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Corso di Laurea Magistrale in International Economics and Commerce

**PUBLIC PROCUREMENT FOR  
ULTRABROADBAND: AN ECONOMIC  
ANALYSIS OF THE ITALIAN EXPERIENCE**

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## TABLE OF CONTENTS

<b>ABSTRACT .....</b>	<b>1</b>
<b>GENERAL INTRODUCTION .....</b>	<b>3</b>
<b>CHAPTER 1: PUBLIC PROCUREMENT AND THE EU STATE AID. ....</b>	<b>5</b>
1.1. PUBLIC PROCUREMENT AND ITS ECONOMIC RELEVANCE .....	7
1.2. GENERAL PRINCIPLES OF PUBLIC PROCUREMENT .....	11
1.2.1. OECD pillars for integrity .....	12
1.2.2. EU governing principles .....	14
1.3. THE EU NORMS .....	16
1.3.1. When does the EU legal framework instantly apply? .....	18
1.3.2. EU Directives: A descriptive analysis .....	20
1.3.3. EU 2014 procurement Directives .....	25
1.4. THE EU STATE AID: DEFINITION AND CHARACTERISTICS .....	32
1.4.1. General notes on State support .....	33
1.4.2. State Aid: Relevant law framework .....	35
1.4.3. The interaction between public procurement and State aid rules .....	38
<b>CHAPTER 2: ECONOMIC THEORY ON PUBLIC PROCUREMENT ....</b>	<b>41</b>
2.1 ECONOMIC MODELS FOR PUBLIC PROCUREMENT .....	41

2.1.1.	Social choice theory .....	42
2.1.2.	Game theory .....	47
2.1.3.	Process-based theory on strategy formation .....	52
2.2	THE BEHAVIOUR OF THE PROCURING AUTHORITY .....	56
2.2.1.	The choice of contracting-out .....	59
2.2.2.	Tender design .....	64
2.2.3.	Tender design when quality is uncertain .....	70
2.2.4.	Tender evaluation: quality-to-price or price-to-quality scoring? .....	74
2.2.5.	Effective Contract monitoring .....	77
<b>CHAPTER 3: ULTRABROADBAND IN ITALY. STRATEGY AND PUBLIC</b>		
<b>TENDERS .....</b>		<b>82</b>
3.1	INTRODUCTION .....	82
3.2	THE PROCESS OF DESIGNING A COMMON STRATEGY .....	83
3.2.1.	The role of broadband as a lever to economic development .....	84
3.2.2.	Approaches for governance .....	87
3.2.3.	EU Guidelines 2013/C 25/01 .....	89
3.2.4.	A Digital Agenda for Europe .....	93
3.2.5.	State Aid SA.41647 (2016/N) – Italy .....	96
3.3	THE ITALIAN STRATEGY FOR ULTRA – FAST BROADBAND .....	99
3.3.1.	Clustering areas .....	100
3.3.2.	Fast broadband in Italy: The scenario .....	103
3.3.3.	The Italian Strategy for Next Generation Access Network .....	107
3.3.4.	Models for infrastructure deployment .....	111
3.4	INFRATEL ITALIA: PUBLIC TENDERS FOR WHITE AREAS .....	116

3.4.1.	First BUL tender .....	123
3.4.2.	Second BUL tender .....	129
3.4.3.	Third BUL tender .....	132
3.5	THE RESULTS OF THE TENDERS .....	136
3.5.1.	Status of the Infratel Italia tenders .....	142
3.5.2.	Will the 2020 objectives be reached? .....	144
3.6	CONCLUSION .....	147

**CHAPTER 4: AN EMPIRICAL ANALYSIS OF ULTRABROADBAND  
DEPLOYMENT IN CALABRIA ..... 151**

4.1.	INTRODUCTION .....	151
4.2.	TECHNOLOGIES AND RESEARCH HYPHOTESES .....	156
4.3.	MODEL AND DATA .....	162
4.4.	RESULTS AND CONCLUDING DISCUSSION .....	171

**GENERAL CONCLUSIONS ..... 177**

**REFERENCES ..... 181**

**APPENDIX TO CHAPTER 2 ..... I**

2.1	A DIGITAL AGENDA FOR EUROPE .....	I
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2.2	BROADBAND IN ITALY .....	II
2.3	ITALIAN STRATEGY FOR NGAN .....	IV
2.4	FIRST BUL TENDER .....	VI
2.5	SECOND BUL TENDER .....	VII
2.6	THIRD BUL TENDER .....	VIII
2.7	ADVANCEMENT STATUS OF PROJECTS .....	IX
<b>APPENDIX TO CHAPTER 4 .....</b>		<b>XI</b>
4.1.	COVERAGE: FIBER VS. FWA .....	XI
4.2.	EXCEL TEMPLATE SHEET .....	XII
4.3.	SIMPLE MEAN COMPARISON .....	XIII

## LIST OF TABLES

Table 1 - EU public procurement legal framework .....	21
Table 2 - Major shifts of Directive 2014/24/EU .....	28
Table 3 - Financial thresholds .....	30
Table 4 - Possible Result of a procurement .....	44
Table 5 - General payoff matrix for two bidders .....	50
Table 6 - Payoff matrix - prisoner's dilemma .....	52
Table 7 - Literature review on broadband impact .....	85
Table 8 - Broadband Guidelines - Assessments .....	91
Table 9 - State Aid SA.41647 (2016/N) .....	98
Table 10 - Clusters - Summary Table .....	101
Table 11 - The Italian Strategy for NGAN - Coverage Targets .....	108
Table 12 - The Italian Strategy for NGAN - Funding Sources .....	110
Table 13 -The Italian Strategy for NGAN - Reference Infrastructure .....	112
Table 14 - Direct intervention model .....	114
Table 15 - BUL tenders - Gantt chart .....	119
Table 16 - Milestones of the first BUL tender .....	125
Table 17 - Value of the first BUL tender .....	126
Table 18 - Upshots of the first BUL tender .....	127
Table 19 - Scores of the first BUL tender .....	127

Table 20 - Score differentials from the awarded tender .....	129
Table 21 -Value of the second BUL tender .....	130
Table 22 - Second BUL tender – Upshots .....	130
Table 23 - Scores of the second BUL tender .....	132
Table 24 - Value of the third BUL tender .....	134
Table 25 - Upshots of the third BUL tender .....	135
Table 26 - BUL projects - Italian Regions .....	141
Table 27 - Status BUL projects - Update July 2019 – Template excel sheet .....	143
Table 28 - Projects advancement status - Italy .....	143
Table 29 - Ultra-fast broadband coverage - 2018/2021 .....	146
Table 30 - Ranking of Italian Regions as per the no. of FWA projects net of Fiber Projects ....	152
Table 31 - Ranking of Eurosud Regions in terms of BU coverage at the end of the works .....	154
Table 32 - "Fiber sample" vs. “FWA sample”: sample width and population covered .....	165
Table 33 - Municipalities Mergers .....	166
Table 34 - "Fiber sample" - comparison of weighed means .....	171

## LIST OF FIGURES

Figure 1 - Key pillars of principles for enhancing integrity in public procurement .....	12
Figure 2 - When do procurement rules apply? .....	19
Figure 3 - Intended, deliberate and realized strategies .....	54
Figure 4 - Strategic learning in the process of strategy formation .....	56
Figure 5 - Procurement process .....	57
Figure 6 - Behavior of procuring authorities .....	57
Figure 7 - Building blocks of tendering management .....	58
Figure 8 - Contracting-out? CTC decision tree .....	61
Figure 9 - The decision to contract out .....	63
Figure 10 - Supplier selection method and scoring rules .....	67
Figure 11 - Contractor selection criteria in selected EU countries (2010-2013) .....	69
Figure 12 - Effective contract monitoring .....	81
Figure 13 - Effect of ICTs on GDP growth .....	84
Figure 14 - FTTH/B ranking of penetration and coverage levels (June 2011) .....	95
Figure 15 - DESI (2015) .....	105
Figure 16 - Fixed Broadband (coverage + take-up) .....	106
Figure 17 - Fast and ultrafast broadband .....	107
Figure 18 - BUL tenders - Map of Italian regions .....	118
Figure 19 - BU coverage - Tender Notice vs. Awarder offer .....	137

Figure 20 - BU Cluster - Tender notice vs. Offer .....	138
Figure 21 - BUL tenders - Upshots .....	139
Figure 22 - Third BUL tender - Projects per parcel .....	142
Figure 23 - Ultra-fast broadband coverage (2019) .....	145
Figure 24 - NGA coverage (2019) .....	147
Figure 25 - FWA Projects (as against Fiber) - Top-3 of table 30 .....	153
Figure 26 - Simplified FWA architecture .....	157
Figure 27 - OF FWA infrastructure .....	158
Figure 28 - FTTx infrastructure .....	159
Figure 29 - VDSL vs. FTTC vs. FTTH .....	160
Figure 30 - Population coverage in the two samples .....	167
Figure 31 - Fiber sample - Population density - Weighed sample mean vs. Weighed mean ....	172
Figure 32 - Fiber sample - Height - Weighed sample mean vs. Weighed mean .....	173

## **ABSTRACT**

All'alba di quella che potrebbe essere definita come una rivoluzione disruttiva delle telecomunicazioni, l'avvento dell'Internet of Things, discorrere di sviluppo della banda ultralarga diviene sempre più necessario. Risulta, quindi, evidente come la diffusione capillare di connessioni stabili ed altamente performanti possa diventare fattore critico di sviluppo e volano di crescita in un mercato sempre più dinamico e competitivo.

In un'Italia ancora alle prese con lo spettro di un'eredità pesante, un ritardo accumulato così grande da costituire un ostacolo quasi insormontabile, il ruolo delle istituzioni pubbliche acquisisce, ancora una volta, ancora di più, carattere imprescindibile. Nell'era delle liberalizzazioni e dell'autocrazia del mercato sembrerebbe quasi un ossimoro, eppure, l'intervento dello stato in un settore di così rilevante importanza strategica torna ad essere decisivo. Le politiche comunitarie dell'ambizioso disegno dell'Europe 2020 hanno fissato degli obiettivi strategici minimi che non possono essere disattesi, non più. È in questo scenario che lo Stato ha premuto sull'acceleratore e dato il là ad un enorme piano di investimenti volto a coprire, finalmente, il digital divide e rilanciare un'economia sempre più dipendente dalle ICT.

È, dunque, compito di questo lavoro di ricerca analizzare in chiave critica il panorama legislativo europeo di riferimento, i disegni normativi italiani, le teorie economiche, le interazioni strategiche, ed il rinnovato paradigma tecnologico allo scopo di comprendere come tre appalti pubblici per la banda ultralarga possano ridisegnare e riscrivere un futuro che, solo qualche tempo fa, pareva essere molto incerto.



## **GENERAL INTRODUCTION**

Relevant authoritative literature, inter alia Qiang et al. (2009), Scott (2012) and Minges (2016), has widely emphasized the importance of Fixed Broadband (FBB) as a key success factor for economic development. In detail, the deployment of a capillary diffused ultrabroadband network throughout all the territory is almost universally deemed for being a necessary condition so as to ensure competitiveness in a fast-changing and dynamic global market. A “future-proof” (PCDM, 2015) technologically advanced broadband infrastructure, apart from yielding direct and measurable effects on countries’ wealth, triggers new business opportunities, social inclusion, productivity gains as well as higher employment.

Hence, there is no coincidence that both national and supranational policymakers have been extensively addressing the issues of digital divide, conversion of existing network infrastructures and choice of alternative technological platforms as pivotal targets of public policies.

Seeing as how the private sector alone is not in a position to take charge of these tough challenges, governments must intervene not only as mere regulators, but also as pro-active players involved in a synergic and cooperative dialectics with private stakeholders. To that extent, central and sub-central government authorities are legitimated to interfere in the economy in order to sterilize inefficiencies originating

by market failures provided that the intervention will not yield distortionary effects on the market competitive dynamics.

Once again, the public sector is called upon to support ultrabroadband deployment, forasmuch as internet connectivity is considered as the major flywheel for the transition to a “network-based knowledge economy” (EC, 2010). The ambitious plan of the DAE set an unprecedented turnaround aiming at overcoming digital divide and providing connectivity to the whole European population by 2020. Consistently with the latter strategic objectives, EU Member States were requested to adopt community targets and implement their own strategies consistently with the binding EU norms on public procurement and State aid.

However, a strict and compelling regulation has been governing the discipline of the public purchasing of goods and services (Handler, 2015) through the purpose-driven allocation of public resources (EU, 2012). Therefore, Member States are not allowed to act on their own behalf accordingly to their own goals and practices regardless of the reference law codifications of public procurement and state aid.

The scenario in Italy was worrisome, indeed the accumulated delay in terms of broadband coverage and penetration was leaving numerous concerns.

Pursuant to the DAE2020 and the reference norms on the design and the execution of public procurement procedures as well as the norms on State Aid, in 2015 the Italian government issued its formal action plan for broadband deployment.

Formally cleared in 2016, the plan, conceived with the purpose of bridging the gap with the other EU Member States, was promptly put into execution. In detail, the government blueprint consisted into the launch of three competitive calls for tendering targeted at covering white areas (EU, 2013) within the clusters C and D, i.e. market failures areas where no private intervention is in place or forecastable. At this stage, it is possible to foresee that the plan implementation may significantly reduce the connectivity gap, but will it be sufficient to bring 30 Mbps broadband connectivity to the whole population and >100 Mbps connectivity to the 85%? Conversely, will the gap be so severe to inhibit the plan effectiveness?

One thing is for certain, this was the direction to go after and that was not a choice, but an impelling need.

In order to provide an answer to these questions, the work employs a top-down perspectival approach from the EU legal provisions and the main economic theoretical models to the commentary of public tenders results.

At the beginning, chapter 1 is meant to discuss some definition problems and to analyze in-depth the legal framework formed by binding principles and norms governing public procurement and state aid.

Moving on, chapter 2 is investigating the major economic literature on public procurement and the decision-making rationale of contracting authorities in tender designing and defining the tenderer selection criteria.

Therefore, chapter 3 is matching the general notes on public procurement with the characteristics of the specific case of the broadband deployment. The strategic path paved out by the 2015 Master Plan is going to be evaluated as against its compliance with the European goals and, subsequently, with respect to its practical execution. Finally (chapter 4), a descriptive empirical analysis is going to be run in order to test some research hypotheses about the technological choices undertaken by public and private entities in a selected regional sample.

## **CHAPTER 1: PUBLIC PROCUREMENT AND THE EU STATE**

### **AID.**

#### **1.1. PUBLIC PROCUREMENT AND ITS ECONOMIC RELEVANCE**

Public Procurement<sup>1</sup> (hereinafter with the acronym, PP) can be defined as “the [dynamic] process by which governments and other bodies under public law purchase products, services and public works” (Handler, 2015<sup>2</sup>) responding to a wide variety of needs. However, it may be argued that this definition is too simplified to fully portray what public procurement is and what it currently entails. The United Nations (UN) consider PP as an “overall process of acquiring goods, civil works and services which includes all functions from the identification of a need, selection of potential sources, contract award and its administration to the end of service or life of asset” (Thai, 2009<sup>3</sup>). As it can be easily seen, this description, while adding more complexity, seems to provide a more compelling definition.

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<sup>1</sup> Public Procurement can be defined as “the buying of goods and services by governmental organizations ... there are strict rules on public procurement”.

See Cambridge dictionary, Public procurement,

<https://www.google.it/amp/s/dictionary.cambridge.org/it/amp/inglese/public-procurement>.

<sup>2</sup> Handler, H. (2015, November 20). Strategic Public Procurement: An Overview. Policy Paper no 28. WWWforEurope .

<sup>3</sup> Thai K. (2009), International Handbook of Public Procurement, Boca Raton: Taylor and Francis.

Given that coping with PP entails the management of public funds, public administrations as spending centers involved in complex sourcing processes have to perform heterogeneous activities targeted to efficiency and effectiveness.

This is because PP accounts for €1.8 trillion or 13.7% of GDP in EU countries in 2013 (OECD, 2015)<sup>4</sup>, for about 12% of GDP in OECD countries (OECD, 2019<sup>5</sup>), and for 48% European Structural and Investment Funds (ESIF) (EC, 2015).

In addition, other non-public estimations<sup>6</sup> appear to confirm this tendency.

Nevertheless, utility maximization in the sense of getting to the most effective outcome, as microeconomists would likely talk about, is neither the sole force triggering the PA machine nor the only object to which PAs are tried in the court of public opinion.

Governments make choices and accomplish objectives for and on behalf of citizens demanding for integrity and transparency not to harm their trust (EC, 2015)<sup>7</sup>. In

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<sup>4</sup> OECD (2015), Size of public procurement, in: Government at a glance, Chap. 9, Public procurement, Paris, July 2015.

<sup>5</sup> OECD (2017), Size of public procurement, in: Government at a glance, Chap. 9, Public procurement, Paris, July 2017.

<sup>6</sup> “Every year more than a quarter of million public institutions and authorities in the EU spend around 14% of GDP on acquiring services, construction works and good of all kinds”. DENTONS (2016), A few questions about implementation of the EU public procurement directives. (dentons.com)/CSCS29452-implementation of the EU directives\_v5. Other older estimations of financial activities of PP managers were esteemed to be something between 10%-30% of GDP in almost all countries in the world. See Calender G. & Mathews D. (2000) “Government purchasing: An evolving profession?”, in: Journal of Public Budgeting, Accounting & Financial Management 12(2), pp. 272-290

<sup>7</sup> “Transparency and integrity in the relevant procedures is also essential for maintaining citizens’ trust in government”, European Commissioners: Corina Crețu, Elżbieta Bieńkowska, Public Procurement – Guidance for Practitioners, Foreword, EC, 2015.

addition, according to OECD (2019), “governments are expected to carry out PP efficiently and with high standards of conduct in order to ensure high quality of service delivery and safeguard the public interest”<sup>8</sup>.

To this extent, jurists would probably talk about an ancient roman law principle: *diligentia diligentis patris familiae*, i.e. the diligence of the diligent good father<sup>9</sup> while fulfilling contractual obligations. If it can be assumed that the electoral mandate giving governments legitimacy to perform is a contract with mutual fulfilments, and the government’s counter-performance for its election is the fair and transparent management of public resources, diligence or, even better, qualified diligence is required.

It can be easily seen that PP processes soak up considerable amounts of resources that are, of course, driven out the accomplishment of other valuable objectives.

At this stage, it could be helpful to highlight that PP is an “important function of government” (Thai, 2001)<sup>10</sup> not only for the weight of resources being allocated but, also, as driving political force for the achievement of economic and social objectives (Arrowsmith, 1998)<sup>11</sup>. Only the fact that some resources are addressed to pursue an objective rather than another is sufficient to recognize the magnitude

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<sup>8</sup> See OECD, 2019, Public Procurement, <http://www.oecd.org/gov/public-procurement/>.

<sup>9</sup> This principle whose roots date back to roman emperor Justinian’s *Corpus Juris Civilis*, is hosted in the Italian Civil Code as amended (art. 1176).

<sup>10</sup> See Thai, KV (2001), Public Procurement Re-examined, in: *Journal of PP*, vol. 1, issue 1, pp. 9-50.

