance architecture of the procurement, including the framing of requirements, the design of evaluation structures, the contractual treatment of uncertainty and the monitoring arrangements required during execution.

For highly complex projects, additional governance mechanisms may therefore be appropriate, such as dedicated procurement managers, independent technical review processes, BIM-based information coordination or structured contract-performance monitoring systems. Importantly, adopting a complexity-oriented procurement framework would not undermine the core principles of EU procurement law. Rather, it would enable contracting authorities to apply existing legal instruments in a manner that better reflects the realities of complex public projects, particularly in sectors such as construction and infrastructure.

6. Digitalisation, BIM and Structured Information in Complexity-Oriented Procurement

The increasing complexity of public projects has also intensified the need for more sophisticated information management mechanisms throughout the procurement and project lifecycle. In traditional procurement processes, project information is typically organised in fragmented documents (technical specifications, drawings, reports and contractual annexes) often produced by different actors and updated at different stages of the project. While such documentation structures may be sufficient for relatively simple projects, they become increasingly difficult to manage as project complexity grows.

Complex construction and infrastructure projects generate large volumes of technical information that must be continuously coordinated among designers, contractors, regulators and project owners. In such contexts, the ability to structure, validate and manage project information becomes a central component of effective procurement governance. Digital technologies, particularly BIM and structured data environments, have therefore emerged as important tools for addressing the informational challenges associated with complex projects.

6.1 Information Complexity in Construction Projects

Information management plays a particularly critical role in construction projects because project knowledge evolves throughout multiple phases, including conceptual design, detailed engineering, construction and operation. Each phase generates new data and may require revisions to previous assumptions or design decisions.

In traditional procurement models, this evolving information is often captured through successive document revisions. However, this approach can lead to inconsistencies, coordination failures and difficulties in verifying compliance with project requirements. The more complex the project, the greater the risk that inconsistencies between technical documents will generate delays, disputes or costly modifications during project execution.

From a complexity perspective, the challenge is not only the volume of information, but also the interdependence between different types of information. Decisions in one part of the project, such as structural design, may affect other components, including mechanical systems, energy performance or accessibility requirements. Effective governance of complex projects, therefore, requires information systems capable of integrating multiple layers of project data and enabling coordinated decision-making among stakeholders.

In this sense, the relevance of digital tools in procurement does not depend only on information intensity, but also on information diversity. Projects characterised by multiple information formats, disciplinary inputs, compliance layers and lifecycle data requirements face greater coordination challenges than projects involving more homogeneous documentation environments. BIM and associated digital information systems are particularly valuable where they help structure this diversity in a coherent and verifiable way.

6.2 Building Information Modelling as a Tool for Complexity Management

BIM represents one of the most significant technological developments in construction project management in recent decades. Rather than relying on disconnected drawings and documents, BIM creates a digital representation of the project as an integrated information model, in which architectural, structural, mechanical and other systems are coordinated within a shared digital environment (Eastman et al., 2011; Succar, 2009). This integrated model allows project stakeholders to visualise technical solutions, detect potential conflicts between systems and evaluate design alternatives before construction begins. By enabling early detection of design inconsistencies, BIM can significantly reduce the risk of costly modifications during the execution phase. From a procurement perspective, BIM also has the potential to improve transparency and traceability within procurement processes. Digital models can be used to verify whether project proposals meet the functional and technical requirements defined by the contracting authority. Moreover, changes to the model can be tracked over time, creating a detailed record of design decisions and modifications. Digital information management tools such as BIM have been increasingly recognised as mechanisms for improving coordination and information integration in complex construction projects (Eastman et al., 2011; Pärn, Edwards and Sing, 2017).

However, the adoption of BIM should not be understood as a universal requirement applicable to all public contracts. The benefits of BIM are most significant in projects characterised by high levels of technical and organisational complexity, where coordination between multiple disciplines is essential. For smaller or more standardised projects, imposing BIM requirements may introduce unnecessary administrative burdens. This suggests that BIM should be integrated into procurement frameworks as a proportional instrument for complexity management, rather than as a rigid regulatory obligation.

The relationship between BIM and innovation is also significant. In some procurement contexts, greater openness to innovative solutions may increase uncertainty at the tender stage and make bid evaluation more complex. At the same time, however, innovation supported by structured digital information environments may reduce downstream coordination problems, improve constructability and simplify aspects of project execution. This reinforces the need to treat BIM not as a uniform obligation, but as a scalable governance instrument whose intensity should be proportionate to both project complexity and solution uncertainty.

6.3 Structured Functional Programmes and Verifiable Requirements

Digitalisation also creates opportunities to rethink how project requirements are defined within procurement procedures. Traditionally, contracting authorities define project requirements through functional programmes or technical specifications written in narrative form. While these documents provide important guidance, they may leave room for ambiguity and interpretation. In complex projects, ambiguities in functional requirements can generate a large number of clarification requests during the procurement procedure and may lead to inconsistent interpretations among bidders.

One potential solution is the development of structured functional programmes, in which project requirements are organised as structured datasets rather than purely narrative descriptions. In such frameworks, key parameters, such as space requirements, performance standards, accessibility criteria and environmental targets, are defined in standardised fields that can be automatically validated against project proposals.

When combined with BIM models, structured requirements can enable automated verification processes, allowing contracting authorities to assess whether proposed designs meet predefined criteria. This approach can significantly reduce administrative workload and improve the consistency of procurement evaluations. Moreover, structured information environments can improve traceability and accountability in procurement processes. By recording how requirements are defined, modified and verified throughout the project lifecycle, digital systems can provide a clearer audit trail of procurement decisions.

6.4 Digital Platforms and Data Governance in Public Procurement

Beyond individual projects, digitalisation also opens new possibilities for improving the governance of public procurement systems as a whole. Many procurement systems already collect large amounts of data on public contracts, including contract values, award procedures and participating economic operators. However, this information is often fragmented across different platforms and rarely used to support strategic decision-making.

Developing structured data platforms for public contracts could significantly improve the ability of public authorities to analyse procurement outcomes and learn from past projects. Such

platforms could include historical data on contract execution, including contract modifications, schedule extensions, cost variations and the causes of project delays where publicly available. Access to such data could improve the quality of project planning and cost estimation in future procurements. Contracting authorities could draw on empirical evidence from comparable projects when defining project budgets, timelines and risk allocation strategies.

At the same time, the development of procurement data platforms raises important governance considerations. In particular, care must be taken to ensure that such systems do not evolve into mechanisms for informal ranking or scoring of companies, which could undermine competition and raise legal concerns. Instead, procurement data systems should focus on improving transparency, supporting evidence-based decision-making and enhancing institutional learning within public procurement systems.

6.5 Digitalisation and the Future of Complexity-Oriented Procurement

The integration of digital tools into procurement governance reflects a broader transformation in the management of complex projects. As public infrastructure and construction projects become more technologically sophisticated, procurement systems must evolve to accommodate new forms of information management and collaboration.

Digitalisation alone cannot eliminate project complexity, but it can provide tools that enable contracting authorities and market participants to manage complexity more effectively. Digital technologies such as BIM, structured information environments and procurement data platforms can be understood as institutional complements to complexity-oriented procurement frameworks. Together, they offer a pathway towards procurement systems that are not only legally robust but also better adapted to the realities of modern public projects.

7. A Complexity-Oriented Framework for Procurement Design

The preceding sections have shown that project complexity plays a significant role in shaping procurement needs, governance requirements and the suitability of different procurement procedures. Yet, despite the flexibility available under EU procurement law, contracting authorities often lack structured analytical tools capable of translating complexity-related considerations into procurement design choices, particularly in the construction sector.

To address this gap, this section proposes a complexity-oriented framework for procurement design, operationalised through the Construction Procurement Complexity Index (CPCI). The CPCI is conceived as a decision-support tool intended to assist contracting authorities during the project preparation phase by enabling a structured assessment of project complexity and linking that assessment to procurement strategy and complementary governance mechanisms. Importantly, the CPCI does not seek to alter the legal architecture established by Directive

2014/24/EU or the CCP. Rather, it provides a transparent analytical basis for selecting among the procurement procedures and governance instruments already available within the existing legal framework. Figure 1 illustrates the conceptual logic of the CPCI framework and its role in linking project characteristics, complexity assessment, procurement strategy and procurement governance. As shown in the figure, project characteristics generate multiple dimensions of project complexity that can be evaluated through the CPCI assessment. The resulting complexity classification supports the alignment between project complexity and procurement strategy, while also informing the governance mechanisms required to manage complex construction projects, including structured information management and digital coordination tools.

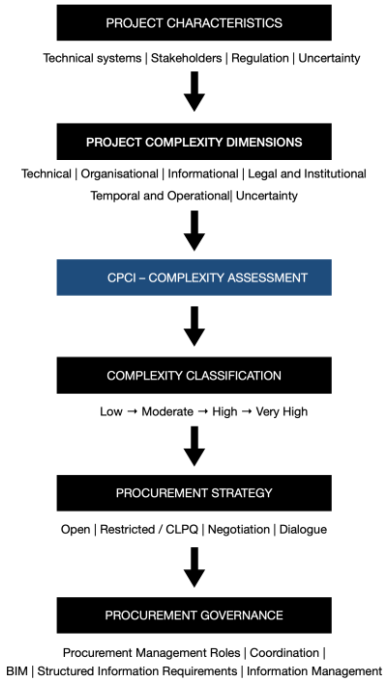

Figure 1 – Conceptual framework of the Construction Procurement Complexity Index (CPCI).

By making the relationship between project characteristics, complexity assessment and procurement design explicit, the framework aims to support more consistent and transparent procurement decision-making. In this sense, the CPCI functions as an analytical bridge between insights from project complexity theory and the procedural instruments available within EU public procurement law.

The following subsections set out the conceptual foundations of the CPCI, define the key dimensions of construction project complexity, explain the operational structure of the index and discuss its implications for procurement strategy, governance arrangements and digital information management.

7.1 Conceptual Foundations of the CPCI

The CPCI builds on the multidimensional understanding of project complexity developed in the project management and construction governance literature. As discussed in the preceding sections, project complexity cannot be reduced to project size or financial magnitude alone, but emerges from the interaction between technical systems, organisational structures, information flows, institutional constraints and different forms of uncertainty.

In the context of public construction procurement, these dimensions of complexity are particularly significant because they affect the ability of contracting authorities to define project requirements, coordinate multiple stakeholders and select procurement procedures capable of addressing the governance demands of the project. Large construction and infrastructure projects typically involve multiple technical interfaces, fragmented contractual relationships, evolving information environments and regulatory constraints, all of which can complicate procurement design and project delivery.

While the project management literature has provided rich conceptual insights into the nature of project complexity, these insights have only partially been translated into operational tools capable of supporting procurement decision-making. Public procurement practice continues to rely heavily on contract value thresholds and standard procedural categories, even in situations where these criteria do not adequately reflect the governance challenges associated with the project.

The CPCI seeks to address this gap by translating the multidimensional concept of project complexity into a structured analytical framework for procurement design. Its purpose is to support contracting authorities in assessing complexity ex ante and in aligning procurement strategy with the specific characteristics of the project, while remaining fully consistent with the legal framework of EU procurement law and the CCP.

7.2 Dimensions of Construction Project Complexity

Drawing on the multidimensional understanding of project complexity discussed in the previous sections, the CPCI identifies six dimensions that are particularly relevant for public construction procurement. These dimensions capture different aspects of the governance challenges faced by contracting authorities when defining project requirements, coordinating stakeholders and selecting appropriate procurement procedures.

Technical complexity reflects the degree of integration required between engineering systems within the project. Construction projects frequently involve multiple interacting subsystems—such as structural engineering, mechanical systems, energy systems, digital infrastructure and environmental control—whose performance depends on careful coordination across technical disciplines. As the number and interdependence of these systems increase, the potential for

cascading effects across subsystems also grows, making coordination between engineering disciplines a central governance challenge.

Organisational complexity relates to the governance structure of the project and the number of actors involved in project delivery. Public construction projects typically involve multiple contractual relationships between contracting authorities, designers, contractors, subcontractors, consultants and regulatory bodies. The greater the number and diversity of actors participating in the project, the more demanding the coordination mechanisms required to align project objectives, allocate responsibilities and manage risks.

Informational complexity refers to the volume, diversity, heterogeneity and interdependence of project documentation and data generated throughout the project lifecycle. Complex construction projects often produce large quantities of technical drawings, specifications, compliance reports and design revisions. Managing these information flows effectively is essential for maintaining consistency between project requirements and the solutions ultimately delivered. This includes not only the intensity of information flows, but also the coexistence of multiple technical formats, disciplinary perspectives, compliance datasets and lifecycle information requirements that must be coordinated consistently.

Legal and institutional complexity reflects the regulatory and institutional environment surrounding the project. Public construction projects frequently require multiple permits and regulatory approvals, such as environmental authorisations, heritage protection assessments or planning permissions. These institutional constraints may significantly influence both the design of the project and its implementation timeline.

Temporal and operational complexity arises from scheduling constraints and operational dependencies. Projects carried out within operating environments—such as hospitals, transport networks or critical infrastructure systems—often require phased implementation and strict coordination with ongoing activities. These conditions can introduce significant logistical challenges even where the underlying technical solution is relatively straightforward.

Finally, solution uncertainty captures the degree to which the contracting authority is able to define the technical solution in advance of the procurement procedure. In some projects, the functional requirements are clear but multiple technological or design solutions may exist. In such circumstances, procurement procedures allowing structured interaction with market participants—such as competitive dialogue or negotiated procedures—may be more appropriate for identifying the most suitable project solution.

Together, these six dimensions provide the conceptual foundation of the Construction Procurement Complexity Index. By evaluating projects across these dimensions, the CPCI framework enables contracting authorities to develop a structured understanding of the sources

of complexity affecting procurement design and project governance. The six dimensions therefore translate the multidimensional understanding of project complexity developed in the project management literature into a structure that can be operationalised in procurement decision-making.

7.3 Constructing the Complexity Index

In order to translate the multidimensional concept of project complexity into an operational assessment tool, the CPCI evaluates each complexity dimension on an ordinal scale ranging from 1 (very low complexity) to 5 (very high complexity). The use of an ordinal scale allows contracting authorities to differentiate between levels of complexity without creating an illusion of excessive quantitative precision. This approach is consistent with established project governance frameworks, which often rely on structured qualitative scoring to support early-stage decision-making under conditions of incomplete information.

The index covers six dimensions: technical complexity, organisational complexity, informational complexity, legal and institutional complexity, temporal and operational complexity, and solution uncertainty. Taken together, these dimensions capture the principal factors affecting the ability of contracting authorities to define requirements, evaluate alternatives, coordinate stakeholders and govern project delivery.

To operationalise these dimensions transparently and practically, the CPCI aggregates the scores attributed to each dimension through a simple additive structure. This approach follows common practices in project complexity assessment frameworks, where ordinal scoring systems are used to support structured evaluations without implying unrealistic levels of mathematical accuracy (Bosch-Rekveldt et al., 2011). The additive structure also preserves the visibility of individual complexity drivers while allowing contracting authorities to obtain an overall complexity profile of the project.

On this basis, the overall complexity index can be calculated as follows:

$$CPCI = T + O + I + L + S + U$$

where:

T – Technical complexity
O – Organisational complexity
I – Informational complexity
L – Legal and institutional complexity
S – Temporal and operational complexity
U – Solution uncertainty

Under this structure, the total CPCI score ranges from 6 to 30, positioning projects along a continuum of increasing complexity.

The use of an additive aggregation reflects the objective of providing a transparent and easily applicable assessment framework for contracting authorities. In early project planning stages, complexity assessments often rely on incomplete information and expert judgement. Under such conditions, simple additive models provide a practical balance between analytical structure and operational usability. More sophisticated aggregation models—such as weighted or multiplicative indices—would require empirical calibration and more precise data than is typically available during the project preparation phase.

To support the practical application of the framework, Table 1 provides indicative criteria that may guide the attribution of scores for each complexity dimension. These criteria should be understood as analytical guidelines rather than rigid thresholds and should be interpreted in light of the specific characteristics of each project.

Table 1 – Indicative scoring criteria for the Construction Procurement Complexity Index (CPCI)

CPCI Dimension	Score 1 – Very Low Complexity	Score 3 – Moderate Complexity	Score 5 – Very High Complexity
Technical complexity (T)	Limited number of technical systems; low interdependence between project components; well-established engineering solutions.	Several interacting technical systems requiring coordination between disciplines (e.g., structural, mechanical, electrical).	Highly integrated technical systems with strong interdependencies; complex interfaces between engineering disciplines; potential cascading effects of design changes.
Organisational complexity (O)	Small number of actors; simple contractual structure; clear allocation of responsibilities.	Multiple organisations involved (designers, contractors, consultants, regulators); several contractual interfaces.	Large number of stakeholders with complex governance arrangements; multiple contractual layers and coordination challenges.
Informational complexity (I)	Limited technical documentation; design largely stable and well defined.	Significant volume and diversity of design documentation, with coordination across disciplines and periodic design revisions.	Large, diverse and evolving volumes of technical information; multiple data formats, disciplinary inputs and compliance

CPCI Dimension	Score 1 – Very Low Complexity	Score 3 – Moderate Complexity	Score 5 – Very High Complexity
			requirements requiring integrated information management (e.g., BIM environments).
Legal and institutional complexity (L)	Standard regulatory framework; limited permitting requirements.	Several regulatory approvals required (e.g., environmental, planning or safety permits).	Multiple regulatory authorities and legal constraints; significant compliance requirements affecting project design or execution.
Temporal and operational complexity (S)	Short project duration; limited scheduling constraints; minimal interaction with ongoing operations.	Moderate duration and scheduling constraints; partial interaction with operational environments.	Long-duration project with strong operational constraints (e.g., construction within operating hospitals, transport networks or critical infrastructure).
Solution uncertainty (U)	Technical solution clearly defined and widely used; low innovation or design uncertainty.	Several feasible technical solutions requiring evaluation; moderate design development required.	Technical solution not fully defined at procurement stage; significant design development, innovative approaches or solution openness requiring structured interaction with the market.

In practice, the CPCI assessment may be conducted during the project preparation phase by a multidisciplinary team involving technical, legal and procurement specialists. Such collaborative evaluation processes may improve the transparency and consistency of procurement strategy decisions and help ensure that relevant dimensions of project complexity are explicitly considered before the procurement procedure is launched.

Although the CPCI adopts an unweighted aggregation of the six dimensions for conceptual clarity, future empirical research could explore whether different dimensions should receive differentiated weights depending on sectoral characteristics, project typologies or institutional contexts.

It should also be acknowledged that any framework based on ordinal scoring inevitably involves a degree of expert judgement in the assessment of project characteristics. However, this does not necessarily undermine the usefulness of the framework. Similar evaluation approaches are widely used in project governance and infrastructure planning to support early-stage decision-making under conditions of uncertainty (Bosch-Rekveldt et al., 2011; Geraldi, Maylor and Williams, 2011). Accordingly, the CPCI, as a conceptual framework, relies on qualitative assessments and expert judgement rather than on empirically calibrated metrics. Its purpose is therefore not to produce a precise quantitative measurement of project complexity, but to support structured deliberation and more transparent procurement design during the project preparation phase.

7.4 Operational Use of the CPCI in Procurement Strategy

The CPCI is not intended to replace existing procurement rules nor to function as a deterministic mechanism for selecting procurement procedures. Instead, it serves as a decision-support framework that can assist contracting authorities in aligning procurement strategies with project characteristics.

In practice, the CPCI assessment may be conducted during the early stages of project preparation by a multidisciplinary team including technical, legal and procurement specialists. By systematically evaluating the different dimensions of project complexity, contracting authorities can develop a clearer understanding of the governance challenges associated with the project before determining the procurement approach.

The framework does not prescribe a single procurement procedure for each complexity score. Rather, it provides a structured analytical basis for evaluating which procurement procedures and governance mechanisms may be most appropriate in light of the project's complexity profile. Projects with relatively low CPCI scores may often be procured through standard open procedures where technical specifications can be defined with sufficient precision. By contrast, projects characterised by higher levels of technical interdependence, stakeholder coordination or solution uncertainty may benefit from procurement procedures that allow greater interaction with market participants, including prequalification mechanisms, competitive procedures with negotiation or competitive dialogue.

By introducing a structured complexity assessment during the project preparation phase, the CPCI framework can therefore enhance the transparency, consistency and strategic alignment of procurement decisions within public procurement systems.

7.5 Complexity Classification and Procurement Alignment

Once the CPCI score has been calculated, projects can be classified into broad categories reflecting different levels of project complexity. These categories are intended to guide procurement strategy rather than determine it mechanically. The objective of this classification is to provide contracting authorities with a structured analytical basis for considering which procurement procedures and governance arrangements may be most appropriate for the challenges associated with each project.

In general terms, different ranges of CPCI scores correspond to varying degrees of technical uncertainty, stakeholder coordination and design development requirements. As project complexity increases, the need for interaction between contracting authorities and market participants typically becomes more significant. Table 2 therefore illustrates an indicative alignment between CPCI score ranges and the procurement procedures available under Directive 2014/24/EU and the CCP.

Table 2 – Indicative alignment between CPCI complexity levels and procurement procedures

CPCI Score Range	Complexity Profile	Indicative Procurement Approach	Rationale
6–12	Low complexity	Open procedure	Projects with clearly defined technical specifications and limited coordination requirements can generally be procured through standard open procedures, ensuring broad competition and administrative simplicity.
13–18	Moderate complexity	Restricted procedure / Limited procedure with prior qualification	Projects involving several technical interfaces or significant proposal preparation effort may benefit from prequalification mechanisms that allow contracting authorities to focus competition among technically capable operators.
19–24	High complexity	Competitive procedure with negotiation	Projects characterised by significant technical interdependencies, organisational complexity or evolving design

CPCI Score Range	Complexity Profile	Indicative Procurement Approach	Rationale
			requirements may require structured interaction with bidders to refine technical or contractual solutions.
25–30	Very high complexity	Competitive dialogue / Innovation partnership	Projects involving high levels of solution uncertainty, technological innovation or complex stakeholder environments may require iterative dialogue processes to identify feasible project solutions before final offers are submitted.

Projects with lower CPCI scores typically correspond to relatively standardised procurement situations in which technical specifications can be defined with sufficient precision and market solutions are well established. In such contexts, open procedures may provide an efficient mechanism for ensuring broad competition while maintaining administrative simplicity.

Projects falling within intermediate complexity ranges often involve several interacting disciplines, multiple contractual interfaces or significant proposal preparation efforts. In these situations, procurement procedures incorporating prequalification stages, such as restricted procedures or CLPQ, may improve the efficiency of the procurement process by focusing competition among operators with demonstrated technical capacity.

Projects characterised by high levels of complexity, particularly those involving strong technical interdependencies or evolving design requirements, may justify procurement procedures that incorporate structured interaction with bidders. Competitive procedures with negotiation allow contracting authorities to refine technical, financial or contractual aspects of the project while maintaining competitive conditions.

Finally, projects exhibiting very high levels of complexity, especially those involving substantial solution uncertainty or innovative technological approaches, may require more iterative solution development processes. In such cases, procedures such as competitive dialogue or innovation partnerships may provide an appropriate governance framework for identifying feasible project solutions before final tenders are submitted.

The relationships presented in Table 2 should therefore be understood as indicative rather than prescriptive. The CPCI framework does not replace the legal discretion of contracting authorities in selecting procurement procedures. Rather, it provides an analytical tool that can support procurement strategy decisions by linking the degree of project complexity with the procedural flexibility available within the framework established by Directive 2014/24/EU and national procurement legislation.

7.6 Complexity, Governance Mechanisms and Digital Information Management

Beyond the selection of procurement procedures, project complexity may also influence the broader governance mechanisms required to support effective procurement and project delivery. In complex construction projects, the coordination of multiple technical disciplines, stakeholders and contractual interfaces often generates significant information management challenges. As a result, procurement governance increasingly depends not only on procedural choices but also on the institutional and technological mechanisms used to structure and manage project information.

From this perspective, digital information management tools, particularly BIM, can be understood as governance instruments that facilitate coordination in complex project environments. BIM enables the integration of architectural, structural, mechanical and other technical systems within a shared digital model, allowing project participants to identify design conflicts, evaluate technical solutions and coordinate project information more effectively throughout the procurement and delivery phases.

The adoption of such tools, however, should be understood as proportionate to the complexity profile of the project. Projects characterised by relatively low levels of technical and informational complexity may be adequately managed through conventional document-based approaches. By contrast, projects exhibiting high levels of technical interdependence, extensive documentation requirements or complex stakeholder interactions may benefit from more structured digital information environments, including BIM-based coordination, common data environments and model-based verification processes.

Digital information management can therefore contribute to improving traceability, transparency and coordination within procurement processes. By structuring project information in a more integrated and verifiable manner, digital tools can reduce the risk of inconsistencies between technical documentation and support more informed decision-making during both procurement and contract execution.

In addition to digital tools, projects characterised by high levels of complexity may also require enhanced institutional coordination mechanisms, such as dedicated procurement management roles or specialised project governance structures. These arrangements may help integrate legal,

technical and administrative expertise within the procurement process and support the management of complex contractual relationships.

Taken together, these mechanisms show that procurement for complex projects should be understood not merely as a legal procedure for selecting an economic operator, but as a broader governance activity extending into contract execution. In this sense, the integration of complexity assessment, procurement procedure design, digital information management and execution-stage coordination represents an important step towards more adaptive and effective procurement systems for complex public construction projects.

7.7 The CPCI as a Decision-Support Tool

The CPCI should ultimately be understood as a decision-support framework rather than a deterministic algorithm. Its primary purpose is to provide contracting authorities with a structured methodology for analysing project complexity and documenting the reasoning underlying procurement strategy decisions.

By making complexity-related factors explicit—such as technical interdependencies, stakeholder coordination requirements and solution uncertainty—the CPCI framework can contribute to more consistent procurement practices and to a clearer alignment between project characteristics and procurement procedures.

In addition to supporting individual procurement decisions, the CPCI may also facilitate institutional learning within public procurement systems. The systematic evaluation of project complexity can help contracting authorities develop more informed procurement strategies and improve the justification of procedural choices within the legal framework of EU procurement law.

More broadly, the CPCI framework illustrates how insights from project complexity theory can be translated into practical analytical tools capable of supporting procurement governance. By linking complexity assessment with procurement procedure design and complementary governance mechanisms—such as structured information management and digital coordination tools—the framework provides a structured approach through which contracting authorities may better align procurement strategies with the challenges posed by complex construction projects while maintaining the fundamental principles of transparency, competition and accountability.

8. Conclusions

Public procurement systems operate within legal frameworks designed to ensure transparency, competition and equal treatment among economic operators. These principles remain fundamental to the legitimacy and effectiveness of procurement regulation within the European Union. At the same time, the increasing complexity of public projects, particularly in sectors such

as construction and infrastructure, creates governance challenges that traditional procurement approaches do not always adequately address.

This article has argued that project complexity should play a more explicit role in structuring procurement strategies. Conventional procurement systems frequently rely on contract value thresholds as the primary criterion for determining procedural requirements. Although these thresholds remain an important regulatory mechanism, they do not necessarily capture the technical, organisational and informational characteristics that define complex projects. The analysis suggests, accordingly, that complexity should be treated as a governance consideration affecting procurement design more broadly, rather than merely as a factor relevant to the initial choice of procedure.

Drawing on the literature on project complexity and project governance, the article has proposed a conceptual framework in which complexity is understood as a multidimensional phenomenon emerging from the interaction between technical systems, organisational structures, information flows and institutional environments. Within this perspective, procurement procedures can be interpreted not merely as legal categories but as governance mechanisms designed to manage different levels of project complexity.

Building on this conceptual foundation, the article introduced the CPCI as a structured analytical framework for assessing project complexity and supporting procurement strategy decisions. The CPCI translates insights from project complexity theory into an operational tool that enables contracting authorities to evaluate relevant dimensions of project complexity during the early stages of project preparation. By linking complexity assessment with procurement procedure design and complementary governance mechanisms, the framework aims to support more informed and transparent procurement decisions.

The analysis also demonstrates that the existing EU procurement framework already contains procedural instruments capable of addressing complex procurement situations. Directive 2014/24/EU provides mechanisms such as competitive dialogue and negotiated procedures that allow contracting authorities to interact with market participants and progressively refine project solutions. The central challenge therefore lies not in creating new legal instruments, but in developing analytical frameworks capable of guiding contracting authorities in selecting the most appropriate procedures in light of project characteristics.

The discussion of the CCP further illustrates how national procurement practice may benefit from such an approach. In sectors such as construction, where projects often involve high levels of technical interdependence, stakeholder coordination and design uncertainty, procurement procedures incorporating prequalification, dialogue or negotiation may improve both the quality of competition and the effectiveness of project delivery.

The article also highlights the potential role of digital information management tools, including BIM, in supporting complexity-oriented procurement frameworks. By enabling integrated information environments and improving coordination between project participants, digital tools can enhance transparency, traceability and decision-making throughout the procurement and project lifecycle.

From a theoretical perspective, this research contributes to the emerging dialogue between public procurement law, project governance and complexity theory. From a policy perspective, the findings suggest that procurement systems could be strengthened by introducing structured complexity assessment mechanisms during the project preparation phase. Such mechanisms may assist contracting authorities in aligning procurement procedures and governance arrangements with the demands of the project while remaining consistent with the principles of transparency, competition and accountability that underpin EU procurement law. A procurement system capable of recognising and governing complexity across the full contract lifecycle is therefore better placed not only to ensure legal compliance, but also to improve the substantive performance of public investment in complex construction and infrastructure projects.

Future research may further explore the empirical implications of complexity-oriented procurement frameworks, including the application of complexity assessment tools in real procurement contexts and the relationship between procurement strategies and project performance in complex infrastructure projects. It would also be valuable to examine more closely how different forms of uncertainty materialise during contract execution and how procurement design influences the need for contractual adaptation or modification. Integrating structured complexity assessment into procurement design therefore represents an important step towards procurement systems that are not only legally compliant, but also better equipped to govern increasingly complex public investments throughout both contract formation and contract execution.

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Innovation Procurement in Big Science Organizations: Legal Frameworks and Enabling Conditions

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Abstract

Big Science Organizations such as CERN and European XFEL are shifting from transactional purchasing to strategic innovation procurement. Through early market engagement and tools like PCP, PPI, and Innovation Partnerships, they co-develop high-risk technologies with industry, especially SMEs. INPROCAP strengthens legal, organizational, and professional capacities to turn public R&D investment into market-shaping innovation and long-term industrial impact.

Keywords: Big Science Organizations (BSOs); early market engagement; innovation partnership; innovation procurement; market shaping; Public Procurement of Innovative Solutions (PPI); Pre-Commercial Procurement (PCP).

1. Introduction

Big Science Organizations (BSOs) — including CERN, the European X-Ray Free-Electron Laser (EuXFEL), the European Spallation Source (ESS), the European Space Agency (ESA), EISCAT, and Fusion for Energy (F4E/ITER) — represent some of Europe's largest public research investments and play a pivotal role in advancing scientific and technological frontiers.

The global Big Science market was valued at approximately USD 29.1 billion in 2020 and is projected to reach USD 41.6 billion by 2025 (BCC Publishing, 2021), with Europe accounting for nearly EUR 10 billion annually (European Space Agency, 2024). Assuming continued growth at a comparable compound annual growth rate (CAGR) of around 7–8 percent, the market is expected to reach approximately USD 44.7 billion by 2026.

BSOs are recognized as drivers of innovation (Autio et al., 2023), often demanding technologies beyond current industrial capability. In the early innovation phase, they act as technology challengers, formulating highly specific technical needs, while industry and research actors respond as technology providers, exploring and co-developing potential solutions. When these early interactions progress to formal tendering, the roles shift: technology challengers become public buyers, and technology providers become suppliers under regulated procurement procedures.

Within this expanding landscape, BSOs are increasingly moving beyond a purely transactional procurement model toward one that positions procurement as a strategic driver of innovation. Rather than relying solely on off-the-shelf solutions, BSOs are engaging with advanced technology suppliers to co-develop novel, mission-critical technologies tailored to demanding scientific and operational requirements.

Big Science procurement is therefore a significant catalyst for innovation. Evidence from procurement activities at organizations such as CERN and the European XFEL demonstrates that supplier engagement can generate substantial technology spillovers, with innovation outcomes — such as patenting activity — typically emerging after a time lag of five to eight years. This underscores the long-term, strategic nature of Big Science procurement and its enduring impact on Europe's innovation ecosystem.

This dynamic has generated world-changing innovations, from CERN's creation of the World Wide Web to ESA's satellite technologies (Gann, 2022). Yet, despite such potential, innovation-oriented procurement remains underused in the Big Science ecosystem. Strengthening this capacity can translate public R&D investment into market-ready solutions and reinforce Europe's industrial competitiveness.

Certain scholarship on demand-side innovation policy underscores that public procurement can function as a powerful market pull instrument, capable of directing supplier innovation efforts

toward clearly defined public needs while simultaneously reducing the uncertainty associated with R&D investment (Uyarra and Flanagan, 2010). In this context, BSOs occupy a unique position: their substantial purchasing power, long-term planning horizons, and demanding technical standards position them as lead users whose procurement decisions can shape entire technology trajectories (Uyarra and Flanagan, 2010).

Beyond acquisition, procurement in Big Science increasingly functions as a strategic, demand-side instrument with the potential to shape markets and supplier capabilities.

The INPROCAP project, funded under Horizon Europe (Horizon Europe Grant No. 101157621), seeks to build advisory expertise on innovation procurement among more than 100 national Industrial Liaison Officers (ILOs). These ILOs connect innovative SMEs (potential technology providers) with the procurement departments of large research infrastructures (technology challengers and later buyers).

This paper presents INPROCAP's findings on:

- the legal frameworks of BSO procurement;
- the enabling pre-requisites, notably early market-engagement instruments that support innovation procurement; and
- the formal procurement procedures (PCP, PPI, Innovation Partnership) through which innovation is implemented.

2. INPROCAP: Project Context and Definitions of Innovation Procurement

INPROCAP is implemented as a Coordination and Support Action (CSA), a funding instrument designed to support networking, training, advisory services, and related activities that strengthen innovation capacity across the European Union. The INPROCAP consortium comprises seven core partner organizations from seven European countries and the project runs from 1 June 2024 to 31 May 2027. This funding enables project partners and BSOs, such as EuXFEL and Technologisk Institut, to deliver specialized training, conduct case-by-case assessments of innovation procurement needs, participate in market engagement events, and develop innovative procurement guidelines, procedures, and advisory services based on best practices. Its main stakeholders include BSOs, national Industrial Liaison Offices (ILOs), and innovative companies, forming a strong triple-helix collaboration. The project operates across the European Big Science innovation ecosystem with the aim of strengthening and transforming innovation procurement practices and focuses on embedding innovation procurement capabilities within national ILOs working with BSOs, enabling them to act as effective bridges between industry — particularly SMEs and startups — and Big Science facilities. The project also establishes a long-term advisory platform and a shared knowledge base to support innovation procurement activities across

Europe, ensuring consistency and the adoption of best practices. Through outreach and engagement activities, including workshops, events, and training sessions, INPROCAP promotes the participation of innovative companies in procurement processes. In parallel, it builds a Community of Practice that brings together BSOs, ILOs, SMEs, research organizations, and procurement experts to exchange knowledge and develop innovation procurement capacity. Overall, INPROCAP aims to motivate and equip SMEs and startups to engage with Big Science facilities, empower ILOs with the tools, training, and expertise needed to act as specialist advisers, standardize innovative procurement procedures across the Big Science market, and facilitate collaborative consortia to co-design technological solutions. By doing so, the project contributes to a shared, sustainable approach that benefits the entire European innovation ecosystem.

According to the European Commission, innovation procurement includes any procurement that involves either (a) purchasing the process of innovation — R&D services with partial outcomes — or (b) purchasing the results of innovation — new or significantly improved products, services, or processes (European Commission, 2021a).

In the public sector, innovation procurement may mean:

- purchase of innovation, referring to buying technologies not yet available on the market;
- innovation through procurement, encouraging innovative suppliers to participate;
- innovation in the procurement process, using new approaches such as functional or performance-based specifications.

INPROCAP focuses mainly on the second meaning of innovation procurement, which emphasizes the role of innovative technology providers and the need to adapt procurement practice to foster experimentation and co-development.

In the public sector, innovation procurement refers to the strategic use of public purchasing power to stimulate the development and uptake of new or significantly improved products, services or solutions, rather than acquiring the existing off-the-shelf offerings. Following this approach, public sectors procure solutions to clearly defined problems and unmet needs instead of prescribing predetermined products or technical specifications, which result in enabling suppliers and innovative technology providers to innovate in response to the identified challenges.

A key success factor for innovation procurement is an accurate understanding of the target unmet need. Successful innovation procurement requires end-users and contracting authorities to understand their unmet needs and requirements precisely (Kubinec, 2024). In public procurement, we should not seek innovation for the sake of innovation, but rather innovation to meet unmet needs that enable an organization to fulfil its function effectively (Roberts, 2017).

This model incentivizes suppliers, particularly innovative technology providers, including SMEs and startups, in developing, testing, and delivering solutions to the market gaps and unmet market challenges that are not yet adequately addressed or not yet widely available on the market, transforming and advancing conceptual ideas or solutions into prototypes and proceeding through iterative development and testing toward viable and deployable solutions.

Innovation procurement focuses on addressing unmet societal or operational needs, such as climate change mitigation, investigate very early stages of fusion-related processes, or advanced digital services, where potential suitable solutions may not yet exist or require substantial and significant improvement. It is based on outcome- or performance-based requirements that specify the desired results rather than the detailed technical specifications, allowing suppliers and innovative technology providers the flexibility to propose creative and diverse approaches or solutions and co-develop with the BSOs. The process often involves the sharing of risks and benefits between public sectors and innovative technology providers, with phased development and testing used to manage uncertainty. Through these mechanisms, innovation procurement contributes to market shaping or creation, accelerates the adoption of innovative solutions, and provides valuable market entry opportunities for SMEs and startups within the innovative public procurement ecosystem.