<sup>11</sup> See Arrowsmith S. (1998), National and International perspectives of PP: Harmony or Conflict?

of that instrument. Since public procurement is budget-driven (in the meaning of fixed resources), defining procurement objectives and allocating resources may imply, often, the evaluation of trade-offs in conflicting procurement scopes.

In fact, it may be relatively self-explanatory that public procurement is a public policy tool, that is “what governments choose to do or not to do” (Dye, 1992<sup>12</sup>) or, again, “political decision for implementing political programs to achieve social [and economic] goals” (Cochron & Malone, 1995<sup>13</sup>).

Thai (2001) widely faced up the issue of “secondary” (i.e. less evident or indirect) objectives of public procurement and concluded that the PP “contributes immensely to job creation and employment, strengthening a particular industry, regional development, diversity” (EL-Gayed, 2013<sup>14</sup>). All the latter objectives may be clustered in the set of “non-procurement goals”, as in Thai (2001).

For the outlined reasons, regulations have always been playing a crucial role in the governmental procuring discipline to limit the bargaining freedom of procuring authorities and to homogenize practices on aggregate level.

PP laws are strict and compelling and are always in continuous evolution to be responsive to emerging changes and preventing undesired outcomes.

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<sup>12</sup> Dye T. (1992), *Understanding Public Policy*, 7ed. NJ: Prentice Hall.

<sup>13</sup> Cochron C., Malone E. (1995), *Public Policy: perspectives and choices*, New York, McGraw-Hill.

<sup>14</sup> EL-Gayed Y. (2013) PHD Thesis, *The Influencing Factors of Public Procurement Policy Development: The case of Libya*.

To this extent, empirical analysis on PP's upshots has granted numerous insights that deeply affected latest legislative issues accepting new criteria and processes, as well as limiting to specific situations the deployment of some rules that have shown to be not as effective as governments would have thought just a decade or two ago.

## **1.2. GENERAL PRINCIPLES OF PUBLIC PROCUREMENT**

For all the pinpointed reasons explained above, public procurement management is a key activity since a “sound stewardship of public resources” (OECD, 2009<sup>15</sup>) is a major source of accountability for public entities.

This is particularly true seeing as how public procurement ends up in the public domain as insofar as it involves considerable amount of public resources.

Therefore, the procuring activity must be completely aligned with the general principles of accountability and integrity that have been formalized over the last years. The compliance with inspiring principles is a key mandatory activity for whatsoever contracting authority within the EU. However, before analyzing the concerned EU provisions, the work will focus on the OECD guide for public procurement practitioners. Despite the latter purveys mere supporting tools for contracting authorities throughout all the procurement stages, it addresses the topic

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<sup>15</sup> OECD (2019), OECD principles for integrity in public procurement.

of integrity with a very straightforward scheme. On the contrary, the EU principles are source of legally binding obligations as they are formed in the EU primary (i.e. Treaty on the Functioning of the European Union) and secondary legislation (i.e. procurement directives).

### 1.2.1. OECD pillars for integrity

In 2009, the OECD published a compelling handbook aimed at supporting contracting authorities. Taking the form of a checklist, the latter guide identifies four “key pillars for enhancing integrity in public procurement” respectively declined in ten general principles, as in the box below.

Figure 1 - Key pillars of principles for enhancing integrity in public procurement

<p><b>A. Transparency</b></p> <ol style="list-style-type: none"><li>1. Provide an adequate degree of transparency in the entire procurement cycle in order to promote fair and equitable treatment for potential suppliers.</li><li>2. Maximize transparency in competitive tendering and take precautionary measures to enhance integrity, in particular for exceptions to competitive tendering.</li></ol> <p><b>B. Good management</b></p> <ol style="list-style-type: none"><li>3. Ensure that public funds are used in procurement according to the purposes intended.</li><li>4. Ensure that procurement officials meet high professional standards of knowledge, skills and integrity.</li></ol> <p><b>C. Prevention of misconduct, compliance and monitoring</b></p> <ol style="list-style-type: none"><li>1. Put mechanisms in place to prevent risks to integrity in public procurement.</li><li>2. Encourage close co-operation between government and the private sector to maintain high standards of integrity, particularly in contract management.</li><li>3. Provide specific mechanisms to monitor public procurement as well as detect misconduct and apply sanctions accordingly.</li></ol>
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**D. Accountability and control**

4. Establish a clear chain of responsibility together with effective control mechanisms.
5. Handle complaints from potential suppliers in a fair and timely manner.
6. Empower civil society organizations, media and the wider public to scrutinize public procurement.

Source: OECD (2009)

Prior to the discussion of the OECD pillars, it may be beneficial to provide a definition of integrity, since the latter term is very broad.

As stated by the same OECD (2009), integrity in PP can be outlined as “the use of funds, resources, assets and authority, according to the intended official purposes, to be used in line with public interest”. However, even this characterization is leaving wide room for operational interpretations. Therefore, for the sake of simplicity, it may be useful to give the meaning of integrity employing a “negative” approach. Integrity throughout PP is violated so long as certain undesirable phenomena emerge, inter alia corruption, fraud and theft, conflict of interest, collusion and bid-rigging, informative manipulation and, last but not least, discriminatory treatment.

At this stage, it is rather self-evident that integrity is a “desirable” attribute for effective public procurement management since it curbs out the occurrence of potentially threatening situations. So as to overcome the risks connected to PP, CAs must punto into practice the aforesaid ten principles.

To our way of envisaging, although this checklist does not provide compulsory mandates, it embraces a worldwide tendency for a fairer and more attentive administration of the public resources.

### 1.2.2. EU governing principles

By contrast, EU inspiring principles are such that EU Member States cannot behave in violation to the reference community legislation.

To what it may concern the primary legislation source, as it will be discussed in the upcoming section, there are no explicit provisions on PP in the Treaty on the Functioning of the EU (TFEU). General binding procurement rules are codified as framed in the so-called “four-freedoms” (Werner, 2019<sup>16</sup>) (Arrowsmith et al., 2011), especially in the following articles:

Free movement of goods (Art. 34 TFEU – formerly Art. 28 TEC)

“Quantitative restrictions on imports and all measures having equivalent effect shall be prohibited between Member States.”

Freedom of establishment (Art. 49 TFEU – ex Art. 43 TEC)

“ [...] restrictions on the freedom of establishment of nationals of a Member State in the territory of another Member State shall be prohibited. Such prohibition shall

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<sup>16</sup> Werner M. J. (2019), Public Procurement Seminar Trier, 15-16 July 2019, Recent CJEU Case Law: core notions and principles & exceptions.

also apply to restrictions on the setting-up of agencies, branches or subsidiaries by nationals of any Member State established in the territory of any Member State.”

Freedom to provide services (Art. 56 TFEU – ex Art. 43 TEC)

“ [...] restrictions on freedom to provide services within the Union shall be prohibited in respect of nationals of Member States who are established in a Member State other than that of the person for whom the services are intended.”

In addition to the cited “freedoms”, it is worth also to mention the prohibition of non-discrimination formed in Art. 18 TFEU (formerly art. 12 TEC), which states:

“Within the scope of application of the Treaties, and without prejudice to any special provisions contained therein, any discrimination on grounds of nationality shall be prohibited. The European Parliament and the Council, acting in accordance with the ordinary legislative procedure, may adopt rules designed to prohibit such discrimination.”

Another source of direct obligations governing the activity of public procurers is defined at recital (1) of Directive 2014/24/EU:

“The award of public contracts by or on behalf of Member States’ authorities has to comply with the principles of the Treaty on the Functioning of the European Union (TFEU), and in particular the 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 latter quoted EU provision is of paramount importance since it declines the TFEU freedoms into manageable general principles which may fruitfully be superimposed to the OECD mandates.

### **1.3. THE EU NORMS**

The binding norms on public procurement that have been created by the EU derive essentially from two major law sources:

- The Treaty on Functioning of the European Union (henceforth, TFEU<sup>17</sup>), formerly named Treaty establishing the European Community (TEC);
- The Procurement Directives.

To what it may directly concern the former source, consistently with par. 1.2.2, the TFEU enlists some inspiring general binding rules that, in principle, must be applied to all public procurement measures and government contracts. Usually, in law literature, the TFEU mandates are considered as “negative” obligations seeing as how EU member states are not allowed to act regardless of what TFEU prescribes. In addition, treaties are directly applicable and enforceable and do not require member states implementations. As a further consequence, a TFEU provision is in a position to even override inconsistent national law.

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<sup>17</sup> EU (2012), Consolidated version of the Treaty on the Functioning of the European Union, 2012/C 326/01, OJ C 326, 26.10.2012, p. 47–390

By contrast, the mere general principles of the TFEU were almost universally considered not enough to homogenize the public procurement discipline within the EU borders.

For this reason, the European lawmaker decided to develop a compelling set of “secondary legislations” (Arrowsmith et al., 2011<sup>18</sup>), that is numerous directives<sup>19</sup> (i.e. legally binding norms which require formal member state implementation) targeted at better specifying the current PP discipline across EU.

Anyhow, the Court of Justice of the European Union (CJEU) widely recognized that certain provisions of the EU Directives yield direct effect, even without national translation and regardless the amount of the procurement<sup>20</sup>, e.g. obligations on advertising, conducting the competition, evidence and criteria for selection and award criteria.

More generally, Directives’ provisions are directly enforceable, i.e. produce direct effect, if the upcoming conditions, as in the CJEU ruling in *Van Gend en Loos*, are fully met<sup>21</sup>. A mandate must:

1. Be enough clear and leave unambiguous room for judicial interpretation;

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<sup>18</sup> Arrowsmith et al. (2011), *EU Public Procurement Law: An Introduction*, EU Asia Inter University Network, University of Nottingham.

<sup>19</sup> Pursuant to art. 288 TFEU (formerly art. 249 TEC), a directive is “a measure of general application which requires member states to achieve certain results but leaves to each member state the precise form and method of implementation”.

<sup>20</sup> As it will be chiefly discussed in the upcoming section, PP is regulated by EU Procurement Directives as insofar as: (i) the specific mandates produce direct effect as in CJEU ruling or (ii) if the overall value of the public contract exceeds the binding EU financial thresholds.

<sup>21</sup> Case 26/62, *N.V. Algemene Transport - EN Expeditie Onderneming Van Gend & Loos v. Netherlands Inland Revenue Administration (“Van Gend en Loos”)* [1963] ECR 1.

2. Establish an unconditional obligation (e.g. member states are not allowed to make a choice between valid alternatives);
3. “Be capable of creating rights for individuals” (Arrowsmith et al., 2011).

Moreover, for the sake of completeness, there two other sources of regulation: (i) regulations, directly binding; and (ii) decisions, which require formal national implementation. As in the case of procurement regulatory framework, these latter sources have been widely used so as to partially amend law decrees of directives.

#### 1.3.1. When does the EU legal framework instantly apply?

“Procurement law must be complied with in the case of cooperation between public authorities and companies when there is a public contract within the meaning of the procurement directives” (Werner, 2019).

At this point, it may be evident that the main codification of EU PP mandates is to be found in the Procurement Directives (as amended), since the TFEU only marginally addresses the issues of regulating government procurement.

The procurement body of law is, in general, binding when a:

- A. Public contracting authority launches a competitive call for tendering for the award of a
- B. Public contract (supply, construction, service and concession contract) whose value offsets the
- C. Financial Thresholds (as in EC Delegated Regulation no. 2017/2365).

Therefore, EU Directives provisions are enforceable as insofar as these three conditions are met (as in the gearwheels of figure 2).

Figure 2 - When do procurement rules apply?



Source: Werner (2019)

To what it may concern the “purchaser”, the latter is subjected to the EU rules if the one of the provisions of Art. 2(1)(1-4) of Directive 2014/24/EU is fulfilled. Hence, contract authorities are, alternatively: central, regional and local government; or other bodies governed by public law<sup>22</sup>.

Specifically, as per the second pillar (i.e. the contract), contracts falling under EU procurement law must: (i) be concluded between one or more contracting

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<sup>22</sup> Other bodies governed by public law must be compliant with the subsequent prescriptions: (i) have legal personality, (ii) founded to target general interest aims and (iii) “another contracting authority provides more than 50% financing or has management supervision or appoints majority of directors (cumulative criteria)” (Werner, 2019).

authorities and one or more economic operators (as described by art. 2(1)(10) Dir. 2014/24/EU), (ii) be in writing and, finally, (iii) have pecuniary interest (art. 2(1)(5) *ibid*). The contracts under EU provisions regard: supplies, services (with a “light-touch regime for social and other specific services”), works (art. 2(1)(6-9) *ibid*) and concessions (whose reference legislative scheme is in Dir. 2014/23/EU).

The financial thresholds will be discussed in section 1.3.3. However, for the purposes of this paragraph, it can be useful to emphasize that misconducts in “contract-splitting” so as not to exceed the same thresholds are prohibited by law.

This is because, sometimes, contracting authorities may be encouraged to radically split the contracts into more lots in order to be excluded from the application of the strict EU rules governing PP.

### 1.3.2. EU Directives: A descriptive analysis

This paragraph is consecrated to a broad legal outline of the main EU norms governing the activity of contracting authorities. To this investigative scope, a descriptive analysis has been performed in order to verify which norms are producing obligations in the public procurement sector. Therefore, the research question to which our attention is currently riveted regards the regulatory framework which directly (and indirectly) governs public procurement across EU. In other words, this examination is aimed at supporting public procurement practitioners through the identification of the current binding norms.

So as to simplify the analysis, the body of laws has been divided into five main lines according to the regulated area: (i) classic procurement, (ii) utilities contracts, (iii) concession contracts, (iv) remedies and, finally, (v) utility remedies.

Standpoint of the examination is the consolidation of the EU public procurement rules which, according to the majority of procurement experts and professionals from among Professor Sue Arrowsmith (Arrowsmith et al., 2011), occurred in 2004 with the publication of Directives 2004/17/EC for “classic procurement” and 2004/18/EC for companies operating in the water, energy, transport and postal sectors. The regulation continuum for points (iii), (iv) and (v) is respectively drawn up as per the amendments of Dir. 2014/23/EU, Dir. 89/665/EEC and Dir. 92/13/EEC.

The Data and legal references retrieved from the EC website: <http://eur-lex.europa.eu> have been grouped into five multi-dimensional arrays, as in table 1, which have been constructed consistently with our research scope.

For a better understanding, consider the explanations in the forthcoming legend.

Table 1 - EU public procurement legal framework

Classic Directives (formerly Public Sector Directives)			
	<b>Directive 2004/18/EC</b>	<b>Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts [2004] O.J. L134/114; and Corrigendum to Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts [2004] O.J. L351/44.</b>	
As amended by	<b>Directive 2005/51/EC</b>	Commission Directive 2005/51/EC of 7 September 2005 amending Annex XX to Directive 2004/17/EC and Annex VIII to Directive 2004/18/EC of the European Parliament and the Council on public procurement [2005] O.J. L257/127.	
	<b>Directive 2005/75/EC</b>	Directive 2005/75/EC of the European Parliament and of the Council of 16 November 2005 correcting Directive 2004/18/EC on the co-ordination of procedures for the award of public works contracts, public supply contracts and public service contracts [2005] O.J. L323/55.	
	<b>Directive 2006/97/EC</b>	Council Directive 2006/97/EC of 20 November 2006 adapting certain Directives in the field of free movement of goods, by reason of the accession of Bulgaria and Romania [2006] O.J. L363/107.	
	<b>Directive 2009/81/EC</b>	Directive 2009/81/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts by contracting authorities or entities in the fields of defence and security, and amending Directives 2004/17/EC and 2004/18/EC [2009] O.J. L216/76.	
	<b>Directive 2013/16/EU</b>	Council Directive 2013/16/EU of 13 May 2013 adapting certain directives in the field of public procurement, by reason of the accession of the Republic of Croatia, OJ L 158, 10.6.2013, p. 184–192	
	<b>Commission Decision 2008/963/EC</b>	Commission Decision 2008/963/EC of 9 December 2008 amending the Annexes to Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council on public procurement procedures, as regards their lists of contracting entities and contracting authorities [2008] O.J. L349/1.	
	<b>Commission Regulation 2008/213/EC</b>	Commission Regulation (EC) No 213/2008 of 28 November 2007 amending Regulation (EC) No 2195/2002 of the European Parliament and of the Council on the Common Procurement Vocabulary (CPV) and Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council on public procurement procedures, as regards the revision of the CPV [2008] O.J. L74/1.	
	<b>Commission Regulation 2009/1177/EC</b>	Commission Regulation (EC) No 1177/2009 amending Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council in respect of their application thresholds for the procedures for the award of contracts [2009] O.J. L314/64.	
	<b>Commission Regulation 2011/1251/EU</b>	Commission Regulation (EU) No 1251/2011 of 30 November 2011 amending Directives 2004/17/EC, 2004/18/EC and 2009/81/EC of the European Parliament and of the Council in respect of their application thresholds for the procedures for the awards of contract, OJ L 319, 2.12.2011, p. 43–44	
	<b>Commission Regulation 2013/1336/EU</b>	Commission Regulation (EU) No 1336/2013 of 13 December 2013 amending Directives 2004/17/EC, 2004/18/EC and 2009/81/EC of the European Parliament and of the Council in respect of the application thresholds for the procedures for the awards of contract, OJ L 335, 14.12.2013, p. 17–18	
	<b>Commission Regulation 2015/2342/EU</b>	Commission Regulation (EU) 2015/2342 of 15 December 2015 amending Directive 2004/18/EC of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, OJ L 330, 16.12.2015, p. 18–19	
	<b>Directive 2014/24/EC</b>	<b>Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, OJ L 94, 28.3.2014, p. 65–242. REPEALING DIRECTIVE 2004/18/EC as amended</b>	
As amended by	<b>Commission Delegated Regulation 2170/2015/EU</b>	Commission Delegated Regulation (EU) 2015/2170 of 24 November 2015 amending Directive 2014/24/EU of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, OJ L 307, 25.11.2015, p. 5–6	
	<b>Commission Delegated Regulation 2365/2017/EU</b>	Commission Delegated Regulation (EU) 2017/2365 of 18 December 2017 amending Directive 2014/24/EU of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, C/2017/7689, OJ L 337, 19.12.2017, p. 19–20	