EuXFEL has applied for funding under the European Union's Horizon Europe programme, the EU's primary research and innovation funding framework. Through the INPROCAP project, EuXFEL plays a leading role and aims to support, drive and implement targeted activities to strengthen innovation procurement capacity within the organization, while actively promoting the transfer of best practices and sharing real-world cases and insights to advance innovation procurement across the wider research infrastructure community. Specifically, the INPROCAP programme supports the BSOs of specialized tailored training sessions, covering the full spectrum of relevant topics and pertinent elements, for procurement experts and national ILOs, who have the potentiality and possibility to catalyse the innovative procurement ecosystem. This enhances participants' knowledge of innovation procurement instruments, legal frameworks, and best practices, fostering knowledge exchange and capacity building across BSOs.

Through the promotion of INPROCAP project, EuXFEL explores, uncovers and identifies the opportunities for effective application of innovation procurement. These evaluations take into account institutional and legal contexts, as well as technical and market-related factors, ensuring that innovative procurement approaches are feasible, compliant, and strategically aligned with EuXFEL's objectives. By systematically assessing procurement processes in this way, EuXFEL is able to explore, uncover, and identify concrete cases to implement innovation procurement, paving the way for practical, legally sound, and strategically relevant innovation initiatives. By combining capacity-building, practical assessments, and pilot implementations, EuXFEL seeks to foster a

culture of innovation-oriented procurement, improve and enhance procurement practices, and contribute to the objectives of INPROCAP in promoting the adoption of innovation procurement, aligning organizational objectives and bringing impact and case sharing across other European research infrastructures.

3. Legal Frameworks Governing BSO Procurement

Innovation procurement within BSOs operates under a complex regulatory environment, as these organizations are governed by diverse legal regimes that reflect their intergovernmental nature and the specific obligations of their host countries, as well as internal institutional procurement regulations. Although the applicable public procurement rules and procedures may vary across BSOs, they are grounded by a shared set of core standard principles that must be consistently observed and upheld. These include the fundamental principles of the legal and ethical foundation underpinning EU public procurement law — such as transparency, equal treatment, non-discrimination, and proportionality — alongside requirements for accountability and sound financial management, ensuring that procurement plans and processes are conducted strategically in a manner that remains competitive, legally robust and capable of accommodating innovative solutions while safeguarding public trust and value for money. At the same time, adherence to these common principles enables BSOs to build up their common ground that further enhances their flexibility to implement innovation-oriented approaches, instruments and tools, and preliminary market engagement practices across varying and diverse institutional and legal contexts, while laying the groundwork for executing tenders in a manner that is not only feasible and appropriate but also strategically aligned with legal and regulatory requirements, ensuring that procurement strategies and tender processes remain legally compliant, fair, and competitive.

BSOs operate under diverse legal regimes reflecting their intergovernmental character and host-country obligations. Some follow EU or national procurement law, while others apply internal frameworks aligned with EU principles.

European XFEL, based in Hamburg, is an intergovernmental organization recognized in Germany as a public-equivalent body. For procurements above EU thresholds, it applies German public procurement law implementing Directive 2014/24/EU (the Classical Directive); below those thresholds, it follows the national sub-threshold regulations (UVgO). To encourage participation by specialized technology providers across Europe, EuXFEL conducts most calls in English, using German only for construction works. Its procurement practice consistently applies the principles of transparency, equal treatment, and best value for money.

ERICs such as the European Spallation Source (ESS) and ELI ERIC (Extreme Light Infrastructure) operate under Regulation (EC) No. 723/2009, allowing each ERIC Council to set its own rules, provided they respect the fundamental principles of EU procurement regulation.

Other intergovernmental organizations, including CERN and ESA, apply internal procurement regulations — the CERN Financial Rules (Bellini-Devictor, 2023) and ESA's Procurement Regulations and Implementing Instructions (ESA, n.d.). Despite structural differences, all maintain competitive procedures based on the same fundamental EU principles.

Interviews conducted within INPROCAP indicate that innovation procurement instruments are not confined to a single procurement framework or regulatory regime. Instead, they can be effectively integrated across all existing procurement regimes, as long as a set of shared foundational principles is respected. These common standard principles typically include transparency, equal treatment of suppliers, proportionality, accountability, and value for money. The INPROCAP survey also shows that BSOs recognize innovation procurement as a strategic tool, but it is still underused in practice. Traditional public procurement procedures are often not well suited to acquire innovative or early-stage solutions, and organizations face limited skills, resources, and dedicated capacity to manage such complex processes. The survey also highlights low awareness and confidence in innovation-specific procurement instruments, alongside cultural resistance, legal complexity, and risk aversion that discourage closer collaboration with industry, particularly SMEs. Budget uncertainty and longer development timelines further constrain uptake. Overall, the findings indicate strong potential for innovation procurement, but also a clear need for improved frameworks, training, early market engagement, and organizational support to enable wider adoption. The interview outcomes further indicate that the adaptability of innovation procurement depends largely on the skills and capabilities of staff within BSOs, as well as on legal and regulatory clarity.

Recent literature on demand-side innovation policy highlights that the limited uptake of innovation-oriented instruments is often not a legal or technical failure, but a demand articulation failure rooted in institutional and organizational constraints. El Bakali et al. (2023), in a systematic review of demand-oriented innovation policies, show that policies intended to stimulate innovation diffusion frequently underperform when public organizations lack the internal capabilities, governance structures, and learning mechanisms required to translate unmet needs into effective demand. Their findings underline that demand-side instruments are most effective when supported by strong organizational capacity, early engagement with potential providers, and evaluation approaches that go beyond outcome measurement to understand behavioural and systemic change. This reinforces the view that innovation procurement in Big Science Organizations depends not only on the availability of legal instruments, but also on internal readiness, professional skills, and governance arrangements that enable experimentation, learning, and risk management.

A clear understanding of procurement rules together with the flexibility embedded within them is necessary to avoid risk-averse behaviour. In addition, supplier and market readiness is essential: SMEs and startups must be both willing and able to engage effectively with BSOs.

Indeed, research on barriers to innovation through public procurement demonstrates that a lack of organizational capabilities of all kinds and counter-productive incentive structures are among the principal reasons for low uptake of innovation-oriented instruments. The procurement of innovation requires a greater degree of in-house competence than standard procurement, and expertise from a wide range of functions beyond procurement alone (Georghiou et al., 2014).

Drawing on the EuXFEL experience, additional critical factors include leadership commitment and strong governance. Clear decision-making structures and robust top-management support are essential to accept and manage risk and to enable innovation. Innovation procurement also requires an appropriate level of risk tolerance as it involves accepting uncertainty, using flexible budgets, and implementing mechanisms to manage financial and operational risks during the innovation procurement tender process. Equally important is an organizational culture that encourages experimentation, co-development with innovative technology providers and collaboration.

Innovation procurement is motivated by several key factors. BSOs often pursue it when existing solutions are inadequate or outdated, creating a need for innovative alternatives. It emphasizes outcomes, prioritizing functional needs and desired results over rigid technical specifications, which encourages creativity and more effective solutions. By fostering technological advancement, innovation procurement can stimulate local industries, support research and development, and help maintain a competitive edge. Its focus on real-world problem-solving distinguishes it from routine procurement processes, while supportive policies or regulations can further promote economic growth, sustainability and digital transformation. Finally, the approach is inherently learning-oriented, encouraging trial, feedback, and iterative improvement to adapt as new solutions emerge.

Within the framework of innovative public procurement, procedures are guided by an unmet-needs–driven orientation, procedural flexibility, and a risk-taking approach. Rather than relying on prescriptive and predefined technical specifications, contracting authorities focus on functional requirements and intended outcomes (Hommen and Rolfstam, 2009). This outcome-oriented framing allows contracting authorities to accommodate uncertainty, leverage emerging technologies, and engage with evolving market capabilities. As a result, innovative instruments such as pre-commercial procurement, innovation partnerships, and competitive dialogue can be effectively applied within the existing EU procurement framework, enhancing innovation uptake and ensuring alignment with broader policy and strategic objectives.

Innovation procurement, in general, outperforms traditional approaches for companies aiming to develop new solutions (Uyarra and Flanagan, 2010). Unlike conventional procurement, which prioritizes price, rigid specifications, and established suppliers, innovation procurement emphasizes functional outcomes, value creation, and early market engagement. It opens opportunities for innovative SMEs and startups, encourages risk-sharing, and strategically manages intellectual property. By focusing on what needs to be achieved rather than how, this approach fosters creativity and high innovation potential, supporting the development of novel solutions rather than repeating existing ones. To operate effectively within such adaptive frameworks, procurement experts must possess the knowledge and competencies required to manage uncertainty while remaining fully compliant with the fundamental principles of public procurement regimes, including transparency, equal treatment, and competition.

Traditional procurement procedures, like the open and restricted procedures, typically have rigid rules. Requirements must be specified in detail, and any changes to the requirements or specifications may necessitate halting or even restarting the tender process. It is also not a free-for-all negotiation — it is limited and strictly controlled — meaning that while innovative approaches can be considered, the rules of the traditional procedures define clear boundaries on what is permissible. In contrast, innovation procurement tools like PCP, PPI and Innovation Partnership provide greater flexibility. They allow contracting authorities to engage in structured discussions at different progress stages with the innovative technology providers to refine proposals, adapt to uncertainty, explore alternative solutions, or refine requirements. The innovation tools also enable solutions to be shaped iteratively at each stage in response to the outcomes of each phase, continuing until the desired final solution or product is achieved — particularly those based on open or restricted procedures that allow limited flexibility in terms of negotiation and defining uncertain solutions.

However, successful integration depends on scientific institutional capacity and organizational flexibility, legal clarity, and robust early-stage planning. Interviewees emphasized the importance of aligning innovation procurement tools with existing legal frameworks, ensuring compliance with national and EU procurement rules and regulations, and providing sufficient flexibility within internal institutional financial and approval rules and procedures — as well as the importance of providing clear and sufficient guidance and targeted training to procurement officers, technical experts, and scientists. When these conditions are met, innovation procurement can serve as a horizontal approach that enhances any procurement regime rather than replacing it (Rolfstam, 2009).

Innovation procurement functions as a regulatory mechanism while simultaneously fostering innovation within the established public procurement practices and regulations of BSOs — such as EuXFEL, CERN, ESA and other major national research institutes.

Recent systematic evidence further supports the role of public procurement as a strategic mechanism for market shaping and capability building among suppliers. Adjei-Bamfo et al. (2022), in a comprehensive review of public procurement for innovation, show that innovation-oriented procurement practices can significantly enhance suppliers' learning processes, absorptive capacity, and long-term innovation performance, particularly for SMEs. Their findings highlight that such impacts are most pronounced when procurement moves beyond transactional contracting toward relational and interactive approaches, including early market engagement, dialogue-based procedures, and phased development models. Importantly, the review emphasizes that innovation procurement should be evaluated against long-term public value creation rather than short-term efficiency gains alone. This perspective aligns closely with the Big Science context, where procurement functions not only as an acquisition tool but also as a strategic instrument to strengthen supplier capabilities, shape emerging markets, and support sustained industrial innovation over extended time horizons.

In this context, procurement functions as a market-shaping tool, actively shaping markets by articulating future-oriented technical, performance and sustainability expectations that strengthen innovative technology providers' capabilities, focusing on frontier technologies not yet reaching market readiness or commercially available. By leveraging public procurement tools — such as pre-commercial procurement with functional and outcome-oriented specifications, risk-sharing contractual arrangements, and phased development processes — BSOs are able to influence technological pathways without depending on formal regulatory mechanisms. Their substantial purchasing power, long-term planning horizons, and demanding technical standards encourage innovative technology providers, particularly SMEs and high-technology startups, to invest in research and development, deliver innovative solutions and approaches, advance new or improved concepts, and scale emerging technologies that might otherwise face uncertain or insufficient demand. At the same time, innovation procurement remains embedded within established public procurement common principles, preserving principles of transparency, competition, and accountability, while incorporating flexibility to enable experimentation and collaborative development. In this way, procurement becomes a strategic governance tool that aligns public scientific missions with industrial innovation, mitigates market and technological uncertainty, and facilitates and promotes the diffusion of advanced capabilities from Big Science projects into broader industrial and societal applications.

3.1 Enabling the Right Conditions and Selecting Feasible Legal Frameworks

With the right enabling conditions for early market engagement, BSOs can more effectively leverage innovation-oriented procurement instruments. Selecting an appropriate legal framework for innovation procurement is critical, along with using procurement instruments that allow BSOs to co-fund and de-risk technology development in partnership with innovative technology

providers and industry. Feasible and best-practice public procurement tools should be considered as early as the pre-market analysis and early development stages, well before full commercialization.

Collaborative innovation models enable BSOs and innovative technology providers to jointly define technical needs, develop and test prototype solutions, and iteratively refine emerging technologies. These approaches rely on functional and outcome-based specifications that focus on the results to be achieved rather than prescribing specific components or solutions. By doing so, BSOs encourage creative, solution-oriented responses from innovative technology providers, promote best practices, and accelerate the development of advanced technologies aligned with demanding scientific objectives.

4. Enabling Pre-requisites: Early Market Engagement and Organizational Capabilities

Before formal procurement begins, BSOs must create an environment conducive to innovation. Two enabling dimensions are critical: early market-engagement instruments, and organizational capabilities and governance.

4.1 Early Market-Engagement Instruments

In the pre-procurement stage, technology challengers interact with technology providers to exchange information about needs, capabilities, and potential solutions. These activities do not yet constitute procurement but are vital for shaping realistic and innovation-friendly tenders.

The most common instruments include:

- Preliminary Market Consultations (Directive 2014/24/EU, Article 40): formalized, documented processes allowing buyers to seek advice from the market in a competition-neutral manner. Specifically in innovation procurement, market consultation plays a crucial role because the innovation cycle is normally longer than the procurement cycle (Voda and Jobse, 2016).
- Industry Days and Academic Industry Meetings (AIM Days): open forums where BSOs present technological challenges and technology providers discuss potential approaches.

Both tools ensure that future procurement is informed and technically sound. They must follow the principles of transparency, equal treatment, and neutrality to prevent any participant from gaining unfair advantage.

When conducting pre-procurement activities, such as preliminary market consultations and industry engagement, it is critical to safeguard legality, fairness, and competition. Interactions with technology providers must be transparent, well-documented, and neutral, ensuring equal access to information and preventing any participant from gaining an undue advantage. Insights

gathered should inform future requirements without predetermining solutions or favouring specific innovative technology providers. Clear boundaries must be maintained between preliminary consultations and procurement opportunities, with no implied commitments or eligibility benefits for participants. Intellectual property and confidential information should be carefully managed, potential conflicts of interest addressed, and state-aid considerations respected. Measures should also be taken to avoid any perception of favouritism toward particular innovative technology providers in anticipating or shaping future tenders. Engaging a diverse and balanced range of market actors helps ensure that subsequent procurement processes remain open, innovation-friendly, and legally robust and enforceable.

Precautions to Observe in Early Market Engagement

Early market engagement instruments, including pre-market consultations, industry days, and academia–industry meetings, must be carefully structured and followed up to support innovation while ensuring full compliance with procurement principles. Contracting authorities should take precautions to preserve transparency, equal treatment, and fair competition by documenting engagement activities and ensuring that relevant information is shared in a non-discriminatory and fair manner. Potential conflicts of interest should be proactively identified and managed, and clear boundaries should be established and communicated to ensure that early market engagement informs procurement planning without predetermining outcomes or conferring advantages on specific innovative technology providers or suppliers. Engagement activities should focus on unmet needs not yet addressed by the market, functional requirements, and desired performance outcomes aimed at solving identified challenges. Discussions should encourage structured brainstorming of possible approaches to potential solutions rather than specifying particular products or technologies, while ensuring the protection of confidential information and intellectual property rights.

Effective follow-up involves systematically capturing insights from engagement activities, coordinating internally across legal, technical, and financial functions, and translating market intelligence into technology-neutral and outcome-oriented specifications. Clear communication of next steps and indicative timelines helps maintain market confidence, while the assessment of market readiness and risk supports the selection of appropriate procurement instruments. When applied in this way, early market engagement serves as a strategic enabler of robust, compliant, and innovation-oriented procurement.

4.2 Organizational Capabilities and Governance

Innovation procurement also depends on internal readiness. BSOs must develop competencies in pre-market research, needs assessment, early supplier engagement, and innovation facilitation, as well as coordination between technical experts, legal units, and procurement staff.

Such capabilities enable BSOs to act as strategic innovation facilitators, not merely as administrative buyers. These enabling conditions — early market dialogue and internal capability — form the foundation upon which PCP, PPI, and Innovation Partnership can operate effectively.

5. Organizational and Cultural Challenges

5.1 Cultural Resistance and Legal and Risk Management Complexity

Despite the potential benefits, BSOs face several systemic barriers to effective innovation procurement. Strong in-house R&D cultures, along with complex internal approval processes and compliance requirements, often create resistance to pursuing innovative collaborations with industry, particularly with SMEs (Uyarra and Flanagan, 2010; Yeow et al., 2015). This makes it more difficult to integrate solutions developed by external technology providers. Additionally, innovation procurement frequently involves significant legal and risk-management challenges, including issues related to intellectual property rights, licensing, liability, contractual negotiations, and phased funding for tender processes. These internal policies and procedural hurdles can discourage the pursuit of innovative development with technology providers, even when such providers are capable of supporting co-development of products or solutions that address unmet innovation needs.

Cultural resistance to innovation procurement is not unique to BSOs but reflects broader patterns observed across public administration. Traditional public procurement culture has been shaped by complex legal frameworks designed to preserve equity, transparency, and cross-border mobility, resulting in bureaucratic processes that grant contracting authorities fewer degrees of freedom than private-sector counterparts. The prevailing administrative culture prioritizes detailed procedural compliance over substantive innovation outcomes, making the adoption of new concepts and instruments more difficult. As Tavares (2019) observes, the successful implementation of innovation procurement requires not merely legal reform but a fundamental cultural shift within public administration toward more competent and autonomous contracting authorities capable of managing uncertainty while serving the public interest (Tavares, 2019).

5.2 Limited In-House Capabilities

BSOs also frequently face constraints in internal resources and skills. In particular, procurement and technical staff may lack dedicated capabilities in market intelligence, technology scouting, and supplier engagement. They quite often rely on support from experts at the ILO. To address these gaps, many BSOs are investing in targeted capacity-building initiatives for innovation procurement experts. For example, the INPROCAP project delivers a specialized series of training programmes, developed in collaboration with BSO experts and national ILO professionals, to strengthen Europe's ability to procure innovative solutions for large-scale scientific research

infrastructures and to enable BSOs and SMEs to engage more effectively in innovation-driven procurement processes.

5.3 Professionalism of Procurement Experts

Procurement experts operate beyond conventional approaches, taking on a more active and agile role, particularly in innovation procurement. Their responsibilities include strategic planning, conducting pre-market consultations with the support from the ILO, and supporting scientists or end users who seek innovative products or solutions. They play a crucial role in formulating specifications that are clear, detailed, and well-structured, covering all phases of the innovation process.

Procurement experts also design and manage phased funding for innovative technology providers, review and apply selection criteria to ensure qualified suppliers are chosen for each phase, and ensure budgets are allocated effectively. They must maintain a comprehensive overview of the entire process and translate this understanding into precise tender documents and technical specifications. In addition, procurement experts anticipate risks at each phase and implement appropriate risk-mitigation measures. They maintain strong control over the process, including the authority to modify specifications, cancel phases, or restructure phases when necessary to address emerging risks or changing requirements.

Depending on the scientific infrastructure, procurement experts should work closely with the ILO and leverage its expertise in pre-market analysis and in identifying unmet needs that are not currently available on the market. Procurement experts should collaborate closely with the ILO in developing innovation procurement strategies and identifying related opportunities.

Recognizing the strategic importance of procurement professionalism, the European Commission adopted Recommendation (EU) 2017/1805 on the professionalisation of public procurement, which establishes a framework for strengthening the skills, knowledge, and competences of contracting authorities across Member States (European Commission, 2017). The recommendation emphasizes that professionalisation policies must systematically address training and career management of public procurement practitioners, while providing practical tools and institutional support to enhance procurement efficiency. This policy framework was complemented by ProcurCompEU, a European competency framework that defines 30 key competences in a structured competency matrix, providing a common reference for public procurement professionals throughout the EU. In the context of BSOs and innovation procurement, this competency framework is particularly relevant, as innovation-oriented procurement demands not only technical procurement knowledge but also capabilities in strategic planning, market intelligence, risk management, early supplier engagement, and cross-functional collaboration — skills that align directly with the advanced competency profiles articulated in the European professionalisation framework (European Commission, 2017).

6. Formal Procurement Procedures for Innovation

Once market engagement and internal preparation are complete, BSOs move into the procurement phase, where technology challengers formally become public buyers and technology providers become suppliers under regulated procedures.

6.1 Pre-Commercial Procurement (PCP)

PCP is a structured, competitive procurement of R&D services (Albano and Sparro, 2010). It separates development from commercial acquisition. Multiple suppliers compete through sequential phases — solution design, prototyping, and validation. Suppliers retain intellectual-property rights, while buyers receive rights to use results under fair terms.

PCP offers key advantages for BSOs:

- de-risking technologies before large-scale investment;
- building a diverse supplier base and avoiding dependency on a single vendor;
- promoting market diffusion of solutions beyond the original BSO.

Evidence from national PCP programmes across Europe confirms these advantages. For instance, the Norwegian full-scale carbon capture PCP triggered five suppliers, including new market entrants, to create cost-effective technological solutions, and using separate R&D procurements enabled the technology to become more cost efficient before committing to large-scale deployment (European Commission, 2021b).

For cross-facility needs, PCP creates economies of scale and paves the way for later Public Procurement of Innovative Solutions (PPI), where validated prototypes are purchased for operational deployment.

6.2 Public Procurement of Innovative Solutions (PPI)

PPI allows buyers to acquire innovative goods or services that are close to market but not yet widely available (Yeow et al., 2015). It is typically used after a PCP phase or when the technology exists but requires adaptation. PPI accelerates the diffusion of innovation while maintaining competition and compliance with procurement law.

6.3 Innovation Partnership

An Innovation Partnership integrates R&D and the purchase of the resulting product or service within a single contract. It is particularly suitable when the challenge is highly specific, the technology non-existent on the market, or only a few suppliers have the necessary expertise. In this model, the BSO defines performance requirements, co-develops the solution with one or more partners, and structures funding around key milestones. This public procurement approach encourages close collaboration while often involving complex arrangements of risk-sharing.

Typically, Innovation Partnership offers a collaborative arrangement between a BSO and external stakeholders — such as SMEs and startups — designed to co-develop new technologies, products or processes extending beyond existing cutting-edge technologies or solutions. Serving as a strategic procurement tool, they enable BSOs to move beyond conventional procurement, co-create frontier technologies, reduce uncertainty in technological development while strengthening and shaping innovative technology providers' capabilities and accelerating innovation, particularly valuable when the technology does not yet exist or is not widely available on the market.

Above the EU thresholds, the regulatory framework is clearly defined. The German regulation governing public procurement procedures expressly sets out the applicable rules and procedures for conducting an Innovation Partnership. Below the EU thresholds, no specific procurement procedure governing Innovation Partnerships is defined. In practice, innovation procurement below the threshold can be conducted using existing procedures listed in the UVgO, such as negotiated procedures; contracting authorities may award contracts using negotiated procedures, with or without competition, or competitive tendering procedures where the contract includes design or innovative solutions. These approaches can be implemented through a flexible application of the existing sub-threshold procurement regulations. This flexibility allows contracting authorities to lawfully implement milestone-based procurement schemes involving multiple suppliers, in which several undertakings participate in an initial development phase and only a subset proceeds to subsequent phases. While such schemes do not constitute Innovation Partnerships or Pre-Commercial Procurement in the formal legal sense, the core principles and logic of the Innovation Partnership — such as phased development, co-design, and risk-sharing — can nevertheless be implemented below the EU thresholds. Depending on market conditions and capacity, the contracting authority may decide, in an initial phase, either to publish a tender notice as an open market instrument to explore the market and engage potential participants, or to invite a group of potential innovative technology providers to participate in the tender in co-developing the innovative products or solutions. Where a negotiated procedure without prior competitive tendering is used, several undertakings — generally at least three — are invited to submit tenders for participation, with the progression between phases determined on the basis of experience from comparable projects, the submitted proposals and predefined selection criteria. Each phase is subject to a stage-gate review to verify compliance with defined quality criteria and to determine whether the project meets the conditions for progression to the subsequent phase.

European XFEL's experience shows when this model excels:

- High R&D-to-product cost ratio — when research costs outweigh product value, partnership allows risk-sharing and prioritizes long-term impact over lowest price.
- Unprecedented technical specifications — when no commercial solution exists, co-development fosters capability growth and expands the future supplier ecosystem.

6.4 Comparison of Innovation Procurement vs Traditional Procurement Procedures

When eligibility conditions are met, an Innovation Partnership differs fundamentally from traditional procurement procedures such as direct purchase, negotiated procedures, open calls for tender, and restricted calls for tender. Direct purchase and open procedure are primarily suited to the acquisition of off-the-shelf goods or well-defined services and offer limited flexibility to address complex or non-existent technologies. Restricted and negotiated procedures provide greater adaptability by limiting participation to qualified suppliers and allowing some degree of clarification and negotiation; however, they remain largely focused on procuring existing solutions and do not formally integrate research and development activities. By contrast, an Innovation Partnership is specifically designed for situations in which the required technology is not yet available on the market or involves a high degree of technical uncertainty. It integrates R&D and procurement within a single contractual framework, enabling the co-development of solutions through iterative, milestone-based phases and structured risk-sharing arrangements. Although more complex to implement, Innovation Partnerships enable BSOs to go beyond conventional procurement, actively shaping innovative technological development, addressing and reducing uncertainty, and strengthening supplier or innovative technology providers' capabilities, delivering strategic benefits that traditional procurement procedures are not designed to achieve. Innovation procurement in general outperforms traditional approaches for companies aiming to develop new solutions.

From the perspective of the economics of incentives, Innovation Partnerships can significantly affect firms' behaviour.

An additional determinant in choosing between innovation procurement instruments is the extent to which the value of the resulting innovation can be observed and verified ex post. When performance outcomes — such as efficiency gains, system reliability, or functional improvements — can be clearly measured, procurement mechanisms can credibly reward high-value innovation and discipline continuation decisions. Conversely, when innovation value is difficult to verify, extensive bundling of R&D and production may weaken incentives and increase the likelihood of inefficient continuation. This highlights the importance of aligning procurement design with the measurability of innovation outcomes.

As highlighted in the literature, the use of contract rights to reward highly valuable innovation can exploit economies of scope and strengthen incentives for research effort, while simultaneously introducing risks related to market dominance and lock-in (Iossa, Biagi and Valbonesi, 2017).

The economics literature further suggests that the effectiveness of Innovation Partnerships does not depend solely on bundling per se, but on the degree to which access to subsequent production rights is made conditional on the realized value of the innovation. Rather than full and unconditional bundling, incentive efficiency is maximized when continuation to the production

phase is explicitly tied to observable performance thresholds and innovation quality. Such conditional or partial bundling preserves the incentive benefits of economies of scope while reducing the risks of supplier lock-in and the undue continuation of low-value projects.

Rather than granting automatic exclusivity, procurement design may preserve competitive pressure by biasing, rather than eliminating, competition in favour of high-value innovators. Mechanisms such as preferential evaluation scores or bidding credits in subsequent production tenders can reward superior R&D performance while maintaining contestability. This approach allows contracting authorities to strengthen innovation incentives without foreclosing market entry or disadvantaging SMEs, thereby balancing dynamic efficiency with long-term competition.

7. Integrating Market Engagement and Procurement Practice

Experience from EuXFEL and other BSOs demonstrates that early market-engagement instruments directly influence the success of later procurement procedures. Well-structured preliminary consultations or Industry Days help define functional requirements, validate market capacity, and design fair, realistic tenders.

During these exchanges, technology challengers gather intelligence from technology providers without distorting competition. When procurement begins, the roles formalize into buyers and suppliers, already equipped with a clearer understanding of mutual expectations. This continuity shortens innovation cycles and increases the probability of commercial uptake after project completion.

8. Conclusions and Policy Recommendations

Innovation procurement enables BSOs to convert scientific ambition into industrial competitiveness and societal value. Despite operating under diverse legal frameworks, BSOs share a common foundation of transparency, equal treatment, and proportionality, which supports the integration of innovation-oriented instruments.

Public procurement can influence innovation indirectly by enlarging the market for new goods, by facilitating the adoption of new standards, and by changing the market structure so as to make it more conducive to innovation (Uyarra and Flanagan, 2010). The leverage effect is particularly significant in industries characterised by heavy R&D requirements, substantial economies of scale, and high levels of uncertainty — conditions that are characteristic of Big Science procurement (Uyarra and Flanagan, 2010; Hommen and Rolfstam, 2009).

A clear distinction should be maintained between enabling pre-requisites and formal procurement procedures:

- Enabling pre-requisites include early market-engagement tools (Industry Days, preliminary consultations) and the organizational capabilities needed for innovation management. They prepare the ground for effective, competition-neutral procurement.
- Formal procedures — PCP, PPI, and Innovation Partnership — translate this groundwork into legally binding R&D and acquisition processes.

Policy recommendations:

- Institutionalise early market engagement as a standard step in major procurements.
- Use PCP for shared technological challenges and scalable solutions.
- Apply Innovation Partnership selectively for bespoke, high-risk developments with explicit IP and lifecycle management plans.
- Strengthen ILO networks and training to bridge the gap between technology providers and buyers.
- Adopt functional and outcome-based specifications to reward performance and adaptability.

Innovation procurement is both a contractual mechanism and a strategic capability. By coupling strong preparatory engagement with fit-for-purpose procedures, BSOs can accelerate technology transfer, enhance Europe's industrial ecosystem, and maximise the societal return on investment in Big Science.

The frustration of end-users perceiving public procurement as an obstacle to innovation can be effectively addressed by systematically deploying these instruments. The evidence presented in this paper demonstrates that procurement need not hinder innovation uptake; on the contrary, with the right organizational conditions, legal clarity, and early market engagement, it can serve as a catalyst that transforms public R&D spending into tangible innovation outcomes (Kubinec, 2024).

Drawing on the preceding analysis, a structured and auditable approach to assessing innovation readiness encompasses multiple critical dimensions. Technology feasibility considers whether the proposed solution can be practically developed, scaled, and integrated, accounting for technical complexity and potential risks. Team execution capacity evaluates the skills, experience, and organizational capability of those responsible for implementation, ensuring they can effectively deliver the innovation. Market adoption potential examines the likelihood of acceptance and uptake by the target market, including demand, competitive dynamics, and regulatory considerations. Organizational readiness assesses whether internal structures of BSOs, processes, and culture are aligned to support innovation throughout its lifecycle. Finally, financial resilience addresses the stability of funding, cost management, and the ability to withstand unforeseen challenges, ensuring that development and deployment of innovation projects can proceed

sustainably. This multi-dimensional framework provides a rigorous basis for evaluating and managing the risks and opportunities inherent in innovation projects.

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Increasing the Participation of Micro, Small and Medium Enterprises (MSMEs) in Public Procurement in Trinidad and Tobago

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Abstract

The purpose of this research is to identify the barriers to MSMEs accessing public procurement contracts in Trinidad and Tobago and to determine the measures that can be used to remove these barriers. The authors used interviews and document reviews to collect the data used in this research, which discovered that MSMEs in Trinidad and Tobago appear to have significant issues accessing public procurement contracts. This situation occurs despite the introduction of secondary legislation, such as the Simplified Procurement Regulation, to encourage the participation of MSMEs in public procurement. Among MSMEs, micro enterprises appear to benefit the least from these legislative initiatives. Factors that contribute to the low inclusion of MSMEs in public procurement include their lack of awareness of these initiatives and the inconsistent implementation of these regulations by public officials.

Keywords: public procurement; MSMEs; Simplified Procurement Regulations 2024; Public Procurement and Disposal of Property Act of Trinidad and Tobago.

1. Introduction

This study looks at public procurement and the effect that it has on the development of micro, small and medium enterprises. It examines the importance of these enterprises and their contribution to the development of a country's economy, especially for emerging economies. Furthermore, it specifically considers micro, small and medium enterprises in Trinidad and Tobago and the public procurement initiatives that affect their contribution to the national Gross Domestic Product (GDP). We examine what prevents an increase in the participation of micro, small and medium enterprises (MSMEs) in public procurement contracts in Trinidad and Tobago and what initiatives should be implemented to remove barriers to their participation. We also examine how MSMEs' participation in public procurement is affected by their legal status, size, age and owner profiles. Furthermore, we consider whether public procurement officials in Trinidad and Tobago implement legislation and regulations that benefit MSMEs. This research also looks at whether MSMEs use information and computer technology (ICT) to their benefit. Additionally, it notes if there is transparency in promoting the SPR and considers whether existing monitoring and evaluation systems contribute to its effective implementation. Finally, this study contributes to procurement research by recommending ways to increase MSME participation in public procurement in Trinidad and Tobago. Also, we try to discover, through interviews and document reviews, how these enterprises in Trinidad and Tobago are affected by the Simplified Procurement Regulations (SPR) initiatives and the measures that can be taken to improve micro enterprise participation in public procurement.

2. Background and Explanation of the Issue

2.1 Literature Review

2.1.1 The Importance of Public Procurement

The Gross Domestic Product (GDP) of a country is one of the main indicators used to measure its financial successes or failures. It is also used as the standard measure of the size of a country's economy, and it determines how well or how poorly a country's economy is doing (Coyle, 2015). This number is so important that every year, the International Monetary Fund (IMF) publishes the GDPs of countries worldwide and uses these figures as indicators of their economic growth or decline (IMF, 2024).

Public procurement (PP) often represents a significant part of a country's aggregate GDP. For example, in the European Union (EU), public procurement accounted for approximately 13.3 per cent of the combined GDPs of EU countries from 2015 to 2019 (Hoekman and Taş, 2020). Therefore, a robust and lucrative public procurement system can increase the GDP of a country.

Public procurement policies can also have a positive and multiplicative impact on SMEs. They may improve a country's economic performance since legislation, regulations, and governmental

policies are important parts of the entrepreneurial dimension of any country. Furthermore, the quality of public procurement regulations is often synonymous with a country's quality of governance. Therefore, these policies can assist in improving the investment climate in which businesses operate (Hoekman and Taş, 2020).

Additionally, there is substantial evidence of public procurement's possible role as a supporter of innovation and entrepreneurship among micro, small and medium enterprises. Government contracts may encourage these businesses to invest more, expand employment, and increase their innovations and productivity (Hoekman and Taş, 2020).

Research into public procurement has argued that there are two important dimensions of public procurement regulation. The first dimension involves the fact that it can level the field of competition among businesses by removing discriminative practices that reduce the participation of micro, small, and medium enterprises. The second dimension deals with transparency and its related mechanisms which reduce the potential for corruption or collusion in the allocation of contracts. Competition and transparency are core elements of what is internationally recognised as good public procurement practice, where the goal is value for money (Hoekman and Taş, 2020).

Additionally, it has been reported in the European Economic Area, that public procurement regulations which have internationally accepted good practice standards, increase competition, thereby decreasing the average contract prices for contracts tendered by public procurement agencies (Hoekman and Taş, 2020).

2.1.2 What are MSMEs and Why They are Important

Historically, micro, small and medium sized enterprises have collectively been called MSMEs. MSMEs are often defined as businesses whose assets, number of employees, or revenues fall below a pre-determined threshold. The values of these thresholds vary across countries, institutions and industries. For example, the European Union defines SMEs as enterprises which employ less than two hundred and fifty persons, with an annual turnover less than EUR 50 million, and/or whose annual balance sheet total is not more than EUR 43 million (European Commission, 2003). Additionally, according to the European Union, micro enterprises are enterprises that have fewer than ten employees and an annual turnover or balance sheet below EUR 2 million (European Commission, 2003).

However, in Trinidad and Tobago (TT) a micro enterprise is an enterprise with not more than five employees and an annual sales turnover of less than or equal to TTD 1 million. Whereas a small enterprise is defined as an enterprise with more than five but less than twenty-five employees and an annual turnover that is not more than TTD 8 million. Medium enterprises employ twenty-six to fifty employees and have annual turnovers not greater than TTD 10 million (Daily Express, 2025). Any business whose annual sales turnover and number of employees exceeds these values

is a large enterprise. This shows that a business' classification as an MSME is greatly determined by its geographical location.

Most of the businesses that exist in the world today are MSMEs, and international financing institutions (IFIs) have noted their importance to their country's economies. From the World Bank's estimates, by the year 2030, millions more jobs must become available to employ the increasing global workforce. This makes MSME development important since in emerging markets, most formal jobs are generated by MSMEs (World Bank, 2019). Additionally, it has been shown that an increase in MSME access to public procurement opportunities can lead to increased competition and vendor variety, thus possibly increasing innovation in the economy (World Bank, 2019). Furthermore, in developing countries and emerging markets, MSMEs are a significant source of domestic revenues and export earnings, outside of the agricultural sector (Patil, 2017).

However, a lack of access to finance is a limitation to MSME growth in developing countries (World Bank, 2019). As such, for MSMEs to contribute to improving the economies of developing nations, they must be given greater opportunities to access finance. Public procurement policies are one of the possible avenues that can be used to achieve this.

2.1.3 Public Procurement Initiatives to Support MSME Participation

Countries that are aware of the benefits of a healthy MSME sector usually introduce into their public procurement regimes, initiatives to support an increased participation of MSMEs. These initiatives often include explicitly favouring MSMEs through price preferences or setting aside a specific share or certain types of public procurement contracts for MSMEs. Also, governments have tried to increase MSME participation by requiring large enterprises, who have won tendered public contracts, to sub-contract work to MSMEs. Additionally, governments have simplified bidding procedures, introduced eligibility requirements that MSMEs can satisfy and reduced contract lot sizes to increase MSME participation in public procurement (Hoekman and Taş, 2020).