Utility Directives			
	<b>Directive 2004/17/EC</b>	<b>Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors [2004] OJ L134/1; and Corrigendum to Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors [2004] O.J. L358/35.</b>	
As amended by	<b>Directive 2005/51/EC</b>	Commission Directive 2005/51/EC of 7 September 2005 amending Annex XX to Directive 2004/17/EC and Annex VIII to Directive 2004/18/EC of the European Parliament and the Council on public procurement [2005] O.J. L257/127.	
	<b>Directive 2006/97/EC</b>	Council Directive 2006/97/EC of 20 November 2006 adapting certain Directives in the field of free movement of goods, by reason of the accession of Bulgaria and Romania [2006] O.J. L363/107.	
	<b>Directive 2009/81/EC</b>	Directive 2009/81/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of procedures for the award of certain works contracts, supply contracts and service contracts by contracting authorities or entities in the fields of defence and security, and amending Directives 2004/17/EC and 2004/18/EC [2009] O.J. L216/76.	
	<b>Directive 2013/16/EU</b>	Council Directive 2013/16/EU of 13 May 2013 adapting certain directives in the field of public procurement, by reason of the accession of the Republic of Croatia, OJ L 158, 10.6.2013, p. 184–192	
	<b>Commission Decision 2008/963/EC</b>	Commission Decision 2008/963/EC of 9 December 2008 amending the Annexes to Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council on public procurement procedures, as regards their lists of contracting entities and contracting authorities [2008] O.J. L349/1.	
	<b>Commission Regulation 2008/213/EC</b>	Commission Regulation (EC) No 213/2008 of 28 November 2007 amending Regulation (EC) No 2195/2002 of the European Parliament and of the Council on the Common Procurement Vocabulary (CPV) and Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council on public procurement procedures, as regards the revision of the CPV [2008] O.J. L74/1.	
	<b>Commission Regulation 2009/1177/EC</b>	Commission Regulation (EC) No 1177/2009 amending Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council in respect of their application thresholds for the procedures for the award of contracts [2009] O.J. L314/64.	
	<b>Commission Regulation 2011/1251/EU</b>	Commission Regulation (EU) No 1251/2011 of 30 November 2011 amending Directives 2004/17/EC, 2004/18/EC and 2009/81/EC of the European Parliament and of the Council in respect of their application thresholds for the procedures for the awards of contract, OJ L 319, 2.12.2011, p. 43–44	
	<b>Commission Regulation 2013/1336/EU</b>	Commission Regulation (EU) No 1336/2013 of 13 December 2013 amending Directives 2004/17/EC, 2004/18/EC and 2009/81/EC of the European Parliament and of the Council in respect of the application thresholds for the procedures for the awards of contract, OJ L 335, 14.12.2013, p. 17–18	
	<b>Commission Regulation 2015/2341/EU</b>	Commission Regulation (EU) 2015/2341 of 15 December 2015 amending Directive 2004/17/EC of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, OJ L 330, 16.12.2015, p. 16–17	
	<b>Directive 2014/25/EU</b>	<b>Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC, OJ L 94, 28.3.2014, p. 243–374. REPEALING DIRECTIVE 2004/17/EC as amended</b>	
As amended by	<b>Commission Delegated Regulation 2015/2171/EU</b>	Commission Delegated Regulation (EU) 2015/2171 of 24 November 2015 amending Directive 2014/25/EU of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, OJ L 307, 25.11.2015, p. 7–8	
	<b>Commission Delegated Regulation 2017/2364/EU</b>	Commission Delegated Regulation (EU) 2017/2364 of 18 December 2017 amending Directive 2014/25/EU of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, C/2017/7691, OJ L 337, 19.12.2017, p. 17–18	

Concession Directives			
	<b>Directive 2014/23/EU</b>	<b>Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts, OJ L 94, 28.3.2014, p. 1–64.</b>	
As amended by	<b>Commission Delegated Regulation 2015/2172/EU</b>	Commission Delegated Regulation (EU) 2015/2172 of 24 November 2015 amending Directive 2014/23/EU of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, OJ L 307, 25.11.2015, p. 9–10	
	<b>Commission Delegated Regulation 2017/2366/EU</b>	Commission Delegated Regulation (EU) 2017/2366 of 18 December 2017 amending Directive 2014/23/EU of the European Parliament and of the Council in respect of the application thresholds for the procedures for the award of contracts, C/2017/7688, OJ L 337, 19.12.2017, p. 21–21	
Corrected by	<b>Corrigendum to Directive 2014/23/EU (2015)</b>	Corrigendum to Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts (OJ L 94, 28.3.2014) OJ L 114, 5.5.2015, p. 24–24	
	<b>Corrigendum to Directive 2014/23/EU (2018)</b>	Corrigendum to Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts (OJ L 94, 28.3.2014), OJ L 82, 26.3.2018, p. 17–17	
Remedies Directives			
	<b>Directive 89/665/EEC</b>	<b>Council Directive 89/665/EEC of 21 December 1989 on the coordination of the laws, regulations and administrative provisions relating to the application of review procedures to the award of public supply and public works contracts [1989] O.J. L395/33.</b>	
As amended by	<b>Directive 92/50/EEC</b>	Council Directive 92/50/EEC of 18 June 1992 relating to the coordination of procedures for the award of public service contracts O.J. L209/1.	
	<b>Directive 2007/66/EC</b>	Directive 2007/66/EC of the European Parliament and the Council of 11 December 2007 amending Council Directives 89/665/EEC and 92/13/EEC with regard to improving the effectiveness of review procedures concerning the award of public contracts [2007] OJ L335/31.	
	<b>Directive 2014/23/EU</b>	<b>Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts, OJ L 94, 28.3.2014, p. 1–64.</b>	
Corrected by	<b>Corrigendum to Directive 89/665/EEC</b>	Corrigendum to Council Directive 89/665/EEC of 21 December 1989 on the coordination of the laws, regulations and administrative provisions relating to the application of review procedures to the award of public supply and public works contracts (OJ L 395, 30.12.1989); OJ L 63, 10.3.2016, p. 44–44	
Utility Remedies Directives			
	<b>Directive 92/13/EEC</b>	<b>Council Directive 92/13/EEC of 25 February 1992 coordinating the laws, regulations and administrative provisions relating to the application of Community rules on the procurement procedures of entities operating in the water, energy, transport and telecommunications sectors, [1992] O.J. L76/7.</b>	
As amended by	<b>Directive 2006/97/EC</b>	Council Directive 2006/97/EC of 20 November 2006 adapting certain Directives in the field of free movement of goods, by reason of the accession of Bulgaria and Romania [2006] O.J. L363/107.	
	<b>Directive 2007/66/EC</b>	Directive 2007/66/EC of the European Parliament and the Council of 11 December 2007 amending Council Directives 89/665/EEC and 92/13/EEC with regard to improving the effectiveness of review procedures concerning the award of public contracts [2007] OJ L335/31.	
	<b>Directive 2014/23/EU</b>	<b>Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts, OJ L 94, 28.3.2014, p. 1–64.</b>	

Source: our elaboration on data from <https://eur-lex.europa.eu>

All the tables below portray with a bigger font the main law sources (they are almost universally considered as the milestone the EU process of codifying public procurement). In addition, they have been highlighted with dark grey. The other norms are highlighted consistently with progressively lighter greys from amending directives to detailed regulations and communications. Corrigendum, which, by definition, are less important, are not highlighted. In addition, in order to give an answer to our research question, the last column of the tables is dedicated to the validity of the same norms. Green stands for “in-force with no amendments”, yellow for “in-force with some amendments” and, finally, red for “no more binding or, better, repealed”.

### 1.3.3. EU 2014 procurement Directives

Since mid-2010, a pivotal attention has been being riveted to the reform of the PP discipline with the purpose of better regulating an already wide body of norms and promoting the achievement of environmental and social objectives throughout all the phases of the purchasing process.

The latter point is of paramount importance seeing as how the new PP regulation has been shaped in accordance with the strategic goals of “Europe 2020”<sup>23</sup>.

The process of profound and meaningful revision of the 2004 Procurement Directives started on 27 January 2011, when the EC formally published the Green Paper on the modernization of the EU procurement policy <sup>24</sup>, through which EC launched a public consultation. The latter culminated in the publication of the Green

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<sup>23</sup> EC (2010), COM(2010)2020, Communication from the Commission, Europe 2020: A strategy for smart, sustainable and inclusive growth, Brussels.

<sup>24</sup> EC (2011), COM(2011) 15 final, Green Paper on the modernization of the EU procurement policy - Towards a more efficient European Procurement Market, Brussels.

Paper: “Synthesis of replies” on 24 June including a set of 623 proposals from among stakeholders, public entities and individuals (Medeiros, n.d.<sup>25</sup>).

As a result, on 27 December 2011, the Commission formalized its harbinger legislative proposals to update the PP legal framework building on the paradigm of 2004 Directives.

Following extensive negotiations among EC, European Parliament and Member States which led to severe amendments with respect to the first versions of the Directives, the improved Procurement Directives were signed on 26 February 2014 and came into force<sup>26</sup> on 17 April:

- “Classic” Directive (2014/24/EU) on the procurement of public contracts repealing former Directive 2004/18/EC;
- “Utilities” Directive (2014/25/EU) on the procurement of utilities public contracts abolishing Directive 2004/17/EC;
- “Concessions” Directive (2014/23/EU) on the procurement of services and work concession contracts partially replacing some provisions of Directive 2004/18/EC.

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<sup>25</sup> Medeiros R. (n.d.), The New Directive 2014/24/EU on Public Procurement: A First Overview.

<sup>26</sup> Since Directives are source of secondary legislation, Member States are required to implement the main devices thereby included through national law. The same MS were asked to adopt 2014 Procurement Directives by 18 April 2016. For a complete study of the Directives’ implementation in June 2016, see: DLA Piper (2016), Implementation of the 2014 Procurement Directives across Member States.

Before addressing the topic of substantial changes in the binding PP discipline, while portraying a general overview of the measures, it is necessary to unveil the set of objectives earmarked by the EU Lawmaker.

Two main general objectives have been set, namely:

1. Simplifying the procurement procedures at community level;
2. Reinforcing the deployment of public contracts as a tool to achieve secondary policies, from among environmental and social policies as well as job creation.

At a less evident level, Directives aim at targeting the upcoming secondary goals:

- To facilitate procedural access to SMEs;
- To enhance procedures' openness to foreign operators;
- To strengthen the use of electronic PP tools and platforms;
- To prevent collusion and corruption;
- To professionalize contracting authorities' activities;
- To clarify how important judicial contributions of the Court of Justice of the European Union (CJEU) should impact on PP binding regime.

For the sake of completeness, the new-fangled legal framework is going to be portrayed by describing each Directive as against prior "secondary legislations".

Classic Procurement Directive (2014/24/EU)

The major changes brought by Directive 2014/24/EU may be summarized as in the following ten areas identified by CFR (2015)<sup>27</sup>:

Table 2 - Major shifts of Directive 2014/24/EU

<p><b>[1] The distinction between part A and part B services has been stamped out</b></p> <ul style="list-style-type: none"> <li>• All service contracts must be compliant with the procurement rules.</li> <li>• A "light-touch regime" is dedicated to social and other specific services (under Annex XIV)</li> <li>• Higher threshold: €750,000</li> </ul>
<p><b>[2] Improved access for SMEs</b></p> <ul style="list-style-type: none"> <li>• Contracts for goods and/or services higher than €500,000 or for works over €5 million must be divided into lots.</li> <li>• If not divided, CAs must set out their reasons.</li> <li>• If split in lots, CAs can limit the number of lots any tenderer can win.</li> </ul>
<p><b>[3] Award criteria must become EMAT</b></p> <ul style="list-style-type: none"> <li>• In the future, CAs must award contracts on the basis of the sole EMAT (rather than choosing between lowest-price and EMAT)</li> <li>• A cost-effectiveness approach may be employed.</li> </ul>
<p><b>[4] Compulsory use of electronic communication</b></p> <ul style="list-style-type: none"> <li>• All communications must be performed electronically.</li> </ul>
<p><b>[5] Amendment of contract ex-post</b></p> <ul style="list-style-type: none"> <li>• "Substantial" changes require a new tender process.</li> <li>• "Non-substantial" changes may be source of ex-post contract amendments.</li> </ul>
<p><b>[6] Teckal exemptions</b></p> <ul style="list-style-type: none"> <li>• The controlling authority has to exercise sufficient control over the controlled body.</li> <li>• The latter has to carry out the essential parts of its activities.</li> </ul>
<p><b>[7] New bases for discretionary exclusion</b></p> <ul style="list-style-type: none"> <li>• CAs may exclude bidders when the latter shown significant deficiencies in public contract performance</li> </ul>
<p><b>[8] Mandatory self-declarations</b></p> <ul style="list-style-type: none"> <li>• The awarded tenderer has to submit all the documentation proving out its pre-qualification</li> </ul>
<p><b>[9] Minimum time limits</b></p> <ul style="list-style-type: none"> <li>• Shortened timescales</li> </ul>
<p><b>[10] Competitive Negotiated Procedure</b></p> <ul style="list-style-type: none"> <li>• Relaxation of the rules</li> <li>• More scope for negotiating</li> </ul>

Source: Our elaboration based on CFR (2015)

<sup>27</sup> Cleaver Fulton Rankin (2015, 08), 10 Key Changes in Public Procurement.

The most straight-forward mandate is regarding the award criterion, which, according to the novel regulation, should be the Most Economically Advantageous Tender (MEAT) evaluated on the sole price or on the price/quality ratio.

Despite eliminating the possibility of awarding contracts to the lowest-price tenderer, under the definition of MEAT, it is yet possible to evaluate offers on the mere price. Therefore, the potential revolution of a full transition to MEAT is, so far, mitigated by the provision recalled above.

Utilities Contracts Directive (2014/25/EU)

To what it may concern the Utilities Contracts Directive (2014/25/EU), the changes introduced by the EU Lawgiver resummons the major shifts just described for Directive 2014/24/EU: “most importantly - codification of contract variation (Presstext), conflict of interest and preliminary market engagement case law, the introduction of the innovation partnership procedure and the "light touch" procedure, improvements to dynamic purchasing systems, revised exclusion criteria and the introduction of life cycle costing award criteria” (DLA Piper, 2016).

An attentive reading of this Directive as in comparison with the former one, it may be rather self-evident that the main difference in the discipline regards the so-called “field of applicability”. In fact, when defining a “utility”, the EC makes it clear that any right/license awarded as a consequence of a public procurement process (employing objective award criteria) will not be considered “special” or “exclusive”

even though the organization is pursuing one from among the regulated Utilities. Hence, the activity is not considered under the procurement rules of Dir. 2014/25. Conversely, as per the activities under the procurement law, the EC formally publishes financial thresholds so as to define the condition according to which the procurement process must be compliant with the EU body of law. Current thresholds, in validity from 1<sup>st</sup> January 2018, are exhibited in table 3 below.

Table 3 - Financial thresholds

<b>Contracting Entity</b>	<b>Supplies (in €)</b>	<b>Services (in €)</b>	<b>Social and other services (in €)</b>	<b>Works (in €)</b>
Public sector bodies subject to the WTO GPA	144.000	144.000	750.000	5.548.000
Other public sector bodies	221.000	221.000	750.000	5.548.000
Utilities (public or private)	443.000	443.000	1.000.000	5.548.000

Source: Burrows & McNeill (2019) based on Commission Delegated Regulation (EU) 2017/2365 of 18 December 2017 amending Directive 2014/24/EU in respect of the application thresholds for the procedures for the award of contracts.

Public sector bodies subject to the WTO GPA are central government authorities of countries which, on a voluntary basis, decided to adhere to the WTO's Agreement on Government Procurement (GPA) put into practice in 1996 under the esprit of regulating public tenders in a way to guarantee the compliance with international inspiring principles from among: transparency and equal treatment of both domestic and foreign suppliers.

Notwithstanding, pursuing our discussion of EU provisions in sec 1.3, a procurement which does not meet its reference financial threshold is, yet, subject to

the positive and negative obligations incorporated by the TFEU and minimum requirements defined the EC Communication 2006/C 179/02<sup>28</sup>.

Concessions Contracts Directive (2014/23/EU)

An ending discussion is reserved to the brief analysis of the novel Directive for concessions contracts (Dir. 2014/23/EU).

There is a slight difference between work and concession contracts. According to the portal of the EC “what is a concession?”, a concession is contract establishing a sort of “bilateral partnership” between the public sector and a private company in which the latter is compensated for the provision of a service/good mostly through the permission to use and commercial exploit the same work or service. Under this definition, the concessionaire, i.e. the private company awarded with a concession contract, is, thus, exposed to the classical business risks of potential losses.

By contrast, a “classic” work contract is such that the private company is remunerated in a fixed monetary value.

In specific sectors, concessions are widely deployed in sectors “affecting EU citizens quality of life” (EC; n.d.) from among transports, port and airport services, motorway maintenance and management, waste management, energy and heating services, leisure facilities and car parks and ICTs development.

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<sup>28</sup> EC (2006), Commission interpretative communication on the Community law applicable to contract awards not or not fully subject to the provisions of the Public Procurement Directives, OJ C 179, 1.8.2006, p. 2–7.

The fundamental shift is that, till 2014, only work concessions were subject to EU regulation (under Dir. 2004/18/EC). Since 2014, also service concessions have been being governed by the binding procurement law on the condition that the reserve value (i.e. the overall foreseen monetary value of the concession) exceeds the current financial threshold of € 5,186,000.

Since our main research attention is riveted to the analysis of the award criteria, it is worth to discuss the concession award regime under the new-fangled Directive. Contracting Authorities may choose the most suitable criterion between lowest-price and MEAT, given that it is compliant with general EU principles (as in the TFEU) and specific requirements of the hereby mentioned body of law.

The award criteria must:

- Ensure fair and equal treatment;
- Be non-discriminatory, that is not to favor internal products or companies;
- Be narrowly linked to the object of the same concession contract;
- Be objective, in the meaning of objectively appraisable;
- Be enlisted in decreasing importance order and advertised in advance.

#### **1.4. THE EU STATE AID: DEFINITION AND CHARACTERISTICS**

More and more often, public procurement is becoming a policy tool for conferring state support. As a consequence, this section is aimed at analyzing the state aid.

First and foremost, a general discussion on state interventionism will open the path to punctually portray the state aid EU regulation. Secondly, after having outlined its main characteristics, the discussion will cover the issue of the law superimposition. In other words, the investigative purpose is to verify whether the evidence-based hypothesis of a strict correlation between public procurement and state aid is confirmed by EU legal provisions.

#### 1.4.1. General notes on State support

The public sector in all its centralized and peripheral institutions has been behaving in the economic system not only as the regulatory authority, i.e. the body responsible for setting the “rules of the game”, but also as an active player operating in a comparable manner as private organizations and individuals do.

The government intervention in the economy of a given country has always been widely discussed as one of the most crucial areas of debate for public economists. Keynesian supporters have always been struggling with the capitalist dictates of market independence about the appropriateness and the efficiency of state supports. However, there is widespread consensus that direct state intervention should be limited to specific strategic sectors driving the overall country’s economy.

To this extent, even Adam Smith<sup>29</sup>, undiscussed fierce father of the self-government of the market in late 1770s foretold that in case of market failures, the state intervention was far more than legitimate<sup>30</sup>. Economic history is providing different examples of governmental interventions with heterogenous root causes and differentiated outcomes. Although the majority trend in latest democracies is to curb the emergence of the state-entrepreneur model for its unforecastable risky derives, its participation in the economic vicissitudes of a country is yet justified in other varied forms and shapes, whether direct or indirect.

For instance, in the EC, the direct support is allowed as insofar as it is limited “to the less and better targeted aid”<sup>31</sup>. The guiding criterion of State Aid (SA) measures is to be read through an attentive interpretation of all its words. There are two dimensions that should be simultaneously considered: the first one is related to the lowest possible support (without damaging the output) and the second to a qualitative provision according to which support cannot be designed with no specific measurable objectives. Even though, this criterion may be seen as the obvious rationale guideline of any reasonable individual maximizing the utility of

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<sup>29</sup> In his theoretical framework, A. Smith defined the free market as capable of its self-government through some invisible free market forces with no need of state intervention. Exception is made for three areas of duties (national defense, administration and public goods). For further information about the topic, see: *An inquiry into the nature and causes of the wealth of nations*, 1776.