However, though policies that encourage the participation of MSMEs may improve public procurement, it is often not easy to discover how these policies advance the interests of MSMEs. MSMEs have different tendering abilities and behaviours, and these differences impact the effect that public procurement policies have on them (Flynn, McKevitt and Davis, 2015).

Notably, in the United States of America (USA), the federal government, during the decade of the 1990s, implemented several reforms in public procurement which increased the proportion of contracts awarded to MSMEs. In 1997, the Small Business Reauthorization (SBR) Act of the USA increased the percentage of federal prime contracts that should be allocated to MSMEs from 20 per cent to 23 per cent. This action caused MSMEs to win more public contracts, but the SBR Act was not uniformly implemented across all federal agencies. Therefore, the USA's federal

government did not achieve its public procurement targets for MSMEs owned by veterans, women and minority groups (Patil, 2017).

In 2014, the Association of Chartered Certified Accountants identified the United Kingdom (UK) as having a public procurement policy framework that is helpful to MSMEs. However, it was discovered that in the UK there are significant difficulties in implementing policies that improve MSME participation in public procurement. This occurred even though the UK increased MSMEs' access to development finance and reduced the barriers to their entry into public procurement. The difficulties in policy implementation were likely caused by a lack of commitment by government agencies to adopt these measures. Also, public procurement officers prefer contract aggregation, and this reduces MSME participation (Patil, 2017).

2.1.4 Challenges Preventing MSME Participation in Public Procurement

Advertising public contracts is very important to MSMEs since it makes them aware of public procurement opportunities. MSMEs are less likely to be informed of public procurement opportunities because they do not have the network of government contacts that larger businesses usually have. Therefore, the widespread publication of notices, clear representations of performance requirements, and ensuring adequate periods for bid preparation, are very important to improving MSME participation in public procurement (Hoekman and Taş, 2020).

MSMEs also stated that the administrative requirements for them to successfully participate in public tenders are onerous and unsustainable (Flynn, McKevitt and Davis, 2015). This includes the fact that the cost of preparing tenders is higher for MSMEs than for large enterprises. Additionally, though MSMEs can deliver the outputs required from public contracts, they often lack the expertise to create proper bids. This prevents them from successfully participating in public tenders.

Moreover, unnecessary, time-consuming bureaucratic procedures and ponderous tender information documentation can deter MSMEs from participating in public procurement. Larger enterprises can surmount these difficulties by using economies of scale and hiring staff who can navigate these issues. Furthermore, public procurement officers and evaluators who are risk averse, prefer to hire large enterprises or older and more established companies instead of MSMEs which are usually newer and less established (Patil, 2017).

Additionally, the implementation of MSME-positive initiatives is severely affected by the framework of legislation, regulations, standards and guidelines that exist in a country. It is also influenced by the expertise, attitudes, and resources of public procurement officials. The implementation of these initiatives can fail if their policies do not mitigate the informational and institutional inequalities that negatively affect MSMEs. Additionally, policy implementation

requires effective monitoring and evaluation systems. Unfortunately, these systems are not always present in developing countries (Patil, 2017).

Furthermore, public procurement officials often avoid granting benefits to MSMEs, if they believe that these benefits distort the fair competitive processes of established public procurement practices. They also tend to reject policies they believe will increase the time needed for a project's output delivery. Public procurement officials are also unwilling to implement costly MSME-friendly policies because their budgets may not have the capacity to bear these additional costs (Patil, 2017).

In addition to these challenges, MSMEs are often unaware of the existence of information and computer technologies (ICTs) that can improve their competitiveness (Cataldo, Pino and McQueen, 2020). They may also lack the knowledge needed to use ICTs in a combined and sophisticated way that maximises their efficiency. This situation is worse in developing countries where MSMEs have less ICT knowledge than their counterparts in developed countries (Cataldo, Pino and McQueen, 2020).

Since the participation of MSMEs in public procurement significantly contributes to a country's financial stability, it is important to gather accurate and country-specific data on MSME participation in public procurement (Patil, 2017). MSMEs have varied characteristics and any investigation into their participation in public procurement should consider this. Additionally, it is vital for these studies to include analyses of the characteristics of MSMEs, such as their legal status, size, age, and owner profile so that the effects of public procurement policies on these MSME differences can be known (Flynn, McKevitt and Davis, 2015).

All in all, as suggested by OECD (2018), removing the barriers to SME participation in public procurement is in line with the principles of equal treatment, open access and effective competition. Indeed, it has been part of many recent public procurement reforms in OECD countries.

2.2 Public Procurement in Trinidad and Tobago

Trinidad and Tobago is a developing country and an emerging economy. As such, the challenges that MSMEs face in public procurement in developing countries are often present in Trinidad and Tobago. Public procurement in Trinidad and Tobago is governed by the Public Procurement and Disposal of Public Property Act (PPDPA) 2015. This Act was partially introduced in 2015 and fully promulgated in 2023 (OPR, 2024). The Public Procurement and Disposal of Public Property (Simplified Procurement) Regulations, 2024 of Trinidad and Tobago came into effect on April 5, 2024 (Ministry of Finance of Trinidad and Tobago, 2024).

According to the Central Statistical Office of Trinidad and Tobago, in 2019 there were 16,190 MSMEs across all sectors, operating in Trinidad and Tobago (Daily Express, 2025). However, in a

speech delivered to the Trinidad and Tobago Chamber of Industry and Commerce on 11 February 2025, the Honourable Colm Imbert, Minister of Finance of the Government of Trinidad and Tobago, reported that at present there are approximately 20,000 to 25,000 MSMEs in Trinidad and Tobago. Additionally, he stated that MSMEs accounted for approximately 30% of the GDP of Trinidad and Tobago (Ministry of Finance of Trinidad and Tobago, 2025). The Office of Procurement Regulation (OPR) of the Republic of Trinidad and Tobago was asked what percentage of government contracts was won by MSMEs. However, to date, they have not responded to our queries for information on public procurement in Trinidad and Tobago. Furthermore, no public data on this issue is available in Trinidad and Tobago.

From the literature reviewed, many of Trinidad and Tobago's initiatives for promoting MSME development are financial support services which include equity financing, incentives, grant funding and loan funding (Ministry of Finance of Trinidad and Tobago, 2022). However, the Office of Procurement Regulation of the Republic of Trinidad and Tobago stated that the Simplified Procurement Regulations (SPR) 2024 was introduced to reduce the strict pre-qualification requirements of the PPDPA. These pre-qualification requirements reduce the number of MSMEs that participate in public procurement. Additionally, the SPR allows for greater flexibility in the public procurement of contracts valued at TTD 1 million or less by giving government agencies more control over the procurement methods used (OPR, 2024). However, government agencies are not required to exclusively award SPR contracts to MSMEs.

The SPR classifies its contracts into two categories. The first category, which is called micro-procurement, deals with contracts that are valued up to TTD 75,000 (OPR, 2024). In this regime, public procurement agencies can engage enterprises that are not listed on the OPR's Depository, through direct contract awards and with oral quotations (OPR, 2024). The micro-procurement contract initiative also allows procurement officers to record oral quotations from MSMEs on approved forms and to maintain local vendor registries.

The second SPR category is called small-scale procurement, and it manages public procurement contracts that are valued at more than TTD 75,000 but less than or equal to TTD 1 million. In this category, public procurement agencies are allowed to accept tenders from enterprises that are not listed on the OPR's Depository, when there are no vendors on the Depository who can provide the goods, works or services required (PPDPA Simplified Procurement Regulations, 2024). This allows public bodies to engage with a larger number of businesses (OPR, 2024). However, unregistered enterprises must be registered on the OPR's Depository before public agencies can award contracts to them (PPDPA Simplified Procurement Regulations, 2024). Public procurement officials are required to keep very detailed records of SPR transactions and submit them in their reports to the OPR. Furthermore, they are required to justify the procurement methods used (PPDPA Simplified Procurement Regulations, 2024).

3. Methodology

3.1 Strategy

This paper used qualitative methods and procedures to investigate the research questions. Qualitative methods were used because it is the best way to understand how the research questions affect MSMEs, and particularly micro enterprises, which is the central theme of this study. Additionally, it gave the researchers the opportunity to discuss related phenomena that are not easily seen in statistical data (Creswell, 2009). The qualitative data analysis for this research began with identifying the best approach to address the research questions. A desktop review of procurement literature, including the Public Procurement and Disposal of Property Act (2015) of Trinidad and Tobago and its Simplified Procurement Regulations (SPR), 2024, were used to identify and record the relevant research themes contained in the literature review.

Ideally, the objective of assessing the impact of the approved simplification measures would require comparing the situation before and after the 2024 Simplified Procurement Regulations (SPR) were introduced. However, since information on public procurement spending and contract allocations on these issues before the SPR was introduced is not available to the public, it is not possible to make this comparison.

3.1.1 The Coding Process

Within the Public Procurement and Disposal of Property Act (2015) of Trinidad and Tobago and its Simplified Procurement Regulations (SPR), 2024, are measures for simplifying public procurement processes. The authors hand-coded this data into themes that show how this legislation attempts to remove the barriers that limit MSME participation in public procurement.

Additionally, data from research papers on MSMEs in third world countries like Trinidad and Tobago was hand-coded into themes that identified how MSMEs' access to public procurement is affected by their characteristics and the willingness of procurement officials to promote and implement legislation that affects MSMEs. Furthermore, data obtained from research papers on MSMEs in third world countries and the PPDPA (2015) was used to hand-code research themes on the public procurement monitoring and evaluation systems of the PPDPA and the use of ICTs by MSMEs. These themes and their indicators are recorded in the table below.

Table 1 – List of Research Themes and their Indicators

Research Themes	Indicators / Measurements
Micro-procurement initiatives	Number of MSMEs and large enterprises that received contracts valued less than TTD 75,000 without tendering.

Research Themes	Indicators / Measurements
	Number of MSMEs and large enterprises that are not listed in the OPR's Depository that received contracts valued less than TTD 75,000 without tendering.
	Number of MSMEs and large enterprises that were able to use oral quotations for contracts valued at less than TTD 75,000.
Small-Scale Procurement initiatives	Number of MSMEs who were not on the OPR's Depository, when they were allowed to tender for contracts valued more than TTD 75,000 but less than TTD 1 million.
Characteristics of MSMEs	The number of MSMEs and large enterprises, according to their characteristics, that benefited from the SPR initiatives.
Procurement Officials Implementing the SPR	The number of procurement officials that are implementing micro-procurement initiatives.
	The number of procurement officials implementing small-scale procurement initiatives.
Promoting Opportunities under the SPR	The number of MSMEs and large enterprises that are aware of opportunities under the SPR.
The use of Information and Computer Technologies by MSMEs	The number of MSMEs and large enterprises using ICTs to deliver public procurement contracts.
	The number of MSMEs and large enterprises using ICTs to discover opportunities in public procurement.
Effective Monitoring and Evaluation Systems	Discovering the existence and effectiveness of public procurement monitoring and evaluation systems.

An intercoder agreement was reached with a colleague to cross-check the codes used in this research.

3.1.2 Data Collection Methods

The data collection methods used in this research were interviews, observations, and documents. The interview questions were based on the indicators identified above and the researcher reviewed the data collected and organised it into categories that transect the data sources.

The interview data was collected via e-mail, and one-on-one interviews where possible, with the use of open-ended questions (Creswell, 2009). This allowed the interviewer to control the line of questioning though the researcher was aware that this method provided indirect information through the views of interviewees (Creswell, 2009). However, this disadvantage was mitigated through cross-questioning the interviewee and referencing information obtained against the body of established knowledge in this area.

Public procurement officers and the owners of business enterprises in Trinidad and Tobago were interviewed for this research. Procurement officers from government departments for finance, tourism, culture, public utilities, community development, public health, infrastructure, education and agriculture were interviewed. The MSMEs and large enterprises interviewed were from various business sectors in Trinidad and Tobago such as agro-processing, tourism, manufacturing, oil and gas, media and construction. This sample gave the researcher an opportunity to interview individuals in the various business sectors of Trinidad and Tobago. It also created opportunities to speak to procurement officials from different government agencies with diverse mandates, that practise different types of public procurement.

For this study, purposeful sampling was used so that the individuals interviewed were people experienced in the central phenomenon of MSMEs participating in public procurement (Creswell, 2009). Maximal variation sampling was used so that the interviewees chosen were expected to hold different perspectives on the central phenomenon (Creswell and Plano Clark, 2018). Interview participants, who were expected to hold differing perspectives, were chosen so that their views would provide this study with a complete and complex picture of the investigated phenomenon (Creswell and Plano Clark, 2018).

Interviews were conducted over the period of a year after the SPR was signed into legislation. A sample size of one hundred and three interviewees was used since this is large enough to obtain relevant answers without acquiring repetitive data. Where possible, the participants were interviewed at their workplaces or places of business. Furthermore, the interviewees were asked questions about public procurement processes and public contracts that were implemented after the SPR was signed into secondary legislation in April 2024.

Where required, the researcher obtained permission to interview procurement officers from their superior officers. Furthermore, business owners were asked for permission to interview their procurement employees if the owners did not conduct procurement activities themselves

(Creswell, 2009). Participants were presented with a letter from the University of Rome, Tor Vergata, that verified the authenticity of the research. The authors endeavoured to ensure that all participants understood the purpose of the study and that participants' rights were protected. The sample composition table below shows the numerical breakdown of the study's participants.

Table 2 – Sample Composition

Types of Interviewees	Number of Participants
Procurement Officers	11
Micro Enterprises	53
Small Enterprises	31
Medium Enterprises	3
Large Enterprises	5
Total	**103**

Furthermore, documents such as records of public tenders were used to collect information for this study. These documents were obtained from government agencies, where possible. Additionally, official reports, newspaper articles and meeting minutes were obtained, and used in this research. The researcher analysed the data collected via basic qualitative analysis. The information collected was analysed for perspectives and this analysis was used to answer the research questions. Where necessary, the data was transcribed and checked for accuracy. It was then organised by the participant categories listed above and formatted to facilitate the analysis. The interviewer then read through the information obtained and wrote memos on their initial thoughts on the data collected. The counts and percentages were derived from the interviewee responses which were cross checked with research documents and the body of established knowledge for reasonableness and accuracy.

3.1.3 Characteristics of MSMEs

As stated above, this research considers how MSME participation in public procurement is affected by their legal status, size, age and owner profiles. Their legal status is whether they are legally registered as a business in Trinidad and Tobago. With regards to age, the study considered businesses that were established one to five years before the interview since they usually have the experience required for tenders valued at TTD 1 million or less. However, at this stage, they do

not usually have an established relationship with government agencies. Hence, their tenders test the procurement evaluator's appetite for hiring experienced but relatively unknown firms. Whether the business is the main source of income for its owner and employees was used as the defining owner characteristic because these businesses are often highly driven to grow.

3.1.4 Limitations

We used non-random purposive sampling which can introduce a high risk of sampling bias into the study. This bias was mitigated by seeking participants from as many industries as possible. Additionally, since participants were asked to recount their experiences with public procurement procedures, self-report bias could have introduced inaccuracies in the interviewees' answers. However, this was mitigated by the researchers cross checking the interviewees' responses and referencing information obtained from the body of established knowledge in this area.

Also, it should be noted that this study took place during the first year after the SPR was signed into legislation. As such, this may not have been enough time for the effects of the new legislation to be seen widely. This was mitigated by widening the interview pool to obtain as much data as possible on this initiative. Future research should also be conducted to determine if the SPR's implementation increases with time. Also, the OPR's lack of response to our requests for administrative information on public procurement in Trinidad and Tobago limited the data that was used for this research. This was mitigated by asking individual procurement officers about their procurement processes. Additionally, this issue could be addressed in future research on procurement in Trinidad and Tobago.

3.2 Analysis

3.2.1 Presentation of Results

Theme 1: Micro-procurement Contract Initiatives

- Indicator: The percentage of interviewed MSMEs that received micro-procurement contracts via direct contract award.

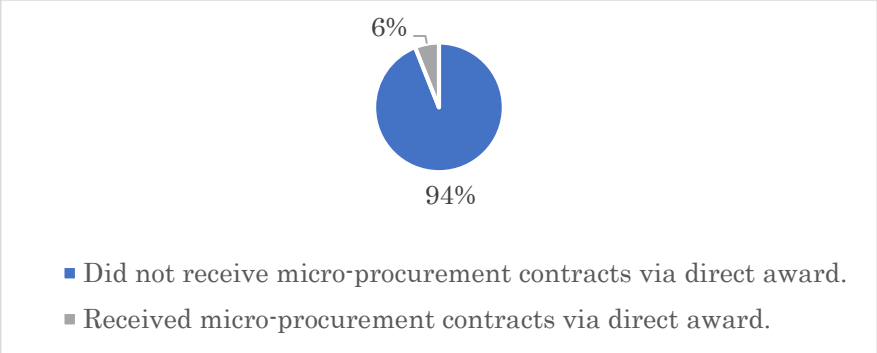

Figure 1 – MSMEs both listed and not listed on the OPR's Directory.

Approximately six per cent of the MSMEs interviewed received micro-procurement contracts via direct award. Furthermore, approximately sixty-four per cent of MSMEs reported that they were asked to tender for micro-procurement contracts, and this reduced their desire to work with government agencies. These MSMEs were primarily in the catering, food retail and events management business sectors.

Comparator: The number of interviewed large enterprises that received micro-procurement contracts via direct contract award. Twenty per cent of the large enterprises interviewed reported that they received direct contract awards for micro-procurement contracts. These enterprises worked in construction. Additionally, eighty per cent of large enterprises stated that they have been asked to tender for micro-procurement contracts. This did not deter large contractors from working with the government since tendering is not expensive for them.

- Indicator: The number of interviewed MSMEs that are not listed in the OPR's Depository

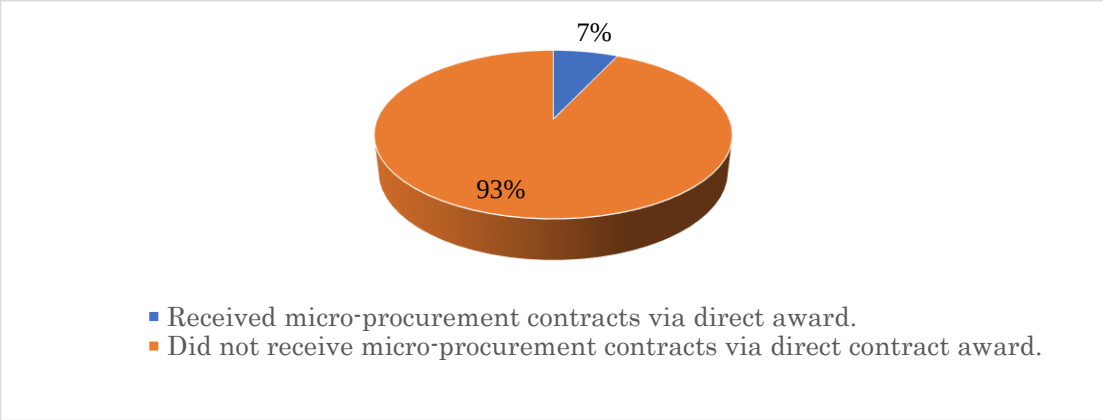

Figure 2 – MSMEs that received micro-procurement contracts.

and received micro-procurement contracts via direct contract award.