<sup>30</sup> For a complete understanding of the Smithian theories about governmental interventionism, see: S. Siami Namini, *Adam Smith and Government Intervention in the Economy, Review of the Wealth of Nations*, May 2015.

<sup>31</sup> The above-mentioned criterion is related to the State Aid Action Plan of Summer 2005. See [http://ec.europa.eu/competition/publications/cpn/2005\\_2\\_3.pdf](http://ec.europa.eu/competition/publications/cpn/2005_2_3.pdf).

the community in which he/she lives in; it has been a great conquest in the context of a fairer administration of the public resources without compromising the market's competitive equilibria.

The efficiency per se is not sufficiently adequate to support the intervention and, hence, the audit of qualitative aspects of the same support, shifting the focus on the measures' effectiveness, is a much more appropriate dimension to legitimate government's meddling in the economy.

#### 1.4.2. State Aid: Relevant law framework

At this stage of the analysis, it may be clear that central governments are, often, advocated to support the economic development in particular industries for the provision of the so-called Services of General Economic Interest (with the acronym SGEI). However, as it will be seen afterwards while briefly discussing EU governance and viability of internal State Aid measures, State support or, better, State Aid is possible if and only if the concerned actions are aligned with the binding principles of the TFEU. Indeed, the latter primary source of legislation widely addresses the issue of granting State aids so as to make sure that the initiatives of the EU Member States do not have distortive effect on the EU competitive environment, that is, in other words, are fair and non-discriminatory.

To this purpose, State Aid law is chiefly described by art. 107 to 109 of the TFEU<sup>32</sup>.

Art. 107 (1) states that: “Any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens competition by favoring certain undertakings or the production of certain goods shall, insofar as it affects trade between Member States, be incompatible with the common market”<sup>33</sup>.

Therefore, it is rather evident that art. 107(1) TFEU is source of “negative obligations”, i.e., for simplicity, Member States are not allowed to allocate public resources if the latter allocation produces effects prohibited by binding community law. Anyhow, relevant law literature, inter alia Sciskalova & Munster (2014)<sup>34</sup>, attempts to reconstruct a positive definition of state aid characteristics through the identification of the forthcoming four attributes:

- Measure (aid) granted by a State or through State resources;
- Economic advantage to particular undertakings (business) or sector (industry);

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<sup>32</sup> In the former TEC, state aid legislative mandates were regulated by art. 87 to 89.

<sup>33</sup> Another definition of state aid has been laid down by the CJEU in the case of *Steenkolenmijnen*. “A subsidy is normally defined as a payment in cash or in kind made in support of an undertaking other than the payment by the purchaser or consumer for the goods or services which it produces. An aid is a very similar concept, which, however, places emphasis on its purpose and seems especially devised for a particular objective which cannot normally be achieved without outside help. The concept of aid is nevertheless wider than that of a subsidy because it embraces not only positive benefits, such as subsidies themselves, but also interventions which, in various forms, mitigate the charges which are normally included in the budget of an undertaking and which, without, therefore, being subsidies in the strict meaning of the word, are similar in character and have the same effect”. *De Gezamenlijke Steenkolenmijnen in Limburg v High Authority of the European Coal and Steel Community*, case 30-59, (*Steenkolenmijnen*), EU:C:1961:2.

<sup>34</sup> Sciskalova M., Munster M. (2014), *Definition and characteristics of state aid*, *Procedia – Social and Behavioral Sciences* 110, pp. 223-230.

- Threat of disruption or distortion of competition within EU internal market (art. 26(2) TFEU);
- Effect on trade between EU Member States.

If the measure is fulfilling the above conditions or if the State Aid is formally recognized as being subject to the provisions of Art. 107 (2) and 107 (3) as well as the “de minimis aid”; hence, the measure is appraised for being compatible (thus, legitimate) with the EU regulations.

To summarize, a state aid occurs when public bodies (i.e. central, sub-central, regional, local public entities) selectively allocate public resources (i.e. public state and EU funds) to certain undertakings (i.e. every entity engaged in economic activities, regardless of its legal status).

Seeing as how conceding a state aid means making a choice between different alternatives and recalling that States are budget-driven, it is relatively self-evident that even State Aid must be compliant with the general principles of transparency and integrity, just like latest law issues on public procurement. Given that there is a booming demand for higher transparency in the public sector, the EC recently opted for reviewing its state aid rules through the so-called State Aid Modernization (SAM) Communication<sup>35</sup>. Pursuant to art. 8 of the latter communication, its objectives are: (i) to foster growth in accordance with the strategy Europe 2020, (ii)

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<sup>35</sup> EC (2012), COM(2012) 209 final.

to strengthen the quality of EC ex ante scrutiny and (iii) to simplify rules and speed decision-making processes.

#### 1.4.3. The interaction between public procurement and State aid rules

As briefly suggested by sec. 1.4, public procurement and state aid are tightly correlated seeing as how these disciplines appear for being overlapping.

Indeed, under the state aid law, contracting authorities may be considered as falling within the scope of state (art. 107(1) TFEU). Thus, the activity of awarding public contracts and allocating resources is subjected to the provisions of TFEU regarding state aid (e.g. prohibitions, general exemptions, ...) which are hierarchically more important as against the procurement Directives. This is mainly due to the fact that both regulations (PP and SA) leave significant discretion room while defining their main actors: contracting authorities and “state”, respectively.

To this extent, as laid down by Petersen C. F. (2018)<sup>36</sup>, it can be fairly concluded that there are undefined boundaries which discriminate public procurement and state aid rules. Coherently with the purpose of this paragraph, our research attention is, at this stage, pivotally riveted to evaluate whether these two regulations target different legal and strategic objectives. Although both rules seek to strengthen the

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<sup>36</sup> Petersen C. F. (2018), Award of public contracts as a means to conferring state aid: a legal analysis of the interface between public procurement law and state aid law, Copenhagen Business School, Doctoral School of Business and Management, PhD Series 10.2018.

competition in the Internal Common Market in the end, they address this goal achievement with diverging primary aims. If procurement rules are devoted to limit public authority powers so as to prevent discriminatory and unfair public tenders, the state aid law aims at prohibiting the conferral of undue selective advantage. It is rather blatant that there is broad room for overlapping.

To conclude, even though a common denominator does exist, “procurement rules are designed to prevent distortion for the market (the public contract, while State aid rules should prevent distortion on the market” (Petersen C.F., 2018)



## **CHAPTER 2: ECONOMIC THEORY ON PUBLIC PROCUREMENT**

### **2.1 ECONOMIC MODELS FOR PUBLIC PROCUREMENT**

Given that public procurement accounts for a significant part of GDP in most OECD countries (as widely emphasized hither and thither), it may be rather obvious that the economic science riveted so many times its attention towards the definition and implementation of economic models. Thus, public procurement has become a pivotal area of interest for most economic scholars all around the world.

Suffice it to say that searching “public procurement” on Google Scholar yields more than 1,400 thousand results of which about 18 thousand published in 2019.

Consistently, this section is fully addressed to provide insights on the most interesting applications of the economic science towards the issues of government procurement either from the perspective of contracting authority or from the standpoint of competing bidders.

### 2.1.1. Social choice theory

The procuring activity of the contracting authority encompasses a various number of heterogenous sub-activities: from the identification of the procurement needs and the definition of the tenders' selection criteria to the award and the ex post control. Throughout all the steps of the process, public procurement can be considered as a policy tool (Bergman & Lundberg, 2013<sup>37</sup>) whose final aim (the so-called procurement scope) is to get to an outcome consistent with the preferences of the contracting authority or, as in the political economy theorization, its principal, i.e. the society.

The outlined view of the procurer as an agent whose final goal is the maximization of the social welfare links public procurement to the so-called social choice theory, an “econometric theory which analyses choice rules, i.e. rules by which the best option is selected from a number of alternatives, based on individual preferences of a group of persons” (Chen, 2008<sup>38</sup>). The social choice theory can be considered as a branch of the welfare economics (firstly theorized by Pigou in Welfare economics, 1920) whose main research intent is to elaborate social evaluation criteria of alternative possibilities.

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<sup>37</sup> Lundberg, S., Bergman, M. A. (2013), Tender Evaluation and supplier selection methods in public procurement, *Journal of Purchasing & Supply Management*, Vol. 19, 73-83.

<sup>38</sup> Chen, T. H. (2008), An Economic Approach to public procurement, *Journal of Public Procurement* (8), pp. 407-430.

At this point, it can be rather apparent that the mandate of whichever contracting authority dealing with public first price sealed-bid auctions is superimposable to a certain extent to the discipline of the social choice theory.

As it will be debated afterwards, the majority of public contracts are awarded through the integrated evaluation of price and quality connotations of the bids in a composite summary index, the EMAT or MEAT.

There is paucity of authoritative literature about the contribution of the social choice theory in the government procurement auctions. However, the topic has been broadly investigated by Tsong Ho Chen (An economic approach to public procurement, 2008) while discussing the so-called “ranking paradox”. The latter situation may emerge when the award system employed by the procurer is based (even partially) on relative terms, that is the situation when the score of a bid for almost one criterion is computed out of a comparison with the other bidders’ offers.

In the most simplified vision of public auctions, the price score (PS) is computed in a way that the maximum allowable score is bestowed to the lowest-price bid, i.e.

the offer with the highest allowance to the amount made up of auction; and an allegedly lowered score to next lowest price and so on.

Table 4 below provides a simple easy-to-read reference example of the ranking paradox. If the tenders are weighed jointly and if the price score is constructed as above, the procurement will be entrusted to tenderer A (with the highest overall score, OS = 83). If the tenderer B is set-aside (for example, its offer is non-

compliant with the procurement requirements), the auction will be awarded to tenderer C. In the case when a (compulsory) pairwise evaluation (table 4b) yields a different result with respect to the aggregate ranking (table 4a), a ranking paradox (or, as in the voting theory, a Condorcet-paradox) is produced.

Table 4 - Possible Result of a procurement

<b>Tenderer</b>	<b>Technical Quality Score</b>	<b>Price (in million)</b>	<b>Price Score</b>	<b>Overall Score</b>
A	53	€ 1.000	30	83
B	57	€ 1.050	25	82
C	60	€ 1.060	20	80

<b>Tenderer</b>	<b>Technical Quality Score</b>	<b>Price (in million)</b>	<b>Price Score</b>	<b>Overall Score</b>
A	53	€ 1.000	30	83
C	60	€ 1.060	25	85

Source: our elaboration based on Chen, 2008.

Three tenders have been submitted to the procuring authority which appraises their bids according to the EMAT criterion. The technical quality score (TQS) is weighted up to 70, while the price score (PS) up to 30, as in the BUL Tenders. Assuming that the price score is evaluated in relative scores and that the TQS remains the same (independently from alternatives), a ranking paradox occurs.

The aforesaid reference template allows to introduce a particularly interesting property of the social choice theory, the “independence of irrelevant alternatives”. i.e. the relative preference between two alternatives (as in the example, A and C) must not be affected by a third alternative (B).

In fact, a ranking paradox may emerge when this rule is disregarded. Consequently, the most important finding of welfare economics, i.e. the Impossibility Theorem <sup>39</sup> (Arrow, 1951) is in force. Arrow's theorem applied to GP states that in the case of two or more tenderers, there is no award system based on ranking alone (with almost one criterion expressed as a relative score) allowing the social choice to reach the first-best outcome if one or more of the following properties are not met (as in the definition of Blau, 1972<sup>40</sup>):

1. Unanimity. If all sub-dimensional criteria conclude that tender A is better than tender B, hence, in the overall score ranking B cannot be preferred to A.
2. Non-dictatorship. There may not be one sub-criterion that will always identify the best proposal, *ceteris paribus*.
3. Universal (unrestricted) domain. For all possible auctions, a winner must be determined. (A Condorcet-winner must exist).
4. Independence of irrelevant alternatives. The relative preference between two alternatives must not be affected by a third alternative.
5. No egalitarianism. The award system "should not always decide that all proposals have the same ranking" (Chen, 2008).

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<sup>39</sup> Arrow K. (1951), *Social Choice and Individual Values* (originally titled *A difficulty in the concept of Social Welfare*), John Wiley & Sons.

<sup>40</sup> Blau, J. H. (1972). A Direct Proof of Arrow's Theorem. In: *Econometrica*, 40: 61-67

At a very first sight, it can be promptly concluded that, in the provided simplified example, the second and the fourth property despite being straight forward are not fulfilled. Under this theoretical framework, there is no deterministic award methodology (in aggregate ranking) allowing the procuring authority to reach a Pareto-optimal<sup>41</sup> allocation (Chen, 2008), rather a second-best outcome (as theorized by Lipsey & Lancaster, 1956<sup>42</sup>).

Bergman & Lundberg (2013) conclude that when the fourth property is not met, that is when the scores depends on irrelevant alternatives, strategic manipulation can likely exist. In this case, a high-quality high-cost tenderer is encouraged to place an exponentially high bid or, if multiple bids per contract are not allowed (as in the majority of public tenders), ask an accomplice to submit tremendously high offers. As a consequence, the price would be set-aside out of the equation and high-quality bidders are expected to be massively favored. Regardless, the Swedish researchers provide a possible theoretic solution to overcome the problem of relative scores. Maintaining valid the assumption that only price scores vary in comparison with the other bids, procurers may fix ex ante a benchmark price (or a range of reference prices) and apprise price bids as against this threshold.

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<sup>41</sup> The Pareto optimum is reached when all agents are better off and when in another allocation almost one agent is worse than before.

<sup>42</sup> Lipsey R. & Lancaster K. (1956), The general theory of second best, in: The review of Economic Studies 24(1), pp. 11-32

Therefore, the overall ranking will no longer be affected by irrelevant alternatives<sup>43</sup> and there will be no more room for strategic manipulation.

Notwithstanding, this solution seems to be only theoretical since very few public auctions employed pre-specified price benchmarks. (OECD, 2019)

### 2.1.2. Game theory

Pursuing our literature overview on public procurement economic theories, based on the reasonable assumption, hither and thither defined above, that players “do not decide completely isolated regardless of other subjects, but that they take the expected reaction of the counterparty into account” (Schmidt, 2015<sup>44</sup>), it may be considered beneficial to explore the topic of decision-making in public procurement through the game theory. The latter is a branch of the economic theory which aims at analyzing the decision-making situations wherein two or more rational-thinking parties (the so-called players) are involved. It can be defined as “the study of mathematical methods of conflict and cooperation between intelligent and rational decision-makers” (Myerson, 1991<sup>45</sup>).

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<sup>43</sup> For further information about the identification of a reference price or a set of prices, see: Dini et al. (2006), Scoring rules, in: Handbook of Procurement, Cambridge University Press.

<sup>44</sup> Schmidt M. (2015), Price Determination in Public Procurement: A Game Theory Approach, European Financial and Accounting Journal, University of Economics, Faculty of Finance and Accounting, Prague, Vol. 10, Issue 1, pp. 49-62.

<sup>45</sup> Myerson, R. B. (1991), Game Theory: Analysis of Conflict, Harvard University Press, Cambridge, Massachusetts.

Undisputedly, the main literature contribution to the development of this branch is due to Von Neumann & Morgenstern (1944)<sup>46</sup> who, firstly, advocate players' deployment of mathematical tools to adapt their behavior as against the others' decisions (or, better, moves) so as to maximize their own expected utility.

The fundamental characteristics of a game model are:

- $n$  players
- $m$  strategies
- $m * n$  payoffs (usually defined with  $\pi$ ) depending on strategic interactions among all players which display gains associated to each strategy.

Thus, a milestone in the formalization of a “theory of games” is the “strategic interdependence”, that is the situation wherein the expected utility of a player does not depend solely on his rational choice, but also on other players' decisions.

As a consequence, it is relatively self-evident that rival tenderers competing for the award of public design and work contracts (as in the case of BUL tenders) are going to submit their bids so as to maximize their expected utility or, better, payoff, i.e. gain the contract at the desired optimum price (if bids are evaluated with the lowest-price criterion) or, in the case of EMAT, at the desirable combination of price and quality. Note that the most desirable price or price/quality is the variable allowing

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<sup>46</sup> Von Neumann J., Morgenstern O. (1944), Theory of games and economic behavior, Princeton University Press, Princeton.

players to reach the highest possible level of utility (corresponding to profit,  $\pi$ ) or, better, the highest possible payoff.

Over the years, there have been severe authoritative contributions on the game theory applicability to competitive tendering among which the work of Schmidt (2005) has been selected since it provides the most straightforward model.

For the sake of simplicity and consistently with our specific research objective riveted to a brief outlook of theoretical games in competitive call for tendering, complex dynamic mathematical models with incomplete information or, again, Stackelberg's sequential games are neglected and may be object of further analyses. Building on the framework of Schmidt (2005) with the notation of Lundberg & Bergman (2013) (as in section 2.4.4.), assume that:

- a. Tenderer's bids are evaluated on the mere price, that is the situation where tenders are awarded to the lowest-price bid, or, alternatively, wherein bids are appraised with EMAT and when all bidders deliver the exact quality value  $[V(Q)]$ . Nonetheless, both cases deliver consistent results.
- b. There are only two ( $n = 1, 2$ ) players (i.e. tenderers or bidders) which must decide their price bid between two general strategies ( $m = L, H$ ): low price and high price. In the former case, the  $n$ -th bidder (if selected) achieves a profit,  $\pi_{n,L} = 1$ ; whereas, in the latter, bidder gains a higher profit  $\pi_{n,H} > 1$ .
- c. The influence of diverging cost structures is neglected.

d.  $p$  is the probability of obtaining the contract for the 1-st bidder, and  $(1 - p)$  is the probability of 2-nd player; by definition, probabilities are equal to 0,5 for both players if they submit the same price bid.  $p$  ranges from 0 to 1 ( $0 < p < 1$ ) in accordance to the price bid of the other player.

To what it may directly concern point d., assume that:

- If firm 1 submits a price,  $P_{1,L}$  and firm 2,  $P_{2,H}$ , the probability of getting the contract is null, that is  $p = 0$ .
- If firm 1's price is  $P_{1,H}$  and firm 2 bids  $P_{2,L}$ , the probability is one, i.e.  $p = 1$ .

The bidding suppliers must decide their price so as to maximize their expected profit function. The expected profit of firm 1 is displayed in the following equation:

$$E(\pi_1) = p [P_m - C(Q)] + (1-p) [0 - C(Q)] \quad [1]$$

Where  $E(\pi)_1$  is the expected profit of firm 1,  $P_m$  is the tendered price,  $C(Q)$  expresses the cost associated with delivering the quality  $Q$  and  $p|P_{2,m}$  is the probability of getting the contract conditioned to the tendered price of firm 2 ( $P_{2,m}$ )

The upcoming payoff matrix (table 5) lists all the possible payoff combinations according to the price-strategy being selected by both bidders.