Approximately seven per cent of the MSMEs interviewed that were not listed on the OPR's Depository received micro-procurement contracts via direct contract award. It is interesting to note that these unregistered MSME recipients had connections within various government departments. For example, some of these recipients worked for the government full-time and conducted their businesses on a part-time basis. Other recipients had friends or relatives who worked for the government. However, most MSMEs that were interviewed stated that they were often unaware of opportunities available under this initiative.

Comparator: The number of interviewed large firms that were not listed in the OPR's Depository and received micro-procurement contracts via direct contract award. All large enterprises interviewed were registered on the OPR's Depository so there were no large enterprises that received micro-procurement contracts whilst not on the OPR's Depository.

- Indicator: The number of interviewed MSMEs that were able to use oral quotations for micro-procurement contracts.

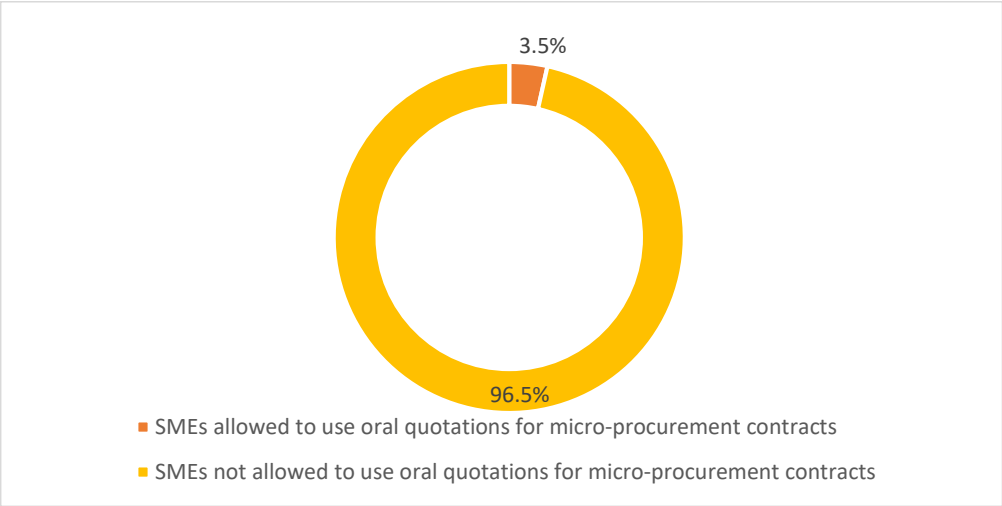

Figure 3 – MSMEs that were able to use oral quotations for micro-procurement contracts.

Only three point five per cent of the interviewed MSMEs who secured micro-procurement contracts were able to use oral quotations. The remaining MSMEs stated they were required to submit written quotations for contracts valued TTD 75,000 or less.

Comparator: From the large enterprises interviewed, six per cent of them reported that they were given the opportunity to use oral quotations. However, one hundred per cent of the large enterprises reported that they still chose to submit written quotations to prevent future price disputes.

Theme 2: Small-Scale Procurement Contract Initiatives

- Indicator: The number of interviewed MSMEs that were not registered on the OPR's Depository but allowed to tender for small-scale procurement contracts.

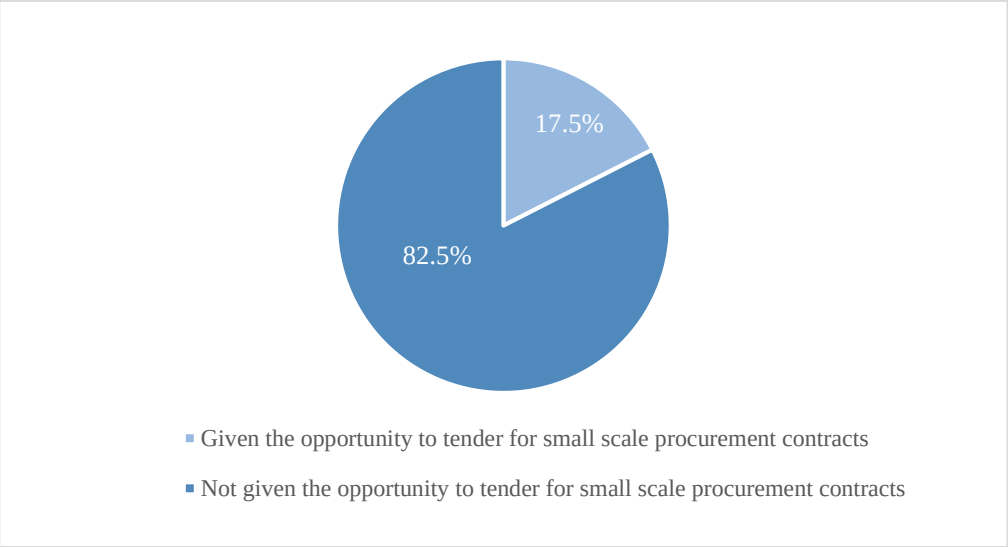

Figure 4 – MSMEs that are not registered on the OPR's Depository.

Seventeen and a half per cent of MSMEs interviewed reported that they were given opportunities to tender for small-scale procurement contracts when they were not registered on the OPR's Depository. However, eighty-two and a half per cent of MSMEs said they had to join the OPR's Depository before they were allowed to tender for these contracts. Comparator: The number of large businesses that were not registered on the OPR's Depository and allowed to tender for small-scale procurement contracts. All large enterprises that were interviewed were registered on the OPR's Directory so this metric could not be compared to the MSMEs.

Theme 3: Characteristics of MSMEs

- Indicator: The number of interviewed enterprises, according to their characteristics, that participated in micro-procurement contracts.

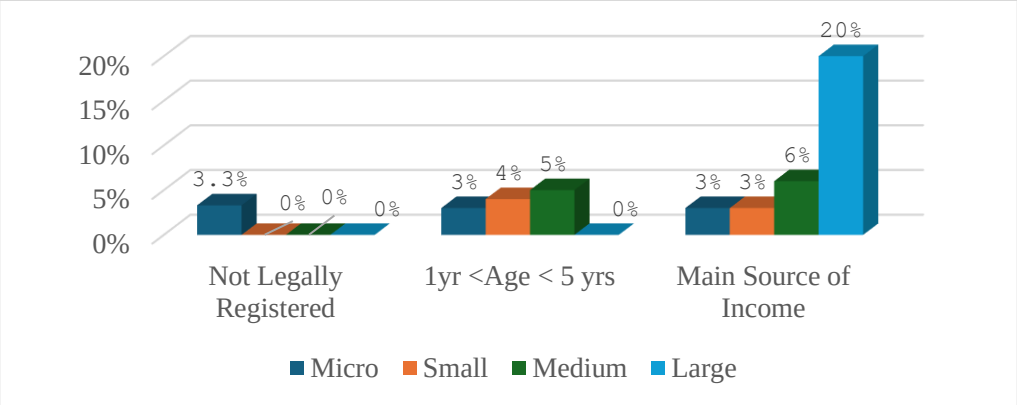

Figure 5 – Interviewee responses to MSME participation in micro-procurement contracts.

From the results shown, the interviewed micro-enterprises gained the least from this initiative. Small, medium and large enterprises that were interviewed gained contracts from this policy but overall, large enterprises significantly gained the most from this program. All small, medium and large enterprises that were interviewed were legally registered. Furthermore, all large enterprises interviewed were more than five years old. As such, their participation in micro-procurement contracts was not captured in the first and second characteristics.

- Indicator: The number of interviewed MSMEs, according to their characteristics, that tendered for small-scale procurement contracts whilst not registered on the OPR's Depository.

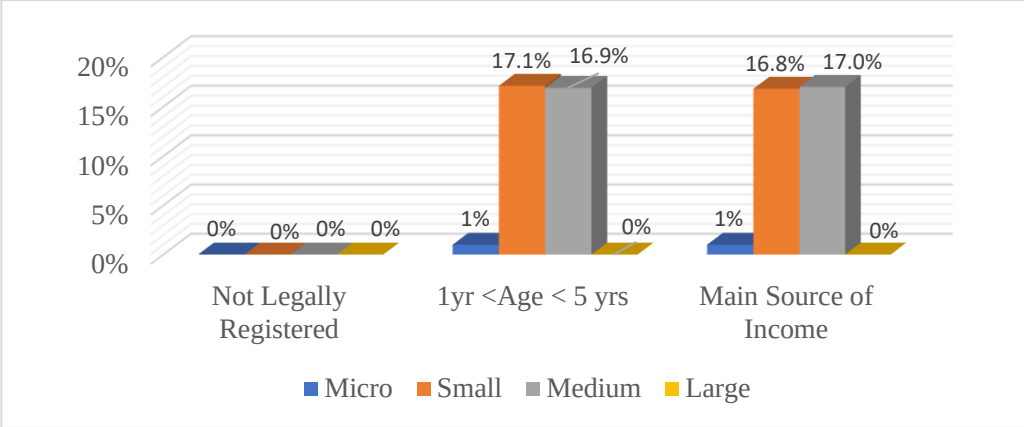

Figure 6 – Participation in small-scale procurement contracts whilst not on the OPR registry.

Less than twenty per cent of small and medium enterprises interviewed, who were not originally on the OPR's Directory, benefitted from the small-scale procurement initiative. All micro, small and medium enterprises interviewed were legally registered; as such their participation was not captured in this characteristic. Furthermore, all large enterprises were legally registered, more than five years old and registered on the OPR's Directory. As such, their participation could not be measured with these characteristics.

Theme 4: Procurement Officials Implementing MSME Promoting Policies

- Indicator: The number of interviewed participants who believe that procurement officials are implementing the micro-procurement rules that promote MSME inclusion.

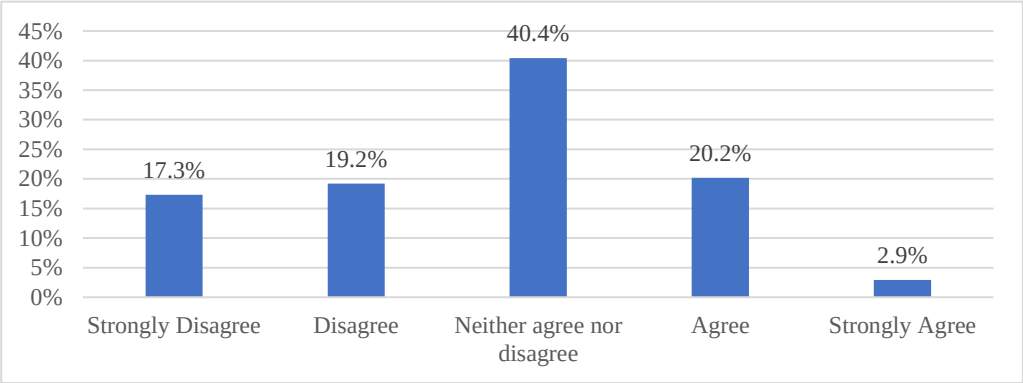

Figure 7 – Interviewees' response to whether micro-procurement rules are implemented.

Interviewed procurement officials admitted that they implemented these initiatives when they had the time or capacity to do so. Forty per cent of the interviewees were not willing to comment on this partly because the procurement officials did not want to initially admit that micro-procurement policies were not always implemented.

- Indicator: The number of interviewed participants who believed that procurement officials are implementing the small-scale procurement rules that promote MSMEs inclusion.

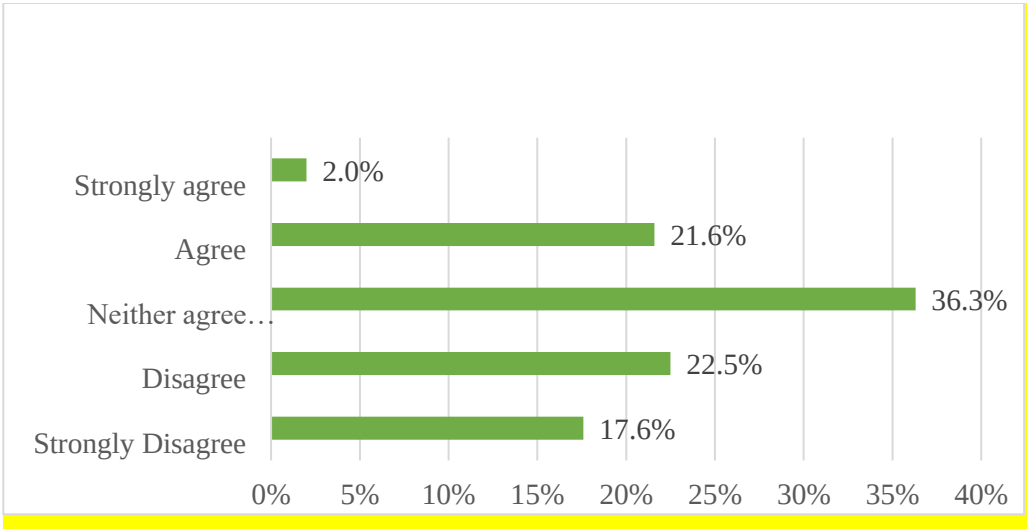

Figure 8 – Interviewees' response to whether small-scale procurement initiatives are implemented.

Procurement officials admitted that not all their colleagues implemented these initiatives because of lack of knowledge or fear of doing the wrong thing.

Theme 5: Transparency in Advertising/Promoting Opportunities under the SPR

- Indicator: The number of interviewed MSMEs that are generally aware of public procurement opportunities under the SPR policy.

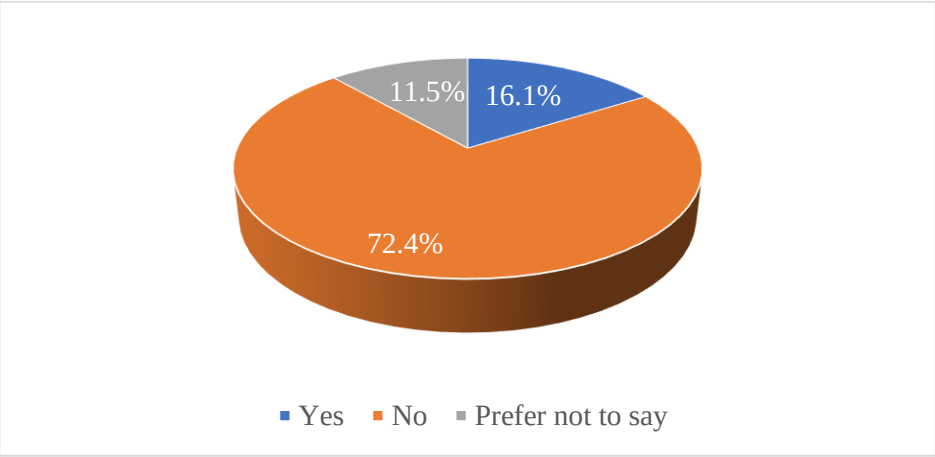

Figure 9 – The number of MSMEs that are aware of the public procurement opportunities under the SPR.

Approximately, seventy-two per cent of the MSMEs interviewed stated that they were not aware of the SPR policies that benefitted them. They also noted that unless they have a relationship with government agencies, they are often unaware of beneficial programs since they are not always advertised.

Theme 6: Information and Computer Technology (ICT) use in MSMEs

- Indicator: The number of interviewed MSMEs using information and computer technology to deliver public procurement contracts.

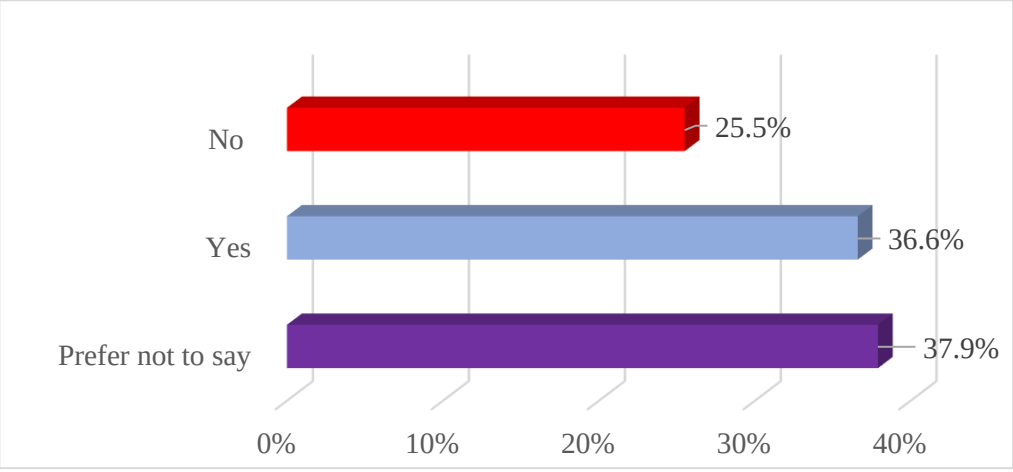

Figure 10 – Interviewees' response to MSMEs using ICT in public procurement.

A little over thirty-six per cent of the MSMEs interviewed admitted that they used ICTs to make their work more efficient and effective. However, they noted that they mainly used ICTs for administrative tasks.

- Indicator: The number of interviewed large enterprises using information and computer technology to deliver public-procurement contracts.

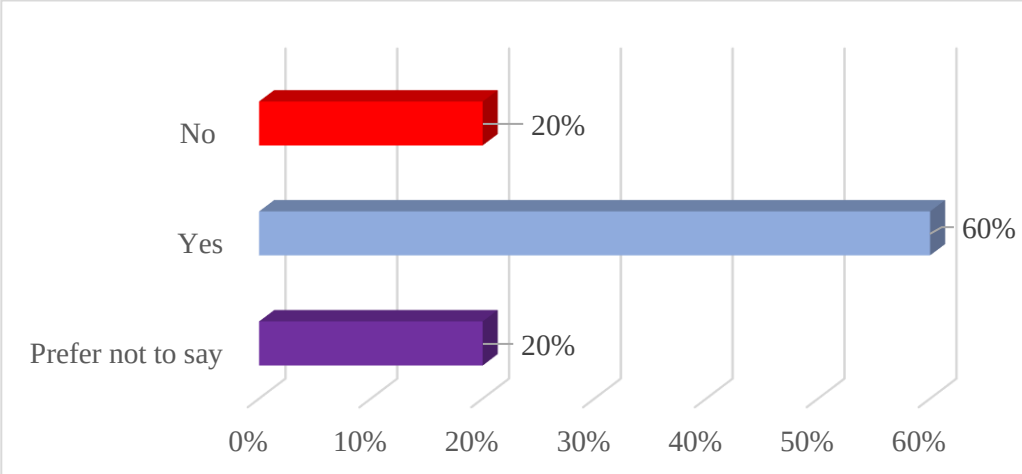

Figure 11 – Interviewees' response to whether large enterprises use ICTs in public procurement.

Sixty per cent of large enterprises were versed in the use of ICTs that maximised their business' efficiency.

- Indicator: The number of interviewed MSMEs using information and computer technology to find opportunities in public procurement.

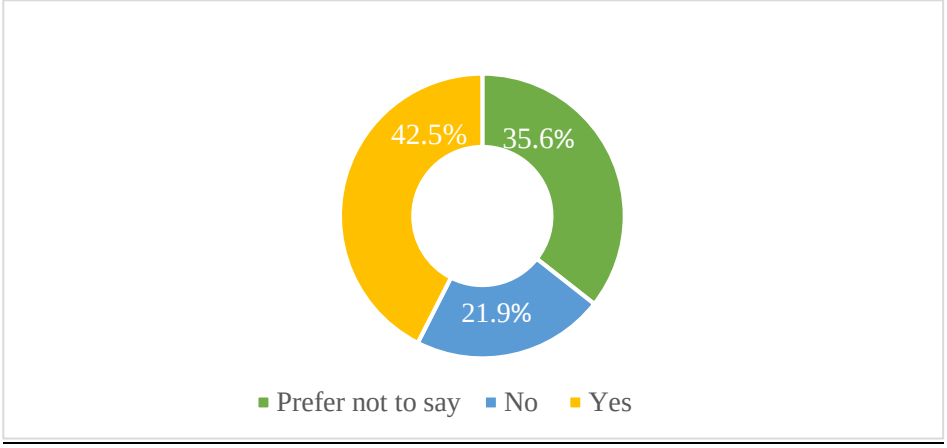

Figure 12 – Interviewees' response to whether MSMEs use ICTs to find public procurement opportunities.

Almost half of the MSMEs interviewed admitted that they used ICTs to find opportunities in public procurement since government agencies use the internet to advertise their tenders. However, they stated that though they used the internet to look for opportunities, their searches are not always successful.

- Indicator: The number of interviewed large enterprises using information and computer technology to find opportunities in public procurement.

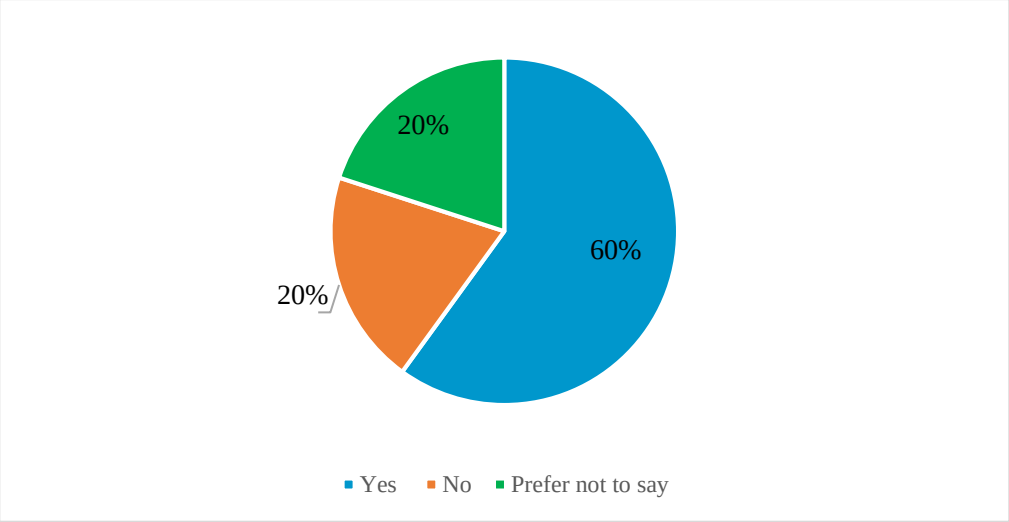

Figure 13 – Interviewees' response to whether large enterprises use ICTs to find public procurement opportunities.

Approximately sixty per cent of large enterprises interviewed use ICTs to find public procurement opportunities. However, they also use their relationships with government agencies to discover new or upcoming procurement opportunities.

Theme 7: Effective Monitoring and Evaluation Systems

- Indicator: The presence of a monitoring and evaluation system for public procurement policy implementation.

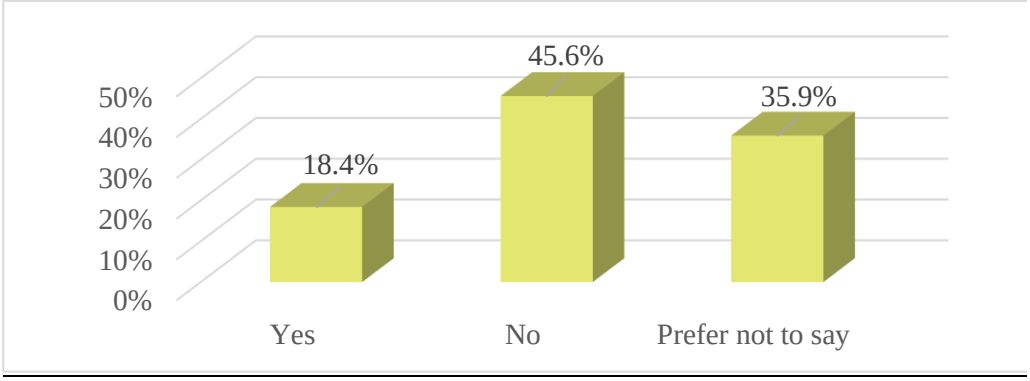

Figure 14 – Interviewees' response to whether monitoring systems exist.

- Indicator: The effectiveness of the monitoring and evaluation systems for procurement policy implementation.

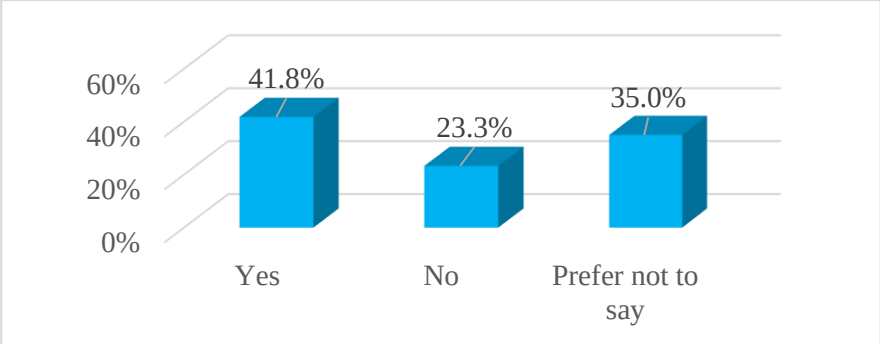

Figure 15 – Interviewees' response to whether monitoring systems are effective.

Procurement officials interviewed admitted that they are required to submit reports to the OPR on their work activities. However, these reports do not monitor the effectiveness of the implementation of the SPR initiatives in supporting MSMEs. The current monitoring systems are focused on determining whether officials are corrupt or following legislated procedures. Furthermore, there are no monitoring or evaluation systems that interview businesses to determine if they benefit from the SPR.

3.2.2 Analysis

Overall, six per cent of MSMEs, and twenty per cent of the large enterprises that participated in the survey, reported that they benefitted from the micro-procurement initiative. Therefore, to date, this initiative has shown a small number of MSMEs, among the study's participants, that benefitted from this public procurement initiative. Owners of micro enterprises said, "I was not aware that these opportunities [i.e. SPR initiatives] existed", "There is too much paperwork

involved in tendering for government [i.e. public procurement] contracts", or "Only people who are friends with government officials know about these things [i.e. SPR initiatives]".

The failure of this initiative to encourage the participation of MSMEs could be attributed to public procurement officials not fully implementing the micro-procurement policy. From the data collected, interviewed MSMEs were still required to tender for micro-procurement contracts that could be awarded via direct contract awards.

Additionally, approximately four per cent of the MSMEs interviewed were allowed to use oral quotations, which were introduced to ease their administrative burdens. Moreover, only seven per cent of the MSMEs interviewed, that are not registered on the OPR's Directory, were awarded micro-procurement contracts. This suggests that this aspect of the SPR has not been properly implemented.

Another potential benefit to MSMEs from the SPR is the ability to tender for contracts whilst the business is not registered on the OPR's Directory. However, since approximately seventeen point five per cent of MSMEs interviewed were able to tender for small-scale procurement contracts whilst they were unregistered, this initiative has not created a large increase in MSME participation in public procurement among the MSMEs that were interviewed. All large enterprises that were interviewed were registered on the OPR's Directory. Registration on the OPR's Directory is not a barrier for large firms because they are able to hire knowledgeable employees to help them join this register.

Furthermore, procurement officials who were interviewed admitted that the implementation of the SPR requires more administrative work for them. In their reports, these officials are required to justify the direct awards they make under this initiative. They must also record oral quotations themselves and prepare reports on SPR contracts. This increase in work sometimes deters them from using SPR initiatives. One procurement official said, "I am worried about being accused of corruption if I make a direct award", so this might explain the hesitancy about implementing this SPR initiative.

The interviews revealed that small and medium enterprises obtain more benefits from the SPR initiatives than micro-enterprises. This is particularly concerning since the micro-procurement initiative should help with increasing the involvement of micro enterprises in public procurement. Therefore, the way this policy is currently implemented does not appear to appreciably encourage the engagement of micro enterprises among the interviewees. Also, even though small and medium enterprises benefit from these programs, they do so in small numbers according to the participants interviewed. This occurs because MSMEs who were interviewed are generally unaware of the benefits of the SPR, and as such do not insist upon the implementation of procedures that will ease their administrative burdens. To date there have been a limited number

of programs that advertise the benefits of the SPR to MSMEs and this contributes to the lack of uniformity in the implementation of these initiatives.

Additionally, the MSMEs interviewed have not largely moved beyond using information and computer technology for administrative tasks. Whereas larger businesses use ICTs to make their contractual outputs more efficient and this makes it easier for them to retain their existing public customers whilst searching for new ones. MSMEs often struggle to increase their customer base in public procurement while retaining their existing customers due to output inefficiencies.

This research noted that though there is a monitoring and evaluation system for public procurement activities in Trinidad and Tobago, it mainly tracks the work of procurement officials and not the experiences or benefits received by MSMEs. As such it does not contribute to the effective implementation of the SPR. Furthermore, this monitoring system appears to be primarily used to fight corruption in procurement, so procurement officials often do not implement MSME positive initiatives, like direct contract awards, for fear of being accused of corruption.

3.2.3 Discussion

From the results, quotes and analysis described above, the apparently low implementation of the legislation appears to be linked to the procurement officials' fear of being accused of corruption or the increased administrative burden required for the implementation. This supports the theories that were observed in the literature review which stated that procurement officials are often unwilling to implement legislation that is helpful to MSMEs because they are unwilling to accept additional administrative burdens or are afraid that they will be accused of corruption. Therefore, these factors appear to cause the uneven implementation of this legislation.

MSMEs appear to moderately benefit from the SPR but this benefit appears to be highly dependent upon their awareness of these programs. Micro enterprises appear to benefit the least from the SPR because they are often unaware of the advantages of this legislation. Their lack of knowledge of this legislation, when combined with the fact that they are often not registered on the OPR's Depository and their smaller business capacity appear to contribute to their lack of participation in public procurement contracts. This is particularly exacerbated by their lack of ICT use which could be used to increase their working capacity. These factors were noted in the literature review as significant barriers to MSMEs accessing public procurement in third world countries.

Larger enterprises generally have the most awareness of beneficial government programs and the capacity to execute public procurement contracts efficiently. This gives them a distinct advantage over smaller businesses when securing public procurement contracts.

3.3 Recommendations

We recommend the following to improve the inclusion of MSMEs in public procurement in Trinidad and Tobago:

- Ensure that the SPR is uniformly implemented across all government agencies in Trinidad and Tobago. This could be encouraged by implementing specific monitoring systems for the SPR's initiatives in government agencies.
- Reduce the SPR's administrative reporting requirements for public procurement officials to encourage officials to implement these initiatives.
- Educate micro enterprises about the possible advantages of the SPR and encourage them to actively advocate for these contracts.
- Amend the SPR legislation to include instruments that make it accessible only to MSMEs, along with monitoring and evaluation systems that ensure it is only accessible to enterprises that meet this criterion.
- Institute a monitoring and evaluation system that actively records whether MSMEs are benefitting from policies that are meant to help them. The information gained from this system should be used to increase the skills and knowledge of public procurement and communication officials in Trinidad and Tobago.
- Institute programs to allow public entities to work and build relationships with MSMEs as they allocate direct award contracts to them. This should encourage public entities to trust MSMEs enough to consider them for larger contracts.

4. Conclusion

One of the stated objectives of the Simplified Procurement Regulations (SPR) 2024 was to address the pre-qualification requirements that created barriers to MSME participation in public procurement (OPR, 2024). The respondents to our investigation reported that the SPR achieved limited gains in the increased participation of both MSMEs and large enterprises in public procurement. Therefore, the current SPR seems to emerge as an initiative that does not specifically target the increase of MSMEs in public procurement.

Furthermore, from the responses of the participants, the SPR does not help all MSMEs equally. Interviewees reported that legally registered and established small and medium enterprises receive more benefits from the SPR than micro-enterprises. Additionally, a lack of ICT knowledge, a low awareness of public procurement opportunities, a lack of transparency in promoting the SPR, and not all procurement officials implementing the SPR's initiatives are all significant barriers to micro enterprises participating in public procurement in Trinidad and Tobago, according to participants in the study's interviews. Therefore, these barriers should be removed

through training public procurement officers and monitoring the implementation of SPR initiatives. In summary, the SPR has the potential to increase micro enterprise participation in public procurement in Trinidad and Tobago, but more monitoring and evaluation is required from the Government of Trinidad and Tobago for it to be fully effective.

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Appendix A – Research Questionnaire Baseline Questions

Theme 1: Micro-procurement Contract Initiatives

- Are MSMEs winning contracts valued less than TTD 75,000 without tendering?
- Are MSMEs that are not in the OPR's Depository winning contracts valued at less than TTD 75,000 without tendering?
- Are MSMEs able to use oral quotations for contracts valued less than TTD 75,000?

Theme 2: Small-Scale Procurement Contract Initiatives

- Are MSMEs that are not in the OPR's Depository winning contracts valued more than TTD 75,000 but less than TTD 1 million?

Theme 3: Characteristics of MSMEs

- The number of MSMEs, according to their characteristics, that participate in public procurement.

Theme 4: Procurement Officials Implementing MSME Promoting Policies

- Are procurement officials implementing the micro-procurement rules that promote MSMEs inclusion?
- Are procurement officials implementing the small-scale procurement rules that promote MSMEs inclusion?

Theme 5: Transparency in Advertising/Promoting Opportunities under the SPR

- Are MSMEs generally aware of public-procurement opportunities under the micro and small procurement contract initiatives?

Theme 6: Information and Computer Technology (ICTs) use in MSMEs

- Are MSMEs using ICTs to deliver the outputs for public contracts?
- Are large enterprises using ICTs to deliver outputs for public contracts?
- Are MSMEs using ICTs to discover opportunities in public procurement?
- Are large enterprises using ICTs to discover opportunities in public procurement?

Theme 7: Effective Monitoring and Evaluation Systems

- Are there monitoring and evaluation systems for procurement policy implementation?
- Do these monitoring systems support the implementation of the micro and small-scale procurement policies?

Strategic but Suboptimal Public Procurement: It's Not a Bug, It's a Feature

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Abstract

In this paper I argue that although strategic public procurement may reduce short-term efficiency, it is essential for upholding the European Union's values. Drawing on the recent 2014 Public Procurement Directives evaluation and major policy analyses such as the Letta and Draghi reports, I argue that an exclusive focus on speed, competition, and cost undermines the rule-of-law requirements of transparency, fairness, and legal certainty. Strategic public procurement reinforces democratic legitimacy by ensuring public expenditure aligns with environmental protection, social justice, and technological resilience. It also strengthens cohesion across the Single Market and safeguards the legality of administrative procedures, which depend on deliberation rather than speed.

Keywords: EU; public procurement; strategic public procurement; efficiency; public procurement goals.

1. Introduction

There has been a dramatic shift in the way public procurement is perceived and in the goals public procurement is used to fulfil. Initially, public procurement was seen as a tool to allow the state and its various bodies and public entities to purchase the tools needed to provide public services at the lowest price possible. Efficiency and the highest regard to budgetary constraints was the goal. But basing the evaluation criteria on price alone often led to substandard quality, forced economic operators to a race to the bottom, which in turn had a negative effect on EU industries and workers. Additionally, the vast buying power of the state, which reached 2 trillion EUR across the EU (European Commission, 2019), was a tool to achieve other valuable and achievable goals.

This approach started to change since the 2004 Public Procurement Directives, but especially since 2014, when the Most Economically Advantageous Tender (MEAT) criteria should have, at least in theory, become more prevalent (Sánchez-Graells, 2015). Unfortunately, the share of contracts awarded in favour of the lowest bid still accounts for most of all awards in all Member States (European Court of Auditors, 2023).

This was supposed to encourage contracting authorities to go beyond mere price, as it was supposed to empower contracting authorities and Member States to start thinking and acting strategically about public procurement and therefore public spending. In parallel, we have witnessed a proliferation of strategic goals in EU public procurement: green, socially responsible, innovative, supply chain security and even (reciprocal) market access geopolitical goals (Nowicki, 2021).

These "new" goals, while important and useful, have indeed had side-effects. Their fulfilment causes added complexity; it can make acquiring goods, services and works more expensive; it can make it more difficult for contracting authorities to conduct public procurement procedures; it can make it more burdensome for economic operators to submit successful bids; and, maybe most importantly, it can make public procurement less efficient.

Recently, there have been frequent calls to simplify EU public procurement and make it more efficient (European Commission, 2025b). While these calls have not been directly linked to the reduction or abandonment of strategic public procurement goals, it is difficult to imagine how to achieve more simplicity and efficiency without sacrificing strategic objectives at least in part.

The aim of this paper is to reiterate that while simplicity and efficiency are valuable goals, they are not and should not be absolute, as this would lead to a public procurement system divorced from our common values. Strategic public procurement has enormous potential in promoting environmental industrial policies, creating socially responsible working conditions, and ensuring secure supply chains and reciprocal procurement market access to other markets. Favouring

efficiency and simplicity above all else defeats one of the most important purposes of public procurement law — to constrain contracting authorities (Telles, 2025).

2. Strategic Goals in Public Procurement

The 2014 Public Procurement Directives are full of references to goals that should be considered strategic. These Articles encourage or mandate the fulfilment of environmental, socially responsible or innovative goals. The core Article when discussing strategic procurement may be Article 18(2) of Directive 2014/24/EU, where green and socially responsible public procurement have been raised to the level of public procurement principles (Steinicke, 2018).