Table 5 - General payoff matrix for two bidders

		firm 2	
		low price	high price
firm 1	low price	$p ; (1 - p)$	$1 ; 0$
	high price	$0 ; 1$	$p \pi ; (1 - p) \pi$

Source: our elaboration based on Schmidt (2005)

The dominance equilibrium of the game differs on the value of the profit gained by the  $i$ -th firm with the highest price bid, that is the size of the coefficient  $\pi$ .

In the case of two firms choosing the same price strategy (L-L or H-H), as in point d., the probability becomes  $p = 0,5$ .

Consider that the profit of offering a high price and being selected is within the range  $1-2^{47}$ ; hence,  $1 < \pi_{n,H} < 2$  (recalling that  $\pi_{n,H} > \pi_{n,L} = 1$ ).

Under these assumptions, it is possible to construct a game model based on the prisoner's dilemma<sup>48</sup>. The latter theoretic model is non-zero-sum game (i.e. yielding variable payoffs' summation), non-cooperative (i.e. players cannot collaborate), one-shot (i.e. played only one), simultaneous and with complete information (i.e. both players have the same information). Moreover, in a prisoner's dilemma the following equality holds:  $n = m = 2$ .

The case for  $\pi = 1,5$  is exhibited in the following table.

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<sup>47</sup> An upper limit of  $\pi$  may be abstracted seeing as how the maximum price bid is equal to amount made up of auction.

<sup>48</sup> The game has been played first in January 1950 in an experiment designed by Merrill Flood and Melvin Dresher. However, the mathematician who, firstly, gave the name "Prisoner's Dilemma" was Albert W. Tucker in late 1950.

Table 6 - Payoff matrix - prisoner's dilemma

		firm 2	
		low price	high price
firm 1	low price	0,5 ; 0,5	1 ; 0
	high price	0 ; 1	0,75 ; 0,75

Source: our elaboration based on Schmidt (2005)

For both firms, the dominant strategy is offering a low price since, accounting for the other player's decision, it yields a higher payoff (i.e. expected profit); therefore, a Nash equilibrium does exist and is "low-low". The latter equilibrium does not fulfill the conditions of the Pareto-Optimality seeing as how both players may be better off by choosing the "high-high" strategy.

The latter combination of strategy may be unrealistic in practice, on the grounds that cooperative agreements (the so-called bid-rigging) of offering both high prices are often prohibited by the current norms.

### 2.1.3. Process-based theory on strategy formation

At this stage of the analysis, it may be considered relatively self-explanatory that players involved in a tendering procedure at various levels, i.e. procurers and bidders, are driven by diverging targeted objectives or, based on Klijn and Teisman (2003)<sup>49</sup>, conflicting interests.

<sup>49</sup> Klijn E-H., Teisman G. R., (2003), Institutional and strategic barriers to public-private partnership: an analysis of Dutch cases, *Public Money and Management*, 23 (3), 137–146.

The path towards the goal accomplishment is usually sharpened by the definition of a strategy. The latter identifies “the medium- and long-term direction of an organization” (Johnson et al., 2011<sup>50</sup>) and labels “a pattern in a stream of decisions [...] consisting of both planned and emergent elements” (Mintzberg, 1978<sup>51</sup>).

As fiercely affirmed by Neugebauer et al. (2015)<sup>52</sup>, an adequately detailed definition of strategy must be drawn by the match of both meanings.

The theoretical framework briefly outlined, despite being built on standard business transactions (that is business-to-business or business-to-consumer with no involvement of the public sector), may be prolifically applied to the situation of a government procurement auction.

Consistent with this consideration, Mattison and Thomasson (2007)<sup>53</sup> exploit the hereby cited relevant literature and analyze the strategy formation in a competitive tendering process, building on the theoretical configuration of Mintzberg (1978, 1987<sup>54</sup>) as in the formulation of Mintzberg & Waters (1985)<sup>55</sup>, so as to examine “how the tendered contract will turn into results”.

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<sup>50</sup> Johnson G, Whittington R, Scholes K. (2011). *Exploring Strategy*. Ninth edition. Prentice Hall: Essex.

<sup>51</sup> Mintzberg H. (1978), *Patterns in Strategy Formation*, *Management Science* 24, pp. 934-948.

<sup>52</sup> Neugebauer F., Figge F., Hahn T. (2015), *Planned or Emergent Strategy Making? Exploring the formation of Corporate Sustainability Strategies*, *Business Strategy and the Environment* vol. 25(5).

<sup>53</sup> Mattison O., Thomasson A. (2007), *The Strategic Process and its Impact on the Outcome of a Tender*, *Annals of Public and Cooperative Economics* 78(3), pp. 439-454.

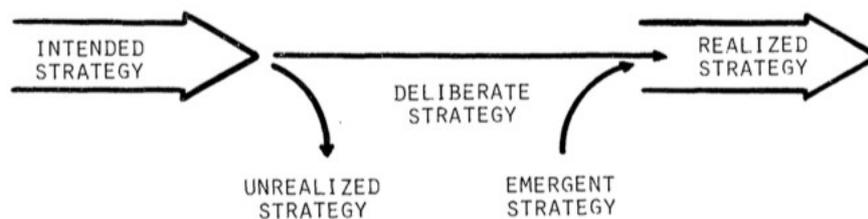
<sup>54</sup> Mintzberg H. (1987), *Crafting strategy*, *Harvard Business Review* (July-August), pp. 66-75.

<sup>55</sup> Mintzberg H., Waters J. A. (1985), *Of strategies, deliberate and emergent*, *Strategic Management Journal* 6, pp. 257-272.

Mintzberg has on several occasions argued that, in the case of strategic interactions (i.e. situations where the behavior of one party is influenced by the other's one and vice versa), there is a significant perceived difference between an intended strategy and the realized strategy.

While comparing the intended with the realized strategy, the Canadian academic identifies two well-distinguished strategic patterns: the deliberate pattern – realized as intended – and the emergent pattern – i.e. the “consistencies realized despite, or in the absence of, intentions” (Mintzberg & Waters, 1985).

Figure 3 - Intended, deliberate and realized strategies



Source: Mintzberg & Waters (1985)

As in figure 3, the intended strategy is the primal input in the process of strategy formation which may or may not be implemented. In the former case, the planned input is totally, or, almost, heavily realized; whilst, on the contrary, in the latter situation, the intended plan is abandoned (or partially thrown away) so as to be updated with emerging patterns<sup>56</sup>. The final output is the identification of the so-called realized strategy.

<sup>56</sup> Perfectly deliberate and perfectly emergent strategies are to be considered only as theoretical possibilities. In fact, the same Mintzberg & Waters (1985) expect to find only tendencies in both directions rather than perfect forms of either. However, they are important so as to identify the “two poles of the continuum along which [...] real-world strategy would likely fall”.

Apart from chiefly describing its model for strategy formation, Mintzberg widely analyzes the situation where the realized strategy is not marching the intended one, that is when an emergent pattern arises and, thus, affects the strategy realization.

In his vision, there are mainly two factors linked to the emergence of the abovementioned situation: (i) the lack of control (of most factors) and (ii) the strategic learning. Moreover, for the sake of discussion, it can be concluded that:

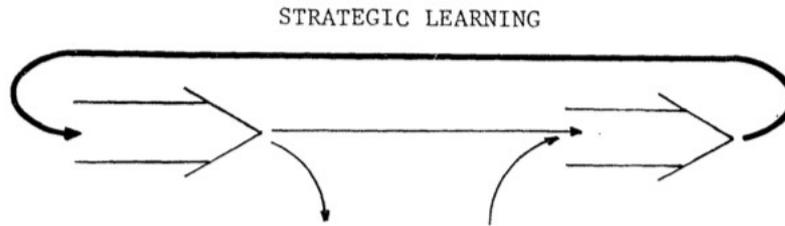
- a) First and foremost, players develop their own planned (or intended) strategy;
- b) Second, net of the unrealized strategy, the intended strategy is put into practice taking the form of the so-called deliberate strategy:
- c) Third, according to the occurrence of emergent patterns, players' attention is riveted on adapting the deliberate strategy to the emerging consistencies so as to define the realized strategy.
- d) Fourth, each player has incomplete control of the whole transaction, or relationship; thus, it may adapt its intended plan so as to react to counterparty's actions.
- e) Fifth, as exhibited in figure 4, players learn over the time and adjust their "direction" consistently with what it is learnt.

Pursuing to points d) and e), strategy formation may be seen as "a process of logical, incremental decision making" (Quinn, 1980<sup>57</sup>).

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<sup>57</sup> Quinn J.B. (1980), *Strategies for change: Logical Incrementalism*, Homewood IL, Irwin R. D.

Figure 4 - Strategic learning in the process of strategy formation



Source: Mintzberg & Waters (1985)

In their empirical study, Mattison & Thomasson (2007) investigate this process in the case of two public Swedish tendering procedures so as to test the theoretical framework so far presented.

The outcome of a public competitive call for tender appears to be deeply affected by the concepts of “logical incrementalism” (Quinn, 1980) and “strategic learning” (Mintzberg, 1978, 1987; Mintzberg & Water, 1985).

It has been demonstrated that if the contracting authority does not pro-actively demonstrate its ability to learn along the process and react to emerging findings, the tendering procedure may become “an instrument without strategic relevance, i.e., an empty phenomenon without the possibility to deliver the desired outcomes” (Mattison & Thomasson, 2007).

## 2.2 THE BEHAVIOUR OF THE PROCURING AUTHORITY

As abundantly discussed, the activity of the procuring activity covers an ample specter of different activities which may be summarized in the figure below.

Figure 5 - Procurement process



Source: Baldi et al. (2016)

Based on the model of Baldi et al. (2016)<sup>58</sup>, a new process flow chart has been elaborated with the purpose of highlighting the momentous decisions taken by the contracting authority: from the choice of contracting-out and the formalization of the tender notice, to the tenders' evaluation and the contract monitoring.

Figure 6 - Behavior of procuring authorities



Source: our elaboration

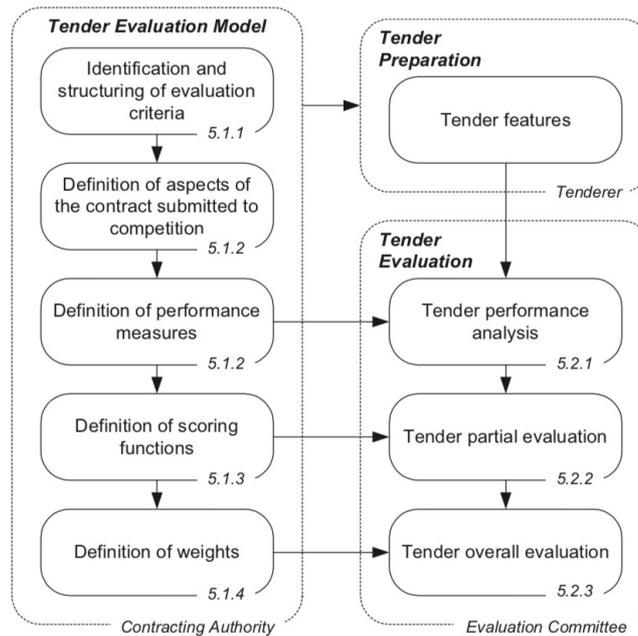
The forthcoming discussion is employing this step-by-step process which appears to be the most easy-to-read; however, other stylized graphical representations of CA activities provide a different perspectival approach. The latter emphasizes a more complex stream of actions and decisions which, in turn, define circular and reciprocal interdependencies.

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<sup>58</sup> Baldi S., Bottasso A., Conti M., Piccardo C. (2016), To bid or not to bid: That is the question: Public procurement, project complexity and corruption, *European Journal of Political Economy* 43, pp. 89-106.

To this purpose, so as to provide a compelling literature overview of what CAs are required to do, it is worth to give an account of the model of Mateus et al. (2010)<sup>59</sup>.

Figure 7 - Building blocks of tendering management



Source: Mateus et al. (2010)

Despite figure 7 depicts a “tender evaluation model”, it can be fairly assumed that if the evaluation committee is internal to the CA organization, i.e., the tender evaluation is performed within the procuring public entity, hence, the evaluation model hereby presented as an input for the proper tender evaluation may fully portrays the activity of public procurement. In a nutshell, the process chart above is showing that: (i) the main building blocks (i.e. tender evaluation model, tender

<sup>59</sup> Mateus R., Ferreira J.A., Carreira J. (2010), Full disclosure of tender evaluation models: Background and application in Portuguese public procurement, *Journal of Purchasing & Supply Management* 16, pp. 206-215.

preparation and tender evaluation) are still connected under the step-by-step rationale; however, (ii) sub-component tasks may describe a different relationship (e.g. the phase 5.1.2. named “Definition of performance measures” is directly linked to the “tender performance analysis” of section 5.2.1 in spite of the intermediate stage of the tender preparation).

#### 2.2.1. The choice of contracting-out

One of the most trivial questions in business regards the so-called “make-or-buy” decisions. Although the latter appear to be peculiar to private organizations, they have become decisive also for the public sector. Yet it is evident that this expression is more likely to be used in a private context.

In fact, the locution “make-or-buy” sounds far more appropriate for expounding the decision of a manufacturing firm whether to produce in-house or to out-source.

Anyhow, there is almost widespread consensus that this expression is too simplified to be fruitfully employed when referring to PAs. Therefore, the use of other terms like “out-sourcing” or “contracting-out” or, in more detail, “competitive tendering and contracting” (CTC, Domberger & Rimmer, 1994<sup>60</sup>) is to be strongly advocated.

Kelman (2002) defines the activity of out-contracting in the public sector as “the business arrangement between a government agency and a private entity in which

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<sup>60</sup> Domberger S. & Rimmer S., Competitive Tendering and Contracting in the Public Sector: A Guide, International Journal of the Economics of business, vol. 1, no. 3, 1994.

the latter promises, in exchange for money, to deliver certain products or services to the government agency or to others on the government's behalf"<sup>61</sup>.

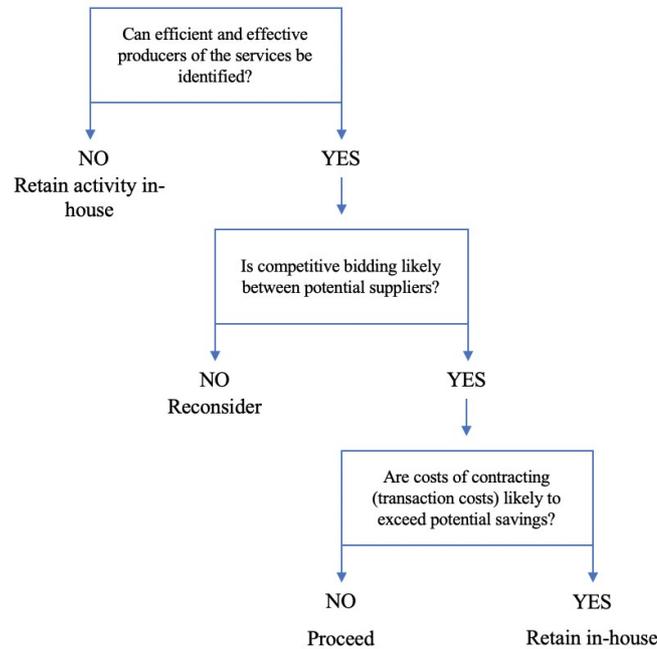
Leaving the taxonomy out of the discussion, it is crystal clear that, to a limited extent, the behavior of a public entity is commensurable to private companies' one. To this purpose, for the sake of simplicity, it has been assumed that the rationale rule of public organizations is dominated by pure economic considerations. Even though this assumption seems to be far from realistic<sup>62</sup>, it allows to build a simplified theoretical decision-making framework.

Domberger & Rimmer (1994) widely portray the public sector activity of contracting-out and formalize an immediate steering decision tree (figure 8) in order to assess whether the decision to out-contract makes economic sense or, differently put, whether the ensuing service delivery would be efficient and effective. First and foremost, the process begins with the identification of potential suppliers. This preliminary activity is conducted so as to make an appraisal of the out-sourcing feasibility.

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<sup>61</sup> Kelman S.J., Contracting, in: *The tools of government: a guide to the new governance*, Oxford University Press, New York, 2002, pp. 282-318.

<sup>62</sup> The decision rule of the public sector may consider the mere economic convenience, as well as achievement of social objectives, accountability, equity treatment and supply security (Domberger & Rimmer, 1994).



Contracting organizations must question themselves if efficient and effective service deliverers do exist, that is if the outside market provides contractors that are more likely to have the needed experience and expertise to effectively supply products and services aligned with the specified requirements.

The second element in the contracting-out decision pertains to the appraise of bidding market conditions. If private firms are accustomed to directly negotiate the service delivery without a bidding process; public organizations, which are often obliged to adopt formal tendering, are concerned about the expectancy of uncompetitive bidders' behaviors. The more competitive the bidding, the rarer the collusion, the more desirable the tender's outcomes.

The third tier of the process entails the evaluation of the actual costs of contracting, i.e. the transaction costs. The latter cover not only the expenditures of evaluating bids and managing standard tender procedures, but also “the costs of contract design and negotiation as well as the monitoring and enforcement costs” (Domberger & Rimmer, 1994). To this extent, a straightforward managerial issue is related to assess whether the contracting costs are more likely to be compensated by savings generated throughout the whole CTC process.

So far, for the sake of discussion, there is plenty of empirical studies showing that contracting costs offset or, even, exceed potential savings (Walsh, 1992<sup>63</sup>; Prager, 1994<sup>64</sup>). This literature chiefly argues that monitoring and enforcement in contracting out are increasingly greater than in the in-house production seeing as how contractors may adopt opportunistic behavior. Yet it is rather self-evident that if contracting costs are lower than CTC saving, contracting-out is recommended. This relatively old theoretical framework, despite being built on standard product- and service-based public procurement auctions, gives the go-ahead to the consideration that there are extensive decisions taken prior to the tender design.

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<sup>63</sup> Walsh K. (1992), Quality and public services, *Public Administration.*, 503-14.

<sup>64</sup> Prager J. (1994), Contracting out Government Services: Lessons from the private sector, *Public Administration Review* 54(20), 176-84.

Nonetheless, the hereby discussed three-tier model gives the appearance of being outdated since it merely encompasses economic evaluations which are yet crucial but no more decisive without consideration of other dimensions.

The latter may be roughly summarized as in the postulated scheme of Amirkhanyan et al. (2007)<sup>65</sup> exhibited in figure 9. The model identifies four main momentous evaluation areas which equally affect the out-contracting decision-making process.

Figure 9 - The decision to contract out

Economic context	Political context	Organizational context	Institutional context
<ul style="list-style-type: none"> <li>•Monetary considerations</li> </ul>	<ul style="list-style-type: none"> <li>•Political Pressure</li> <li>•Anti-governemnt ideology</li> </ul>	<ul style="list-style-type: none"> <li>•Capacity to deliver in-house service</li> <li>•Capacity to manage contract</li> <li>•Characteristics of the supply</li> </ul>	<ul style="list-style-type: none"> <li>•Rules and regulation</li> </ul>

Source: Amirkhanyan et al. (2007)

Notwithstanding, the provision of four across the board factor may appear to be dubious, since there is abundancy of empirical authoritative investigations advocating that public organizations' behaviors are driven especially by economic consideration (above all, Hirsh, 2000<sup>66</sup>). Neither the use of this model is unquestionable, but it is still insightful and leaves copious points for reflections.

<sup>65</sup> Amirkhanyan A., Kim J., Lambright K (2007), Putting the Pieces Together: A Comprehensive Framework for Understanding the Decision to Contract Out and Contractor Performance, *International Journal of Public Administration*, 30:6-7, 699-72.

<sup>66</sup> Hirsch, W. Z.; Osborne, E, (2000), Privatization of Government Services: Pressure-Group Resistance and Service Transparency, *Journal of Labor Research*, 21, pp. 315–326.

To conclude, the extensive application of the aforementioned processes may support the decision-making process of a government body as a practical toolkit. Anyhow, in most cases, out-sourcing is legally required, and the application of these criteria may be beneficial only to the extent of limited specific areas for which there is no legal binding constraint. The shift from overall compulsory competitive tendering (CCT, as amply addressed by Taylor, 2005<sup>67</sup>) to discretionary sub-phase out-sourcing is thus far made possible, if the previously highlighted conditions still hold.

#### 2.2.2. Tender design

According to the in-force normative framework (EU 2004 Procurement Directives<sup>68</sup> as amended by Directives 2014/24/EC and 2014/25/EC), contracting authorities have a significant discretionary power in designing the competitive calls for tender. The EU Directives mandate that a public work contract may be awarded to the winning bidder on the basis of the price only (i.e. the lowest price) or, alternatively, on the quality-price (or price-quality) ratio, as expressed by the economically most advantageous tender (herein forward, EMAT). In the latter case, a detailed scoring rule is to be provided in order to be compliant with the principles of transparency

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<sup>67</sup>Taylor P. (2005), Do public sector contract catering tender procedures result in an auction for “lemons”?, *International Journal of Public Sector Management*, Vol. 18 Issue: 6, pp.484-497

<sup>68</sup> Art. 55 Directive 2004/17/EC and art. 53 Directive 2004/18/EC.

and equal treatment (in the meaning of non-discriminatory and fair). For the sake of simplicity, assuming that national regulations are strictly aligned with the current EU binding framework<sup>69</sup>, it is rather evident that procurers are called up to make a choice between alternative tendering designs<sup>70</sup> or, better, supplier selection methodologies.

In essence, the procuring authorities are asked to determine whether the desirable outcome (in terms of public common interest and defined by utility functions and indifference curves) is more likely to be reached when the bidders are ranked as against one or more dimensions. In other words, they have to esteem *ex ante* whether the mere price is sufficient to guarantee the achievement of the procurement scope or, by contrast, if the tender design should audit simultaneously both price and quality.

If the tender is awarded to lowest-price bid, the offers may be asked to meet minimum quality requirements. On the contrary, if the choice of the procurer falls into the EMAT (i.e. a composite index which takes into account price and quality at the same time), the call for tender is bestowed to the bid that either provides the

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<sup>69</sup> According to Arrowsmith (2006), EU MS discretion on procurement rules has significantly diminished over the last decade.

<sup>70</sup> In the majority of the cases, the contracting authorities can freely determine whether the lowest-price criterion is to be preferred to the EMAT and vice versa. This is almost universally true, except from specific stylized circumstances being accounted by the lawmakers. For instance, the Italian regulation for public contracts stipulates that the use of EMAT is compulsory in mandated situations.

best possible quality for a given price (this is the case of the so-called beauty contests), or achieves the highest composite quality and price score.

In employing the former method, the exceeding quality to the minimum required threshold is subtracted from the economical offer (i.e. price score, PS) or, conversely, the quality gap to the desired quality level is summed to the price bid.

Bergman & Lundberg (2013) describe this method either as “quality-adjusted lower price tender” or “quality-to-price scoring”.

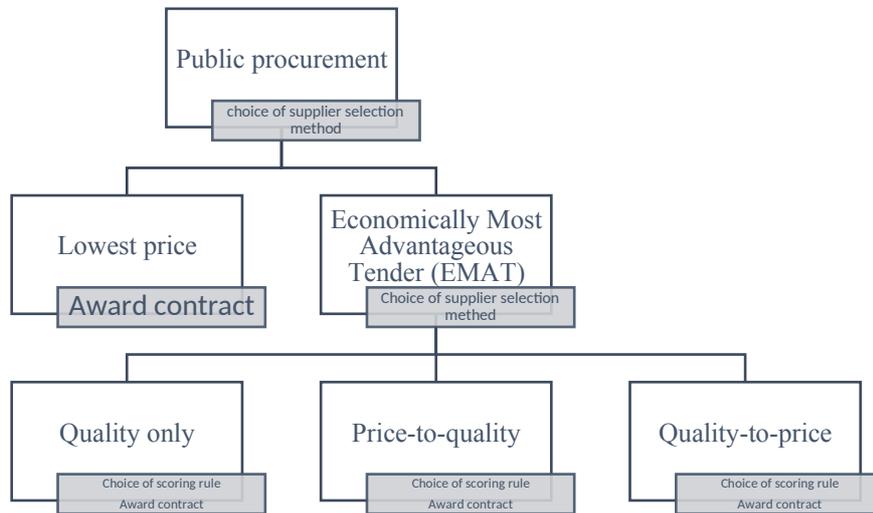
The latter leans on the consideration that, in the most simplified vision, the quality is perfectly observable and verifiable<sup>71</sup> and, thus, it can be translated in monetary terms (adjusting the price bid to difference in offered quality).

If the tender is conferred to the bid that offers the highest composite overall score (both in quality and in price), the economical part of the offer should be converted in a score that is added to the quality score, “making the tender a price-adjusted highest-quality tender” or “price-to-quality scoring” (Bergman & Lundberg, 2013).

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<sup>71</sup> The assumption of perfect observability and verifiability of the value of the quality is extremely simplified, indeed it allows to better comprehend how the quality-to-price scoring rule works. Empirical evidences demonstrate that, in most cases, quality is uncertain, and difficult observed by the procuring authority.

Figure 10 - Supplier selection method and scoring rules



Source: Bergman & Lundberg, 2013

Electing the most suitable supplier selection method (also known as award methodology or procurement design problem) is entailing numerous concerns in terms on procedures' complexness. The easiest way to rank bids, i.e. the lowest-price tender, may in practice become very demanding to determine effective and adequate (from the procurer perspective) minimum quality specifications.

As in the figure above, the EMAT requires not only the additional laborious activity of combining quality and price into a single overall score using either quality-only, price-to-quality or quality-to-price, but also a multidimensional evaluation of price and quality scores, respectively.

Relevant economic literature (Dini et al., 2006; Chen, 2008; Mateus et al., 2010; Telgen & Schotanus, 2010; Bergman & Lundberg, 2013) concluded that the mere definition of complex procedures for selecting bids (and awarding contracts) albeit

appropriately conceived is not enough for curbing out the occurrence of undesirable economic properties. This is because the contracting authority has to deal with transaction costs (that, in the case of EMAT, are not negligible; Bergman & Lundberg, 2013) and with the quality appraisal when the latter is imperfectly observable and verifiable.

However, it is responsibility of the procurer to draw up award criteria consistently with the identified procurement requirements.

Coherently with the latest law shifts (as widely debated in chapter 1) the legal EU framework governing public procurement auctions (recalling that, now, CA are asked to determine ex ante the supplier selection method between lowest-price and Economically Most Advantageous Tender), displays a growing tendency to employ EMAT as against lowest-price-based tenders as it is perceived as selection procedure allowing wide discretionary power to procuring authorities to award tenders. In fact, consistent with Verdeaux (2003), EMAT has been the most common principle in most EU member countries, especially in design and build tenders. Moreover, for the sake of discussion, it may be worth to mention a more recent empirical analysis on the contractor selection criteria conducted by a Polish engineering scholar, Bochenek (2014)<sup>72</sup>.

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<sup>72</sup> Bochenek J. (2014), The contractor selection criteria in open and restricted procedures in public sector in selected EU countries, Creative Construction Conference 2014, Procedia Engineering 85, pp. 64-79.

Figure 11 - Contractor selection criteria in selected EU countries (2010-2013)

Country	Criteria	Open procedure					Average	Restricted procedure					Average
		Year	2010	2011	2012	2013		2010	2011	2012	2013		
France	MEAT		91.70%	91.00%	90.50%	91.00%	<b>91.1%</b>	85.20%	82.30%	83.80%	87.30%	<b>84.7%</b>	
	Lowest price		2.90%	3.10%	2.90%	2.80%	<b>2.9%</b>	6.50%	4.10%	3.80%	2.80%	<b>4.3%</b>	
	Not specified		5.40%	5.80%	6.70%	6.30%	<b>6.1%</b>	8.30%	13.60%	12.40%	9.80%	<b>11.0%</b>	
UK	MEAT		88.80%	87.50%	84.10%	88.70%	<b>87.3%</b>	90.40%	91.10%	91.90%	93.10%	<b>91.6%</b>	
	Lowest price		8.50%	8.50%	12.20%	9.90%	<b>9.8%</b>	8.10%	6.80%	4.90%	6.90%	<b>6.7%</b>	
	Not specified		2.70%	4.00%	3.70%	1.40%	<b>3.0%</b>	1.50%	2.10%	3.30%	0.00%	<b>1.7%</b>	
Ireland	MEAT		98.20%	89.30%	74.30%	60.50%	<b>80.6%</b>	88.30%	91.90%	97.40%	84.20%	<b>90.5%</b>	
	Lowest price		1.80%	10.70%	25.70%	38.20%	<b>19.1%</b>	11.70%	8.10%	2.60%	15.80%	<b>9.6%</b>	
	Not specified		0.00%	0.00%	0.00%	1.30%	<b>0.3%</b>	0.00%	0.00%	0.00%	0.00%	<b>0.0%</b>	
Spain	MEAT		86.60%	81.90%	81.90%	78.60%	<b>82.3%</b>	72.30%	78.60%	91.70%	84.60%	<b>81.8%</b>	
	Lowest price		4.70%	6.60%	5.70%	7.90%	<b>6.2%</b>	21.30%	7.10%	0.00%	7.70%	<b>9.0%</b>	
	Not specified		8.80%	11.50%	12.40%	13.50%	<b>11.6%</b>	6.40%	14.30%	8.30%	7.70%	<b>9.2%</b>	
Italy	MEAT		59.90%	64.00%	64.80%	61.30%	<b>62.5%</b>	70.40%	76.10%	69.40%	59.80%	<b>68.9%</b>	
	Lowest price		35.50%	32.80%	27.80%	32.50%	<b>32.2%</b>	28.00%	22.60%	27.20%	37.50%	<b>28.8%</b>	
	Not specified		4.60%	3.20%	7.30%	6.20%	<b>5.3%</b>	1.60%	1.30%	3.40%	2.70%	<b>2.3%</b>	
Portugal	MEAT		73.50%	70.10%	56.60%	59.60%	<b>65.0%</b>	35.10%	51.50%	39.00%	78.60%	<b>51.1%</b>	
	Lowest price		6.90%	5.60%	12.50%	11.50%	<b>9.1%</b>	61.60%	33.80%	58.50%	7.10%	<b>40.3%</b>	
	Not specified		19.60%	24.30%	31.00%	28.80%	<b>25.9%</b>	3.30%	14.70%	2.40%	14.30%	<b>8.7%</b>	
Czech Rep.	MEAT		66.90%	56.00%	42.10%	23.60%	<b>47.2%</b>	60.60%	36.30%	55.40%	47.40%	<b>49.9%</b>	
	Lowest price		33.10%	43.90%	57.80%	75.80%	<b>52.7%</b>	38.50%	57.50%	41.00%	51.70%	<b>47.2%</b>	
	Not specified		0.00%	0.20%	0.10%	0.60%	<b>0.2%</b>	0.90%	6.10%	3.60%	0.70%	<b>2.8%</b>	
Poland	MEAT		7.80%	8.90%	11.00%	12.90%	<b>10.2%</b>	9.10%	7.10%	16.80%	34.30%	<b>16.8%</b>	
	Lowest price		91.90%	90.80%	88.30%	86.80%	<b>89.5%</b>	89.90%	83.00%	83.20%	64.40%	<b>80.2%</b>	
	Not specified		0.30%	0.30%	0.70%	0.20%	<b>0.4%</b>	0.90%	9.90%	0.00%	1.20%	<b>3.0%</b>	
Germany	MEAT		45.40%	43.00%	38.80%	35.50%	<b>40.7%</b>	52.20%	48.80%	45.40%	47.80%	<b>48.6%</b>	
	Lowest price		52.00%	54.40%	58.80%	61.90%	<b>56.8%</b>	36.70%	26.10%	33.20%	46.90%	<b>35.7%</b>	
	Not specified		2.60%	2.60%	2.40%	2.60%	<b>2.6%</b>	11.10%	25.10%	21.40%	5.40%	<b>15.8%</b>	
Austria	MEAT		47.00%	27.70%	25.10%	31.00%	<b>32.7%</b>	16.70%	53.80%	71.40%	57.90%	<b>50.0%</b>	
	Lowest price		43.80%	64.00%	68.00%	61.20%	<b>59.3%</b>	50.00%	15.40%	28.60%	42.10%	<b>34.0%</b>	
	Not specified		9.20%	8.30%	6.90%	7.80%	<b>8.1%</b>	33.30%	30.80%	0.00%	0.00%	<b>16.0%</b>	
Belgium	MEAT		18.40%	24.50%	22.20%	19.50%	<b>21.2%</b>	57.10%	65.20%	56.80%	62.20%	<b>60.3%</b>	
	Lowest price		76.60%	74.20%	75.80%	79.80%	<b>76.6%</b>	39.30%	23.90%	34.10%	33.30%	<b>32.7%</b>	
	Not specified		5.00%	1.30%	2.00%	0.70%	<b>2.3%</b>	3.60%	10.90%	9.10%	4.40%	<b>7.0%</b>	
Netherlands	MEAT		26.70%	28.10%	30.40%	55.30%	<b>35.1%</b>	66.30%	72.30%	80.20%	89.00%	<b>77.0%</b>	
	Lowest price		73.30%	71.90%	69.50%	43.70%	<b>64.6%</b>	31.90%	27.70%	19.60%	10.30%	<b>22.4%</b>	
	Not specified		0.00%	0.00%	0.10%	1.00%	<b>0.3%</b>	1.80%	0.00%	0.20%	0.70%	<b>0.7%</b>	
Sweden	MEAT		36.00%	35.30%	25.30%	18.60%	<b>28.8%</b>	56.90%	69.80%	51.50%	21.90%	<b>50.0%</b>	
	Lowest price		41.70%	37.80%	40.40%	41.40%	<b>40.3%</b>	11.80%	1.90%	0.00%	3.10%	<b>4.2%</b>	
	Not specified		22.30%	26.90%	34.30%	40.00%	<b>30.9%</b>	31.40%	28.30%	48.50%	75.00%	<b>45.8%</b>	

Source: Bochenek (2014)

His investigation (depicted in figure 11) explores, in thirteen selected EU countries, the choice of supplier selection criteria for the award of work contracts based on the completion or part construction and civil engineering work. The analysis takes into consideration both types of standard procedures (as mandated by EU

Procurement Directives): open and restricted procedure. The arising findings seem to be consistent with the germane results of Verdeaux (2003) and theoretical discoveries of Lundberg & Bergman (2011, 2013, 2017). In Italy and some other developed EU countries (for instance: France, UK, Ireland and Spain) there is a blatant tendency (more than two thirds of the contracts have been awarded on the basis of the EMAT) to prefer EMAT as against the lowest price.

In the case of Italian ultra- and ultra-fast broadband development tenders, Infratel Italia S.p.A., the procurement authority of the MISE (Dicastery of Economic Development), employed the EMAT (or MEAT, as widely used in the previous sections) counting on the fact that the composite index of technical quality score (TQS) offset the price score. This choice seems to be in line with major government procurement (GP) studies.

An additional scrutiny of tendering design when quality is uncertain (i.e. not perfectly observable and verifiable) as well as a more-in-depth outline of the tender evaluation methodologies will follow in the subsequent paragraphs.

### 2.2.3. Tender design when quality is uncertain

When EMAT is selected, the problem of quality is of paramount importance. It is proven out that the assumption of a perfectly observable and verifiable quality is too extreme to make a good approximation of how real things work. Thus, contracting authorities have to deal with non-perfectly verifiable uncertain quality.

In general, private procurement auctions may solve this challenging problem weighting the bidders' reputation, exploiting their extreme freedom in defining the tender design. The undermining assumption is that a bidder which is renowned for being serious, scrupulous and effective guarantees the achievement of a higher level of quality with respect to relatively unknown competitors. On the contrary, public procurement auctions which must be inspired to the principles of non-discriminatory equal treatment and transparency (Tadelis, 2012) cannot rely on a subjective appraisal of the value of bidders "brand image", as marketers would probably say.

It may be argued that public contracting authorities can resort to other instruments at their own prompt disposal in order to overcome the problem of quality uncertainty. To this extent, detailed procurement rules may turn out to be an important tool to secure quality. Intuitively, the stricter and more detailed the rules, the more predictable the overall quality (Lundberg & Bergman, 2017).

In addition, if the scoring rules are extremely detailed, this might also prevent the emergence of corruption and favoritism. Conversely, in the case when rules are vaguer, the tough rivalry among competitive bidders may ensue non-economic undesirable results (for instance, think about corruption, sabotage and boycotting).

So far, quality has been assumed to be non-perfectly observable and difficultly evaluated *ex ante*. Now, take into account the case when quality is scarcely verifiable, i.e. when the procuring authority cannot systematically appraise quality

neither ex ante nor ex post. The arising situation is totally distorted from the setting presented few lines above. Before, stricter rules were preventing less qualitative works, indeed, at this stage, they can even alter the whole supplier selection process. This is because bidders are in a position to overrate their total quality propositions pledging that a higher quality level will be provided when the yard works will be completed. In literature, this situation is usually referred as the “risk of quality degradation” or the exploitation of asymmetric information.

When agents, especially public agents, value different alternatives as against one uncertain criterion, they have to deal with the so-called moral hazard.

Leveraging the fact that the controller has very little room to appraise quality ex post, bidders may submit an augmented (unreal) offer in terms of quality in order to get the contract and, once the contract is bestowed, provide a less qualitative upshot. In doing so, tenderers accept the risk of being caught, which decreases when quality uncertainty increases, in order to make money off of the lowered quality.

In other words, when the quality is expected to be non-perfectly demonstrable, suppliers are encouraged to shirk on ex post quality.

To this purpose, as a preliminary tool, it is mandatory for the public procurers to identify ex ante some criteria against which evaluate the ex post quality that are more likely to be effectively observed by themselves or by a designed controlling agency (or, better, government agency). Once these criteria have been successfully identified, the contracting authority may include in the contract notice directly

actionable cash-back clauses or penalty mechanisms. According to main insights of the normative theory, the procuring authority may also behave in the opposite way. If it retains a certain degree of freedom in the appraisal of ex post quality (observable but imperfectly verifiable) in order to be in a position to reward particularly qualitative performances. At this time, it can employ various incentive systems, including the possibility of extending the contract's length.