This has been further implemented in more detail throughout the Directive. Contracting authorities may decide not to award a contract to the tenderer submitting the most economically advantageous tender where they have established that the tender does not comply with green and socially responsible obligations (Article 56(1) Directive 2014/24/EU); contracting authorities may decide to exclude economic operators that violated their green or socially responsible obligations (Article 57(4)a of Directive 2014/24/EU); the violation of socially responsible and green obligations with regard to abnormally low tenders may represent grounds for tender rejection (Article 69(2 and 3) of Directive 2014/24/EU); and many more.

Using public procurement to foster innovation has been introduced via a separate public procurement procedure (innovation partnership, Article 31 of Directive 2014/24/EU), but also via the possibility of including innovative weights when using the MEAT criteria (Inden, 2018).

Additionally, Article 25 of Directive 2014/24/EU also establishes tools for the fulfilment of an important strategic goal — reciprocal (public procurement) market access. Article 25 reserves the "right to treatment no less favourable" to economic operators, works, supplies and services from countries with signed reciprocal free trade agreements (FTAs) with public procurement clauses. Therefore, third-country economic operators, goods, works and services may be given diminished standing or even might be excluded from EU public procurement procedures (Wang and Arrowsmith, 2018). This specific strategic goal makes it easier for the Commission to establish new FTAs, and to open third country markets for EU economic operators. If third-country economic operators, goods and services were free to enter the EU public procurement market, third countries would not have an incentive to conclude FTAs and open their domestic markets to EU competition.

Even though these strategic goals seem diverse and to have very little in common, there is a common thread that unites them. If they were, for example, deleted from the upcoming Directives (or Regulations), EU public procurement procedures would be much simpler, contracts would be concluded much faster, and there might even be more competition in individual public procurement procedures due to a larger number of economic operators that would be allowed to

participate and/or fulfil the participation criteria. This raises the normative question of whether a public procurement model without these strategic objectives would adequately reflect the broader policy purposes currently embedded in EU public procurement law.

3. State of Strategic Public Procurement in 2025

It can be difficult to evaluate the actual impact of strategic public procurement provisions without hard data, but fortunately the 2014 Public Procurement Directives are currently under revision and the Commission has recently published its "Evaluation of Directive 2014/23/EU on Concessions, Directive 2014/24/EU on Public Procurement and Directive 2014/25/EU on Utilities".

The Evaluation contains lots of data specifically relevant for each individual aspect of strategic procurement (green, socially responsible, innovative, and even market access). And while these will be analysed in detail, there is an overarching datapoint of significant importance for green, socially responsible and innovative public procurement. If the main (and only) criteria for public procurement awards are price — it will be very difficult if not impossible to procure strategically. As Caranta puts it, "mandatory or not, SPP requires subtlety that is totally inconsistent with the lowest price or any other simple and mechanical criterion" (Caranta, 2023). Therefore, MEAT is given more prominence in 2014. This should have helped contracting authorities move away from price-only evaluation criteria. But the progress here was limited at best.

The Directives aimed to promote strategic procurement by providing legal tools to support the uptake of green, innovative, and social criteria (Sjåfjell and Wiesbrock, 2015). These tools were complemented by EU policies, pilot projects, and guidance, while leaving Member States and contracting authorities to set their own ambition levels and targets. Despite these efforts, the European Court of Auditors (ECA) found that the share of contracts awarded solely on lowest price increased between 2011 and 2021 (European Court of Auditors, 2023). Recent data similarly show that awards based on MEAT criteria declined from about 70% (2006–2010) to 63% (2017–2024) (European Commission, 2025a). However, this trend may reflect changes in the composition of tenders rather than reduced use of qualitative criteria (European Commission, 2025a). Nevertheless, there was no significant reduction in price-only criteria.

3.1 Green Public Procurement

The 2014 Directives explicitly enable contracting authorities to include environmental characteristics at different stages of public procurement procedures. To support uptake, the Commission complemented the legal framework with guidance, voluntary green public procurement criteria, ecolabel tools, helpdesks, and buyer networks, while many Member States adopted national strategies, targets, and mandatory green criteria for selected product groups (European Commission, 2025a). Because green public procurement provisions remain largely

voluntary and are implemented differently across jurisdictions, uptake and reporting methods vary significantly (European Commission, 2025a).

Available evidence nevertheless shows uneven use of green criteria across the EU (e.g. Lithuania reports 89.3% of procurement value dedicated to green initiatives, while Croatia reports 21%, European Commission, 2025a). Based on reported data from 14 Member States, green procurement accounts for just under 25% of contracts by number, while data from 10 Member States indicate an average of about 37% by value, suggesting that environmental criteria are used more frequently in higher-value tenders. These figures should be interpreted with caution due to non-harmonised definitions, self-reporting, and possible reporting bias, and they generally capture the presence rather than the quality of environmental criteria (European Commission, 2025a).

3.2 Socially Responsible Public Procurement

Following the 2014 Directives and their numerous articles facilitating the use of socially responsible public procurement criteria, the Commission supported socially responsible public procurement through a range of measures, including EU-wide training programmes for procurement officials, dedicated guidance documents, collections of good practice cases, helpdesks, webinars, and awareness campaigns (European Commission, 2025a).

Comprehensive EU-wide data on socially responsible procurement uptake remains limited, and this is mostly true across the majority of Member States (Caimi and Sansonetti, 2023). For example, Croatian public procurement statistical reports started to include socially responsible public procurement self-reporting for contracting authorities only from 2024 onwards (Ministry of Economy of the Republic of Croatia, 2025). But the evidence that is available indicates growing use across Member States, though with very uneven levels of maturity (European Commission, 2025a).

3.3 Innovative Public Procurement

The Commission has promoted innovation procurement through dedicated guidance and support measures, including the Innovation Procurement Guidance, training programmes, the Urban Agenda, the Public Buyers Community – Big Buyers Working Together platform, and actions under the New European Innovation Agenda (European Commission, 2025a).

Despite this support, the uptake of public procurement of innovation remains very low and represents only a marginal share of total procurement value and volume. Only a limited number of Member States systematically monitor innovative public procurement, and reported levels are typically below 1% of procurement value, with the highest reported national share around 2.6% (European Commission, 2025a).

The dedicated innovation partnership public procurement procedure has also been rarely used in practice, with only 199 contracts awarded between 2016 and 2023 across 17 Member States, even though their combined value exceeded EUR 8.5 billion (European Commission, 2025a). Stakeholders attribute this limited uptake to procedural complexity, perceived legal and audit risks, and a preference for more familiar procurement methods (European Commission, 2025a).

3.4 Third-Country Economic Operator Market Access

The strategic interest of the EU in ensuring reciprocal public procurement market access is significant. Allowing public procurement market access only to economic operators from countries with established reciprocal FTAs that include public procurement provisions allows the Commission to pursue new FTAs effectively, since there is a significant incentive for third countries to pursue FTAs as a prerequisite to access to one of the world's most important public procurement markets (La Chimia, 2021). Furthermore, this way the Commission expands business opportunities for EU economic operators, which can now successfully bid in new markets. While Article 25 of Directive 2014/24/EU and Article 43 of Directive 2014/25/EU have allowed differential treatment of third-country economic operators, this was not widely used across Member States (Turudić, 2026). When the CJEU established new rules on participation in late 2024 (Kolin, 2024) and early 2025 (Qingdao, 2025), there was a possibility this would change. But the discretionary nature of possible exclusions, score adjustments and other kinds of differential treatment of third-country economic operators in EU public procurement procedures — paired with significant unanswered questions left by those CJEU judgements — has led to a very different approach to these issues across the Member States, thus making it difficult to address the reciprocal opening of public procurement markets in an efficient and consistent way (Turudić, 2026). A good example of this may be the recent conclusion of the EU–India FTA, which conspicuously lacks a dedicated Government (Public) Procurement Chapter (European Commission, 2026). This appears to be India's decision, as the EU has for some time submitted its proposals for this chapter. Although the exact reasons are hard to pinpoint, one likely factor is how third-country economic operators are treated in the EU. Contracting authorities now have broad — and often only lightly constrained — discretion to decide whether to admit bidders from third countries, and some Member States use that discretion to allow wide participation. From that perspective, India may reasonably ask why it should further open its public procurement market to EU firms when it already benefits from comparatively open access to the EU market.

4. Has Strategic Public Procurement Failed?

The data collected and presented by the Commission suggests that limited progress has been achieved regarding strategic public procurement since the introduction of the 2014 public procurement directives. Green public procurement has seen wider adoption, but it cannot be

classified as widespread; socially responsible public procurement is still insignificant in comparison and is even scarcely included in national statistics of Member States; innovative public procurement remains marginal. While some Member States have achieved progress, most of them haven't. Regulation of third-country economic operator market access, also a strategic public procurement goal, has been dramatically changed by the CJEU — but not for the better.

If this is the state of strategic public procurement after all these normative and judicial interventions, a legitimate question is: is it worth it? Can (and should) strategic public procurement goals be achieved? If strategic public procurement is so hard to achieve, shouldn't we try to make public procurement as simple and efficient as possible, therefore pursuing goals that are attainable? These are the questions that were asked frequently in the last few years. Take, for example, the Letta and Draghi reports. The Letta report frequently addresses the need to make public procurement more circular, sustainable and strategic; and even "leveraged as a key instrument for promoting social value, enhancing social capital, and aligning with the EU's ambitions for green and digital transformations" (Letta, 2024, p. 45). But at the same time, it is suggested that public procurement goals should be streamlined and clarified, because "by establishing a smaller, more precise set of objectives that are both clear and measurable, the EU can facilitate the efficient realisation of desired outcomes" (Letta, 2024, p. 45). Furthermore, to promote competition it is suggested that administrative procedures need to be streamlined, selection criteria need to be refined to achieve effective public procurement (Letta, 2024).

The Draghi report calls for the introduction of "standardised low-carbon and environmental sustainability criteria for public procurement" (Draghi, 2024, p. 111) and minimum quotas for select EU produced products in public procurement (Draghi, 2024). But at the same time, there are calls for dramatic simplification of EU rules, "normative restraint", and even recommendations to introduce a Commission Vice-President for Simplification (Draghi, 2024).

Therefore, both the Letta and Draghi reports insist on two somewhat opposing goals: more strategic public procurement, but also more simplicity in public procurement. Are those two goals reconcilable, can they both be achieved? Maybe, but this would be very difficult. While strategic public procurement has many advantages and should not be discarded, it does indeed introduce more complexity into public procurement procedures. Every strategic public procurement layer adds weeks and months to the public procurement procedure, new rules contracting authorities need to apply, new opportunities for economic operators to challenge potential illegalities.

5. The Pitfalls of "Simple and Efficient" Public Procurement

Choosing simplicity and efficiency as the primary normative driving force in any kind of (administrative) procedure has severe consequences: "a rule of law–based, value-driven approach emphasizes democratic accountability, inclusive participation, and social cohesion, and the

protection of fundamental rights. In contrast, a technocratic, competitiveness-oriented model prioritizes efficient governance, regulatory streamlining, and measurable economic outcomes" (Cseres, 2025). Therefore, allowing simplicity and efficiency to be the main lens through which we evaluate public procurement procedures may lead to rushed procedures, rushed remedies or no remedies at all (as is the case in "simple" low-value public procurement procedures in Croatia); it may nudge contracting authorities to accept any contract modification the contractor wants or risk contract termination and a new (inefficient) public procurement procedure.

This is also true for strategic public procurement — a "simple and efficient" public procurement procedure has no room for additional complex layers of green, socially responsible, innovative public procurement, or complicated market access rules.

For the sake of argument, if one accepts the view that efficiency and simplicity should be the primary drivers of public procurement legislation, it is necessary to consider what objectives and safeguards would thereby be sacrificed.

6. "Simple Public Procurement"

Simplification of legal procedures has been one of the cornerstones of modern administrative science approaches, such as New Public Management (Torfing et al., 2020). But a simplification of administrative procedures (and especially complex administrative procedures such as public procurement) can lead to unwanted outcomes. Favouring simplicity at the expense of established strategic goals can diminish the democratic legitimacy of public procurement, EU-wide cohesion as well as social cohesion.

6.1 Democratic Legitimacy

There are certain goals most citizens of every Member State can agree on, as they are common throughout the EU, e.g. protection of the environment, social security, fair working conditions (Scheppele et al., 2020). If the primary driving force of public procurement legislation is procedural simplicity, these values will be difficult to implement, and the vast buying power of the state could not be wielded to enforce those values throughout the EU. Therefore, if citizens see simple procedures that do not consider shared values, the trust in public institutions diminishes as does the democratic legitimacy of those institutions.

6.2 EU-Wide Cohesion

Article 3(3) of the Treaty on European Union (TEU) defines the internal market, and by defining it, it considers social, green and innovative goals:

> *The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social*

> *progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance. (European Union, 2012, Art. 3(3))*

Since public procurement represents up to 20% of the EU's GDP, it is also a very important part of the internal market. Fragmentation in the strategic use of public procurement is not a new phenomenon — the past decade has already demonstrated that Member States differ significantly in how actively they pursue green, social, and innovative goals through procurement, even under the current 2014 Directives framework. However, any further attempt to simplify public procurement procedures at the expense of achieving strategic objectives risks entrenching and deepening this existing fragmentation. Depending on the new public procurement legislative tools and the level of discretion afforded to Member States in transposition, some Member States may find ways to act more strategically than others — not as an unintended consequence, but as a predictable and avoidable outcome. This raises questions about the conformity of such proposals with the TEU and further undermines EU-wide cohesion.

6.3 Social Cohesion

Simplicity as the main normative driver of public procurement procedures may lead to simple evaluation criteria, giving preference to (lowest) price over MEAT, and allowing a broader range of economic operators to participate in each public procurement procedure — even if they provenly exploit their employees or pay below-average wages. Short-term savings via lower prices and more competition at the expense of lower socially responsible standards undermine social cohesion and create a skewed market. However, whether simplification of public procurement procedures leads to this outcome is not automatic — it depends significantly on how simplification is achieved. Simplification that reduces administrative burdens while preserving or strengthening award criteria and strategic objectives need not reward irresponsible economic operators. In fact, where contracting authorities have sufficient competence and autonomy, simplified procedures could in principle make it easier to pursue strategic goals rather than harder. The concern arises specifically when simplification is achieved by reducing or eliminating qualitative award criteria, lowering transparency requirements, or shifting towards lowest-price-only evaluation — in those circumstances, a market is created in which socially irresponsible economic operators are rewarded with public procurement contracts at the expense of responsible ones that cannot match artificially low prices achieved through social or environmental dumping (Caranta, 2022). The critical question for the ongoing reform debate is therefore not whether to simplify, but which elements of the current framework are simplified and which are preserved.

7. "Efficient Public Procurement"

Achieving efficient legal (administrative) proceedings is a worthwhile goal (Barnes, 2020). The administration of justice in any capacity is meaningless if final administrative acts and judgements are not reached in a timely manner. This is of course applicable to public procurement, where some public procurement procedures tend to last for a long time. But overall, the data paints a different picture: while the time necessary to evaluate offers in public procurement procedures above EU thresholds increased by 4 days on average (from 58 days in 2008–2010 to 62 days after 2014), the median number of person-days spent on public procurement procedures above EU thresholds decreased from 108 days in 2008–2010 to 57 days in 2019–2024 (European Commission, 2025a).

Croatia offers an instructive, if not conclusive, illustration of how the pursuit of efficiency in remedies can lead to outcomes that raise serious legality concerns. The Croatian public procurement appeal body DKOM is legally bound to issue decisions within 30 days of an admissible appeal and largely complies with this obligation — its average procedure duration was 34 days in 2024, an increase attributable largely to understaffing (DKOM, 2025). However, remedies are rarely used: out of 16,468 public procurement procedures in 2024, only 428 were subject to an appeal (DKOM, 2025). This low usage is at least partly a product of deliberate design choices justified on efficiency grounds — reduction of appeal time limits to 10 days against the standard 15 days in general administrative procedures, restrictions on locus standi, and a dramatic increase in appeal fees, including increases of up to 100 times in some instances in late 2022 (Turudić, 2022; 2024). Whether these measures produced measurable negative outcomes in terms of procurement quality or legality is difficult to establish rigorously from available data. What can be said is that they were justified primarily on efficiency grounds and that they systematically reduced access to review mechanisms — an outcome difficult to reconcile with the Remedies Directives and the broader EU rule of law framework. Croatia thus illustrates a risk that is not unique to it: that efficiency, as a normative justification for procedural reform, can become a pretext for limiting accountability rather than genuinely improving outcomes.

8. Conclusion — "Double Down on Strategic Procurement"

Strategic public procurement should not be treated as a deviation from the "proper" purpose of public procurement, nor as a regulatory burden that must be corrected through simplification at any cost. As this paper has argued, the reduced speed, added complexity, and occasional short-term inefficiencies associated with strategic procurement are not a bug, but a feature of a value-driven, rule-of-law–based system. Public procurement is not merely an instrument for acquiring goods, services, and works at the lowest possible price, but a legal framework designed to constrain contracting authorities and align public spending with environmental, social, innovative, and strategic market objectives.

Recent evaluations show that progress in green, socially responsible, and innovative procurement has been uneven and often limited. However, this should not lead to the conclusion that strategic procurement has failed, nor that it should be abandoned in favour of procedural minimalism. Strategic goals are, by their nature, more demanding, more resource-intensive, and more legally complex. The appropriate response is to strengthen institutional capacities and clarify legal tools — not to strip procurement of its strategic dimension.

Elevating simplicity and efficiency to overriding principles risks weakening transparency, remedies, legal certainty, and democratic accountability. A procurement system in which speed and cost reduction become the dominant normative criteria risks being progressively divorced from our common values and from the broader objectives of the internal market. As the evidence discussed in this paper suggests, simplification justified primarily on efficiency grounds can gradually erode the procedural safeguards, award criteria, and review mechanisms through which strategic, social, and environmental objectives are pursued. Accepting deliberation instead of speed, and structure instead of discretion, is therefore not a weakness, but a necessary condition of legitimate and cohesive EU public procurement.

Therefore, the upcoming public procurement Directives (or Regulations) should "double down" on strategic procurement: by insisting on more mandatory strategic criteria; revamping third-country economic operator market access rules; softening the stance of "link to subject matter" as a prerequisite for wider adoption of green procurement; making all discretionary exclusion grounds mandatory — thus ensuring mandatory exclusions of economic operators that violate sustainable business practices; ensuring wider participation of unions and civil society in contract performance monitoring. When the revision of the Remedies Directive comes into focus, locus standi should be widened to explicitly include economic operators with an interest to obtain a contract in a new public procurement procedure after the previous one was annulled (Turudić, 2022) and include civil society; and further remove additional barriers to remedy use — especially via rethinking the approach to appeal fees.

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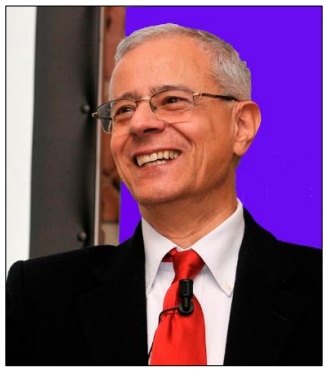

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