Anyhow, another important instrument to ideally safeguard the quality of the tender's outcome is to require that bidders are compliant with some pre-qualification requirements which, in turn, should assess the capacity of the same bidders to efficiently and effectively complete a public work contract (adequate financial<sup>73</sup> and technical<sup>74</sup> capacity as well as other general accountability requirements).

To summarize, if the procuring activity per se is a complex multi-step-process, securing quality adds increased complexness especially in the tendering design phase. The trade-off between quality uncertainty and rules strictness must be attentively addressed in order to harm out the occurrence of undesirable outcomes.

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<sup>73</sup> Pursuant to the Italian discipline for public contract (Legislative Decree no. 163/2006 as amended), contracting authorities are asked to define which financial requirements (as in art. 41) have to be met by tenderers.

<sup>74</sup> Procuring authorities are called up to identify which technical requirements (as in art. 42) have to be fulfilled by tenderers.

#### 2.2.4. Tender evaluation: quality-to-price or price-to-quality scoring?

For all the reasons briefly outlined in paragraph 3.4.2, the EMAT methodology is usually preferred to the lowest-price criterion. For the sake of discussion, EMAT ensures wider perceived discretion to contracting authorities in determining dimensional weighing, especially in contexts when price and quality are uncertain. As in figure 10, the EMAT overloads procuring authority with an additional decisional activity in which they must decide whether the tender will be awarded on the basis of: quality only, quality-to-price or price-to-quality.

For the purpose of this work, the analysis will be concentrated on the latter two ways of evaluating bids. The harbinger problem is that EMAT synthesizes two dimensions expressed in two different unit measures. Therefore, procurers have to transform one of the two variables into the other's unit measure in order to make the aggregate overall ranking possible. Bergman & Lundberg (2013, 2017) diffusely suggest that there are essentially two basic ways to achieve such purpose: (i) adjusting the price in accordance to quality variations (e.g. an exceeding quality level will lower the price and vice versa) or (ii) transform the price into a score. In theory, these two systems are interchangeable one to the other; however, it may be argued that quality-to-price is preferable to price-to-quality scoring.

Assume that:

1. The marginal rate of substitution between quality and value of quality is non-increasing, that is a unit increase in quality will yield diminishing values<sup>75</sup>.
2. The marginal value of money is, per construction, approximately constant<sup>76</sup>.
3. Weighing and scoring are integrated in the forthcoming model.
4. There is no cash flow discounting.

Quality-to-price scoring rule

The procurer's utility function is:

$$U(Q, C) = V(Q) + B - P \quad [2]$$

where B is the procurer's budget, V(Q) is the value of quality Q and P is the price.

As in standard microeconomic theory, the procuring authority is expected to be rational and, thus, its goal will be to find the optimal level of quality (Q\*) that maximizes the utility.

In order to make the transaction possible, a participation constraint must hold:

$$\begin{aligned} V(Q) + B - P &\leq V(Q) + B - C(Q) \\ P &\geq C(Q) \end{aligned} \quad [3]$$

Where C(Q) is the cost of quality Q.

The inequality displayed in equation [2] states that the i-th bidder has to gain non-negative profits ( $\pi = P - C(Q)$ ; if  $P \geq C(Q)$ , thus:  $\pi \geq 0$ ).

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<sup>75</sup> Ideally, a quality increase from 99 to 100 will not likely be worth as much as an increase from 0 to 1.

<sup>76</sup> For a detailed explanation of this assumption see: Bergman & Lundberg (2013) p. 78.

However, usually equation [2] is presented as it follows:

$$EP = P - V(Q) \quad [4]$$

Where EP is the evaluation price and the procurer's budget (B) is neglected.

The quality value V(Q) is subtracted from the submitted price P. The tenderer that offers that lowest EP will get the contract and will be paid according to the tendered price P.

Price-to-quality scoring rule

Assuming that the procurer's utility (as in equation [1]) is linear in money, the price score (PS) must be linear in the bid, thus:

$$PS = a - bP \quad [5]$$

The problem is to define a quality scale that is comparable to the term bP. A possible straight forward solution is to employ the same quality value function as above V(Q) multiplied by the same b used in the price score.

So, quality can be scored as bV(Q).

$$OS = QS + PS \quad [6]$$
$$OS = bV(Q) + a - bP$$

The bidder which achieves the highest OS will get the contract and will be paid the submitted price P. A consistent outcome is reached, nevertheless this method adds pointless complexity to tender evaluation.

Comparison of the scoring rules

As it can be seen, both methods provide equivalent outcome; however, the use of the quality-to-price scoring rule may be advocated for the ensuing reasons:

1. Price-to-quality scoring suffers from the problem of dependence of irrelevant alternatives or, as in par. 2.1.1., the issue of fixing reference price.
2. Quality-to-price permits to evaluate bid in familiar measurement units; whilst, on the contrary, price-to-quality scores, using unusual unit measures, may magnify the problem of managing non-linearities throughout the model.

The theoretical framework provided by Bergman & Lundberg meets our envisaging; however, based on the information at our disposal, the scoring rule of chapter 2 is based on price-to-quality evaluations. Possible critical areas have been acknowledged and may direct future research agendas.

#### 2.2.5. Effective Contract monitoring

All activities prior to the contract award have been attracting vast empirical literature, on account of that, there is paucity of research addressing the topic of the procurer's behavior in the execution phase of the procurement.

Few notable exceptions (Amirkhanyan et Al., 2007; Giuffrida & Rovigatti, 2017<sup>77</sup>) emphasize the noteworthiness of the controlling bustle.

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<sup>77</sup> Giuffrida M., Rovigatti G. (2017), Can the Private Sector Ensure the Public Interest? Evidence from Federal Procurement, [www.siepweb.it/siep/images/premio\\_siep/Giuffrida\\_Rovigatti.pdf#page42](http://www.siepweb.it/siep/images/premio_siep/Giuffrida_Rovigatti.pdf#page42).

If supervising the execution has become a best practice, the binding legal context widely requires compulsory controlling processes for public work contracts.

An efficient evaluation of the “supplier” performance as against the contract specifications may be particularly relevant in the case where parties agree on some claw-back clauses. A claw-back is a contractual provision, almost universally included in public work contracts financed by public funds, whereby money already paid to a contractor must be returned to the contracting authority if pre-specified circumstances do come up<sup>78</sup>. Hence, watching over is essential.

Giuffrida & Rovigatti (2017) describe all the monitoring activities accomplished by public procurers under the term “public oversight”<sup>79</sup> which entails “cost certification, pricing data transmission and production surveillance”.

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<sup>78</sup> Infratel Italia BUL tenders formally required that the awarded tendered shall compensate the public authority in the case of extra-profits.

<sup>79</sup> Oversight may be accomplished by both public and private. However, it has been demonstrated that the highest contract effectiveness (evaluated in terms of performance) is due to public oversight. Giuffrida & Rovigatti (2017) conclude that public oversight ameliorate “both time and cost outcomes, leading to increases in performance of +7.2% and +5.3%, respectively”. For this reason, efforts are exerted to the monitoring activity of the same procuring authority.

Public oversight may also alleviate the issues of moral hazard and strategic manipulation at the expenditure of some “red tape<sup>80</sup>” (Bozeman, 1993)<sup>81</sup>, i.e. excessive or meaningless increased bureaucracy<sup>82</sup>.

Yet, it is evident that effective contract monitoring (henceforth, ECM) is a fundamental activity ensuring not only the consistent execution of the contract but also staving off the occurrence of pathological conditions in the government-contractor relationship.

By contrast, identifying and implementing an ECM system is an increasingly difficult task, adding complexity to an already demanding process. To this point, Kettl (1993)<sup>83</sup> characterizes public ECM as in connection with the “smart buyer challenge”. The government may become a smart buyer if it knows:

1. What service it wants to “buy”;
2. Who it wants to “buy” the service from;
3. The quality of what it has “purchased”.

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<sup>80</sup> Bozeman (1993) widely addresses the topic of defining and contextualizing “red tape”. Nonetheless, he still employs the original definition of Kaufman (1977). The latter sees red tape as “the existence of an excessive number of administrative constraints, the seeming pointlessness of many constraints, and, finally, the sluggish pace at which public agencies often act”. For further information, see: Kaufman H. (1977), *Red Tape: its origins, uses and abuses*, The Brookings Institution, Washington.

<sup>81</sup> Bozeman B. (1993), *A Theory of Government “Red Tape”*, *Journal of Public Administration Research and Theory*, Volume 3, Issue 3, pp. 273–304,

<sup>82</sup> Implicitly, for the sake of simplicity, in order to be compliant with the framework of Lundberg and Bergman (2013), it has been assumed that quality is verifiable and observable. Hence, rules give scarce room for intended strategic misconducts.

<sup>83</sup> Kettl, D. F (1993), *Sharing Power: Public Governance and Private Markets*, The Brookings Institution: Washington, DC.

However, it can be argued that being a smart buyer is too vague for representing the capacity of putting ECM into practice; thus, a more rigorous and in-depth investigation is needed so as to provide simple albeit concrete analytical tools.

OECD (2013) enlists all the conditions ensuring that monitoring yields meaningful results: consistent goals overtime, good and reliable data availability, possession of adequate analytical and reporting skills and, last but not least, official support and guidance. Amirkhanyan et al. (2007), while presenting their theoretical framework “for ECM”, define, hither and thither, what makes a well-designed monitoring measure productive.

The latter has to be meeting the upcoming requirements: (i) has construct validity; (ii) is unimpeachable; (iii) has the ability to distinguish between heterogenous performance dimensions; (iv) is unbiased and (v) seizes the entirety of performance and not external issues.

Notwithstanding, as it may be already perceived, the mere effectiveness of a controlling measure is not sufficient to assess whether to overall oversight process is effective. Therefore, the American scholars develop a comprehensive and compelling checklist on the prevailing factors affecting the public oversight, which are briefly exhibited in the following figure.

Five critical dimensions have to be simultaneously taken into account so as to make a sufficiently precise appraise, i.e. government, contractor, government-contractor relationship, market conditions and political environment.

Figure 12 - Effective contract monitoring

<b>Government</b>	<b>Contractor</b>	<b>Government-contractor relationship</b>	<b>Market conditions</b>	<b>Political environment</b>
<ul style="list-style-type: none"> <li>• Past experience with contracting-out</li> <li>• Existence of well-designed monitoring tools</li> <li>• Agency Leadership</li> <li>• Resource adequacy for monitoring activities</li> </ul>	<ul style="list-style-type: none"> <li>• Resource adequacy for monitoring activities</li> <li>• Perception of monitoring requirement</li> </ul>	<ul style="list-style-type: none"> <li>• Past-relationship</li> <li>• Goal consensus</li> <li>• Contract clarity</li> <li>• Complexity of the contracting relationship</li> <li>• Geographical proximity</li> </ul>	<ul style="list-style-type: none"> <li>• Provider competition</li> <li>• General market conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Political pressure</li> </ul>

Source: Amirkhanyan et. Al (2007)

If the five-dimension assessment is passed, it means that the contracting authority, or whoever public entity in charge of the supervision, is in a position to deliver an evidence-based ECM.

## **CHAPTER 3: ULTRABROADBAND IN ITALY. STRATEGY AND PUBLIC TENDERS**

### **3.1 INTRODUCTION**

This chapter is devoted to a broad outline of the fast and ultra-fast broadband scenario in Italy. Its main research objective is granting the reader a complete and compelling portrait of the Italian Plan for white areas from its roots to its outcomes. To this specific aim, the analysis firstly proceeded with an introductory investigation of the milestones in the process of designing the strategy for the deployment of ultra-broadband network by taking into account domestic laws and decrees as well as EC decisions and communications.

Furthermore, a full section will be consecrated to the analysis of the main insights of the strategy for NGAN, whose key features are necessary for the understanding of BUL<sup>84</sup> tenders' functioning mechanisms.

As a direct consequence, the following paragraph (i.e. 2.4) will explore Infratel Italia BUL tenders under the perspective of a chronological discussion from the publication of tenders to their awards. To this purpose, it may be helpful to point

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<sup>84</sup> BUL is an acronym standing for Ultra-broadband. It will be widely used.

out that some analyses will not be replicated in the course of the chapter but will find their place in the accompanying appendix.

At that stage, it is our hope that the comprehension of the phenomena will be good enough for examining quantitative upshots that, for the sake of fullness, will be complemented by brief and punctual commentaries about empirical evidence.

In addition, the section will end with our final observations about the foreseen compliance with the strategic framework together with general forecasts about strategic and operational steps yet to come.

### **3.2 THE PROCESS OF DESIGNING A COMMON STRATEGY**

This section of the work is, on purpose, addressed to a general dissertation about necessary preliminary considerations and legal steps undermining the formalization of BUL tenders plan.

First and foremost, the role of broadband development will be commented as a lever to trigger economic growth.

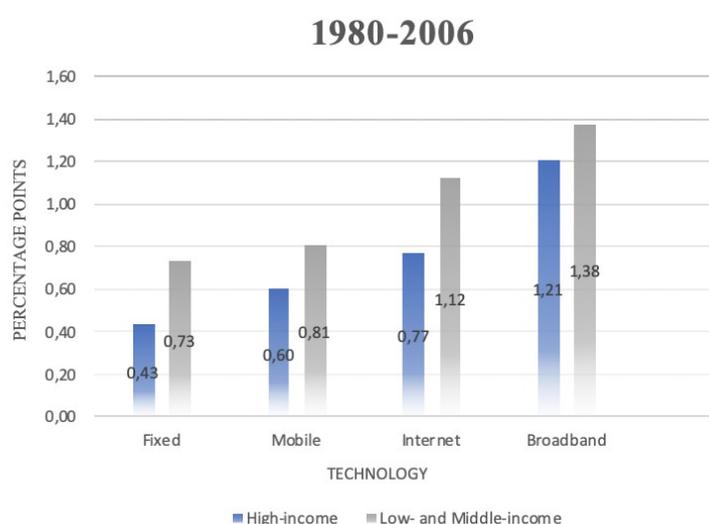
Secondly, the description will employ a funnel perspective from multi-level governance approaches, to EU decisions and, finally, to the Italian implementation of the community targets.

### 3.2.1. The role of broadband as a lever to economic development

There is almost universal consensus that ICTs have a positive effect on economy.

Among all technologies, fixed broadband has a wider economic impact with respect to fixed telephone, mobile and Internet use (Qiang et al., 2009).

Figure 13 - Effect of ICTs on GDP growth



Source: Qiang et al. (2009) based on Qiang 2008.

As it will be seen soon after, fixed broadband investments are conspicuous and absorb significant resources. As a consequence, this paragraph surveys the most relevant and authoritative literature on the economic impact of fixed broadband penetration in order to hand out a full background knowledge on the reasons why broadband development is imperative for the economy of a given country.

Table 7 below exhibits an overview of the various empirical studies that scholars have proposed over the years. Researches are grouped according the geographical

areas being examined as well as income level, when the analyses addressed wider samples.

Table 7 - Literature review on broadband impact

Country	Authors	Data	Effect
United States	Thompson and Garbacz (2008) - Ohio University	46 US States for the period 2001-2005	A 10% increase in broadband penetration is associated with 3,6% increase in efficiency
South - America	Zaballos and Lopez-Rivas (2012)	26 Latin America and the Caribbean (121 observations)	A 10% increase in broadband penetration raises per-capita GDP growth by 0,9-1,5 percentage points
OECD	Czernich et al. (2009) - University of Munich	25 OECD countries between 1996 and 2007 (300 observations)	A 10% increase in fixed broadband penetration yielded an additional 3.2% increase in GDP
	Koutroumpis (2009) - Imperial College	2002-2007 for 22 OECD countries	An increase in broadband penetration of 10% yields 0,25% increase in GDP growth
European Union	Koutroumpis (2009) - Imperial College	15 EU countries in the time span 2003-2006	GDP raises by 0,3-0,9 percentage points as a consequence of a 10% increase in broadband penetration
High income economies	Qiang et al. (2009) - World Bank	1980-2006 for 120 developing and developed countries	10% increase in broadband yielded an additional 1,21 percentage points of GDP growth
	Scott (2012)	86 countries (developed & developing) from 1980-2011	10% increase in broadband yielded an additional 1,19 percentage points of per-capita GDP
Low&middle income econ.	Qiang et al. (2009) - World Bank	1980-2006 for 120 developing and developed countries	10% increase in broadband yielded an additional 1,38% GDP growth
	Scott (2012)	86 countries (developed & developing) from 1980-2011	10% increase in broadband yielded an additional 1,35 percentage points of per-capita GDP

Source: our elaboration on: Qiang et al. (2009); Minges (2016); Scott (2012).

Each analysis employed a different regression method. When the impact is not punctual, the authors used two or more regression methods. Hence, in this case, the effect is defined as a range.

As one can easily see from the literature overview above, all authors concluded that an increase in fixed broadband penetration yielded a variable increment in the GDP.

The jump in broadband penetration can be considered as a good lever for the economic development not only in terms of per-capita GDP, but also for other measures. High potential economic gains from broadband encompass escalated productivity, lowered costs, new business opportunities, jacked up employment growth, more rapid innovation and enhanced trade.

However, the most significant effect and the most studied one is on the value added.

Hence, to this extent, our efforts are limited to the inspection of one of the most convincing<sup>85</sup> cross-sectional study conducted by Qiang et al. in 2009 for the World Bank based on the endogenous growth model as theorized by Barro in 1991<sup>86</sup>.

The model is built on equation [7]<sup>87</sup>:

$$GDP_{8006} = \alpha_0 + \alpha_1 \ln(GDP_{80}) + \alpha_2 (I/GDP)_{8006} + \alpha_3 PRIM_{80} + \alpha_4 BBPEN_{8006} + \alpha_5 SSA + \alpha_6 LAC + \mu \quad [7]$$

The empirical groundwork determined that “a 10-percentage point increase in fixed broadband penetration would increase GDP growth by 1,21% in developed economies and 1,38% in developing ones.” (Qiang et al., 2009). While, the coefficient for high income countries was significant at level 1%, the significance was merely 10% for low- & middle-income countries<sup>88</sup>.

For the purposes of this paragraph, a sole experimental study has been considered, whereas all the findings mentioned in Table 4 are worth to be furtherly searched through.

<sup>85</sup> The terms “convincing” or “authoritative” are used on purpose because the study investigated more than a hundred countries (either developing or developed) in a wider time span (bigger than 20 years).

<sup>86</sup> Barro R.J., 2001, Economic Growth in a Cross Section of Countries, in: The Quarterly Journal of Economics 106 (2), pp. 407-443.

<sup>87</sup> Where  $GDP_{8006}$  is the average growth rate of real per-capita GDP between 1980-2006,  $GDP_{80}$  is per-capita GDP (in US\$) in 1980,  $(I/GDP)_{8006}$  is the average ratio of investment to GDP,  $PRIM_{80}$  is primary school enrollment rate in 1980,  $BBPEN_{8006}$  is the mean broadband penetration and  $SSA$  and  $LAC$  are dummy variables for countries in Sub-Saharan Africa and Latin America and the Caribbean (LAC).

<sup>88</sup> The lower significance of the model for developing countries is common to other models. This is due to difficulties faced up while collecting reliable data (especially in African countries). (Scott, 2012).

Ultimately, the development of broadband and ultra-fast broadband networks seems to be favorably connected to countries' wealth. No coincidence that it has been one pivotal strategical priority (both at community level and domestically).

### 3.2.2. Approaches for governance

Since Italy is an EU member state, it cannot pursue operational strategies without respecting the in-force EU regulation framework, especially in specific areas.

In other words, when a state becomes part of a community or a federation through a binding treaty (like the treaty of Rome in 1957), it cedes a part of its sovereignty to another political (or, better, executive) body, that is remising jurisdiction on selected intervention areas to a supranational institution. Simply put, the Italian government under the community law cannot do whatever it wants to without formal EC clearance or disregarding current EU norms, because of a shift in the decision-making process.

At this point, it is likely clear that the matter of governance is extremely determining, especially in the case of competing competencies and overlapping authorities.

Although there are different views of the hierarchical connections among states and EU institutions, it is rather self-explanatory that they are deeply correlated.

Pursuant to the aim of this seminary, the emphasis is put on the concept of multi-level governance<sup>89</sup> whose salient traits may be recapped as in the theorization of Marko Trnsky<sup>90</sup>:

- National governments no longer control supranational policymaking;
- “Decision-making competencies are shared by actors at different levels rather than monopolized by state executives. [...] Supranational Institutions have independent influence in policymaking.
- States do not solely monopolize the links between domestic and European actors: subnational actors operate in both national and supranational arenas, creating transnational associations in the process”<sup>91</sup>.

At this stage of the description, it may be advantageous to introduce two approaches related to integrated governance that exerted influence on the process of designing a common strategy:

1. Top-down: supranational bodies mandate subnational authorities the accomplishment of targets identified at a supranational level, giving the latter wiggle room in specific foreseen conditions. As in the case of broadband deployment, EC fixed minimum performance targets whereas member states

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<sup>89</sup> For one of the most compelling and pioneering studies on governance in the EU see: Marks, G. & Hooghe, L. (1996), European Integration from the 1980s: State-Centric v. Multi-level Governance. In: *Journal of Common Market Studies*, Vol.34, No. 3, 341-378

<sup>90</sup> Trnsky M. (n.d.), Multi-Level Governance in the EU, <https://www.sustainableislands.eu/BlockImages/InLibraryData/GalleryData/MULTI-LEVEL%20GOVERNANCE%20IN%20THE%20EU%20by%20Marko%20Trnski.pdf>.

<sup>91</sup> *Ibidem*.

implemented the extensive strategy towards the implementation of their own strategic plans.

2. Bottom-up: sub-national authorities join the decision-making process in a more participative way sharing their local needs and preferences. Supranational institutions decide in accordance to the communion of priorities. To what it may directly concern our investigation, the EC formally cleared the Italian Strategy for NGAN through SA.41647.

Consistently with the specific circumstances, one may be preferred to another or they may be employed jointly in accordance with the current binding regulations. To conclude, whilst our description exploits a top-down perspectival approach, on the contrary, the process of designing a strategy for broadband infrastructure deployment is to be intended under the banner of synergy, coordination and subsidiarity. In fact, multi-level governance in latest scholar issues yet involves different actors at diverse levels but no wonder entails vertical or hierarchized relationships. From one-to-many to many-to-many.

### 3.2.3. EU Guidelines 2013/C 25/01

The EC Communication 2013/C 25/01, namely “EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks”, is of the utmost relevance. This is because it acts as a compass guiding EU member states (henceforth, MS) governments and central EU institutions in the process of

assessing whether a particular SA measure for broadband is compatible and legitimate under the EU regulatory framework.

The so-called “Broadband Guidelines” supply a step-by-step methodological approach in order to certify the compliance with the EU binding norms.

To this extent, when EC is called upon to make an appraisal of a SA, it performs jointly two different tests verifying:

- Whether the SA is compatible with the discipline of art. 107(3)(C) TFEU;
- Whether the nature of the same SA measure is proportional and produces limited distortive effects on competition and competitiveness.

Table 8 portrays all the conditions that should be simultaneously fulfilled in order to be compliant with in-force governing principles. The former enlists seven conditions whose total satisfaction is mandatory as a means of getting formal EC clearance. On the other hand, the latter enumerates eleven benchmarks against which the proportionality of the measure is evaluated. Failure to meet any of these conditions would most likely require an in-depth assessment (according to art. 108(2) TFEU) which could even result in a conclusion that the aid is incompatible with the internal market. In this extreme case, the measure is considered illegitimate and, thus, infringing the community law.

Table 8 - Broadband Guidelines - Assessments

<b>The compatibility assessment under Article 107(3) TFEU (sec. 2.5)</b>		
<b>ID</b>	<b>CONDITIONS</b>	<b>DESCRIPTION</b>
1	Contribution to the achievement of objectives of common interest	The Commission will assess to what extent the planned intervention will contribute to the achievement of the objectives of common interest.
2	Absence of market delivery due to market failures or important inequalities	Where the market provides insufficient broadband coverage or the access conditions, SA may help to remedy such market failure. Governments may choose to intervene to correct inequalities.
3	Appropriateness of State aid as a policy instrument	Public intervention in support of broadband networks may take place at State, regional or municipal level. Therefore, coordination of the various interventions is essential.
4	Existence of incentive effect	Regarding the incentive effect of the measure, it needs to be examined whether the broadband network investment concerned would not have been undertaken within the same time frame without any SA.
5	Aid limited to the minimum necessary	The Commission has highlighted a number of necessary conditions to minimise the State aid involved and the potential distortions of competition.
6	Limited negative effects	The change in the beneficiary's behaviour because of the aid may also have negative effects on competition and trade. The significance of the distortion can be assessed on effects on competitors.
7	Transparency	Aid shall be awarded in a transparent manner; it must be ensured that the MS, economic operators, the interested public and the EC have easy access to all relevant acts and pertinent information.

<b>Design of the measure and the need to limit distortions of competition (sec. 3.4)</b>		
<b>ID</b>	<b>CONDITIONS</b>	<b>DESCRIPTION</b>
A	Mapping and analysis of coverage	Member States should clearly identify which geographic areas will be covered by the support measure in question.
B	Public consultation	Member States should give adequate publicity to the main characteristics of the measure and to the list of target areas by publishing the relevant information of the project and inviting to comment.
C	Competitive selection process	The selection process shall be conducted in line with spirit and the principles of the EU Public Procurement Directives.
D	Most economically advantageous offer	Within the context of a competitive tender procedure, the aid granting authority shall establish qualitative award criteria on which the submitted bids are assessed.
E	Technological neutrality	As different technological solutions exist to provide broadband services, the tender should not favour or exclude any particular technology or network platform.
F	Use of existing infrastructure	Member States should encourage bidders to have recourse to any available existing infrastructure so as to avoid unnecessary duplication of resources and to reduce the amount of public funding.
G	Wholesale access	Third parties' effective wholesale access to a subsidised broadband infrastructure is an indispensable component of any State measure supporting broadband.
H	Wholesale access pricing	Wholesale access price, should be based on the pricing principles set by the NRA and on benchmarks and should take into account the aid received by the network operator.
I	Monitoring and clawback mechanism	The granting authorities shall closely monitor the implementation of the broadband project during the entire duration of the project. Member States should implement the clawback mechanism if the aid amount of the project is above EUR 10 million.
J	Transparency	Member States shall publish on a central website at least the following information on the State aid measures: the full text of the approved aid scheme and its implementing provisions, name of the aid beneficiary, aid amount, aid intensity and used technology.
K	Reporting	Starting from the date when the network is put into use, for the duration of the aid measure, the State aid granting authority should report every 2 years key information on the aid projects to the EC.

Source: our elaboration on EU 2013/C 25/01

Before moving forward with our analysis, the Guidelines are extremely useful also for another reason. According to demographic dynamics, market conditions and geographical characteristics the territory is ideally divided into three different areas:

1. Black Areas: “When in a given geographical zone there are or there will be in the near future at least two basic broadband networks of different operators and broadband services are provided under competitive conditions it can be assumed that there is no market failure”.
2. Grey Areas: “one network operator is present, and another network is unlikely to be developed in the near future”.
3. White Areas: “there is no broadband infrastructure and it is unlikely to be developed in the near future”.

In the provision of the EU lawgiver, each area is accompanied by specific intervention models and targeted objectives (consistent with “A Digital Agenda for Europe”). Public sector intervention is possible only in:

- White areas (also known as “market failure areas”)
- Grey areas, provided that the eligibility assessment<sup>92</sup> is passed.

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<sup>92</sup> The eligibility assessment of a state intervention in grey areas is defined in recital (70), enlisting the so-called eligibility criteria.

### 3.2.4. A Digital Agenda for Europe

The Digital Agenda for Europe (DAE2020 <sup>93</sup>) is a strategic document for the EU programming period 2014-2020 in which all member states commit to promote digital innovation and to foster the development of technologically advanced infrastructure networks.

DAE2020 is one among seven flagship initiatives <sup>94</sup> of the Europe 2020 Strategy (for simplicity, EU2020<sup>95</sup>) whose target is the achievement of three “mutually reinforcing priorities” (EC, 2010) by 2020:

1. Smart growth: “developing an economy based on knowledge and innovation”<sup>96</sup>;
2. Sustainable growth: “promoting a more resource efficient, greener and more competitive economy”<sup>97</sup>;
3. Inclusive growth: “fostering a high-employment economy delivering social and territorial cohesion”<sup>98</sup>.

DAE2020 is framed in the first priority of EU2020 and constitutes one of its leading elements because it has been forecasted that in the following decades the economy

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<sup>93</sup> EC, COM(2010)245 final, A Digital Agenda for Europe.

<sup>94</sup> The seven flagship initiatives of EU2020 are: Innovation Union, Youth on the move, A digital agenda for Europe, Resource efficient Europe, An industrial policy for the globalization era, An agenda for new skills and jobs, European platform against poverty.

<sup>95</sup> EC, COM(2010) 2020, A strategy for smart, sustainable and inclusive growth.

<sup>96</sup> EC, COM(2010)245 final, A Digital Agenda for Europe, p. 3.

<sup>97</sup> Ibidem.

<sup>98</sup> Ibidem.

will be a “network-based knowledge economy <sup>99</sup>” with the internet connectivity at its vital center.

The 2020 strategic framework has widely emphasized the need of broadband deployment for meeting the goals of raising social inclusion and competitiveness within the EU borders.

At the moment of DAE2020 formalization (about 2010), European citizens accessed the net mainly through first generation internet services (generally at low speed below 30 Mbps).

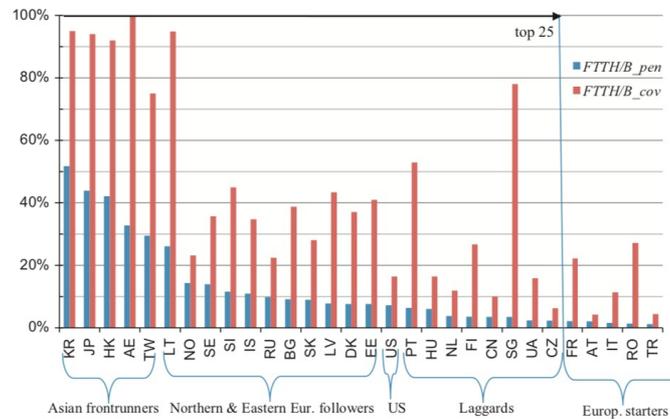
The figure below provides an instant (crystallized in June 2011) of FTTH/B subscriptions (as a % of total internet subscriptions) of the top 25 ranked economies together with a group called “European Starters” (whose Italy belonged to).

At a very first glance, Europe lagged well behind other advanced economies with an average penetration of about 2% (Briglauer W. & Gugler K., 2013).

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<sup>99</sup> EC, COM(2010) 2020, section 2.4, Fast and ultra-fast internet access, p. 19

Figure 14 - FTTH/B ranking of penetration and coverage levels (June 2011)



Source: Briglauer W., Gugler K. The deployment and penetration of high-speed fiber networks and services:

Why are EU member states lagging behind? Telecommunications Policy 37 (2013) 819-835, p. 827

In particular, in order to bridge the gap with the other countries in the world, DAE2020 aims<sup>100</sup> at ensuring that:

1. Basic broadband for all by 2013: basic broadband<sup>101</sup> coverage for 100% of EU citizens. (Baseline: total DSL coverage (as % of the total EU population) was at 93% in December 2008)
2. Fast broadband by 2020: broadband coverage at 30 Mbps or more for 100% of EU citizens. (Baseline: 23% of broadband subscriptions were at least 10 Mbps in January 2010)

<sup>100</sup> Basic coverage is related to “First Generation Access” network (herein forward, FGB), whilst, on the contrary, the two DAE target for 2020 are connected to the so-called “Second Generation Access” network (SGB) – also known as “Next Generation Access” network (NGA).

<sup>101</sup> The EC has not provided a lower performance threshold for defining basic broadband, leaving the Member States to decide in autonomy. Italy employed the performance requirement of 2 Mbps. (Matteucci, 2019)

3. Ultra-fast broadband by 2020: 50% of European households should have subscriptions above 100 Mbps. (No Baseline)

Pursuant to the legal context, diffusely described above, Italy, as a MS, had to translate the general indications of the DAE2020 into domestic operational high-speed internet strategies.

Hence, as a direct consequence, the Italian government introduced its own Digital Agenda (Agenda Digitale Italiana, ADI) adopting community inspiring principles and operative targets to the Italian needs.

In other words, Italy is at the helm for the identification of domestic priorities as well as intervention models whose effectiveness is to be evaluated as against EU scorecards.

As per high-speed internet connections, in 2015, Italian government issued “The Italian Strategy for ultra-broadband” that will be furtherly addressed in section 3.3.

#### 3.2.5. State Aid SA.41647 (2016/N) – Italy

The State Aid measure SA.41647 (2016/N)<sup>102</sup> has represented a crucial milestone for the effective deployment of the Italian ultra-broadband strategy.

Following the path of previous state aids (SA.33807 and SA.34199), the “measure” audited at the same time actions on “white” as well as both “grey” and “black”

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<sup>102</sup> Decision C(2016) 3931 Final, Brussels, 30.06.2016.

areas, that is a set of heterogenous NUTS level 3 areas with differentiated needs and various interventions requirements.

The decision cleared in late June 2016 formally accepted the strategy (consisting of carefully targeted public sector interventions) proposed by the Italian government in order to match DAE2020 objectives.

Prior to the formal clearance of the strategy, the EC has assessed the compatibility of the scheme in accordance to art. 107(3)(c) of the TFUE and in the light of the above-mentioned EU Broadband Guidelines 2013/C 25/01 (OJ C 25, 26.01.2013, p. 1) which provide a detailed guide for the application of art. 107(3)(C) in this kind of state aid. The compatibility assessment hereby discussed is a two-step process involving: firstly, an evaluation of the compliance of the scheme with compulsory conditions<sup>103</sup>; and, secondly, an appraisal whether the positive impact offsets negative side effects<sup>104</sup>.

The EC concluded that “the measure is designed in a way that does not distort competition or adversely affect trading conditions to an extent contrary to the common interest and is in line with the objectives of article 107(3)(C) TFEU <sup>105</sup>” (EC, 2016).

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<sup>103</sup> As defined in EU Broadband Guidelines 2013/C 25/01, section 2.5, recital (33).

<sup>104</sup> Ibidem, recital (34).

<sup>105</sup> EC (2016), Decision C(2016)3931 final, SA.41647 (2016/N), p. 24.

The approval was of unprecedented relevance since it involved more than EUR 4.0 billion, a much higher budget with respect to the 2012 measure<sup>106</sup> mainly addressed to the development of passive fiber network in white areas (where state support is up to 100%).

The table below is designed to grant a full portrait about the state aid SA.41647. It has been conceived in order to host the main insights of the measure (enlisted pursuant to the order of the decision) which have been selected in accordance with our investigative purpose.

Table 9 - State Aid SA.41647 (2016/N)

<b>State Aid SA.41647 (2016/N)</b>	
<b>Previous State Aid Decisions</b>	Decision C(2012)9833 SA.34199 expired and it cannot be used to finance new projects
<b>Duration</b>	The measure should remain in force until 31 December 2022
<b>Standstill obligation</b>	Italy commits not to use funds without formal clearance of EC
<b>Budget and financing instruments</b>	DCF (Development and Cohesion Fund) with about EUR 2.2 billion
	EU funds (ERDF and EAFRD) with about EUR 1.8 billion
<b>Intervention model</b>	Direct intervention model
<b>Aid intensity</b>	Up to 100% of the construction cost of the passive network
<b>Tender procedure</b>	Construction, maintenance, management and commercial exploitation of the network will be assigned either separately or jointly in accordance to in-force procurement rules
<b>Award criterion</b>	Most Economically Advantageous Offer

Source: our elaboration on EC C(2016)3931 final

<sup>106</sup> EC (2012), Decision C(2012)9833 final, SA.34199 (2012/N) estimated a foreseen budget of more than EUR 9 billion (including the co-financing of privates), however, the allocation of public funds only accounted for less than 30% (i.e. EUR 2.5 billion).

### **3.3 THE ITALIAN STRATEGY FOR ULTRA – FAST BROADBAND**

In order to achieve the minimum targeted objectives of DAE2020 (as widely debated above), the Italian government in 2015 preordained its Master Plan (henceforth, MP) for the NGAN deployment.

Pursuant to the EU Broadband Guidelines, the SA discipline was aimed at achieving the technological neutrality (as in the proportionality assessment of section 3.2.3).

With respect to older MPs, this was a crucial turnaround.

The strategy would not have been entailing a choice among alternative technologies (e.g. FFTH vs. FFTC), as in the past, but, rather, would have left the technological decision to the operators so long as it permitted the achievement of the specific objectives.

The 2015 MP allowed, for the first time, the operators to freely determine more flexible and technology neutral projects which, in turn, might effectively put into practice a significant feature of NGAN: the so-called scalability.

It may be defined as “the possibility to move from one technical solution to a more advanced one when the latter becomes profitable, without incurring in substantial adjustment costs.” (Cambini et al., 2016).

This improvement in the MP design is also consistent with the need of “future-proof” infrastructure, as prescribed by the same 2015 MP.

Even though it may be clear that the desirable technological solution is the Fiber-to-the-home (FTTH), a cost-saving approach towards the management of public resources required the direct use of this architecture only in areas with high potential. In the residual ones (by far the most numerous), with significantly different market conditions (take as benchmark cluster D, for instance), a less advanced solution (FTTB or FTTdp) would be as effective as the most innovative in order to reach the target of 30 Mbps.

Anyhow, due to the scalability property, SGB infrastructure architecture are such that they may be enhanced in the future to meet even more challenging future goals that are already in the forthcoming policymaker agendas.

The upcoming sub-paragraphs will portray the ultra-broadband scenario in Italy together with a more detailed analysis of the MP as in the legislative provisions.

### 3.3.1. Clustering areas

The activity of gathering round the areas of the Italian peninsula has been performed heading for improving the effectiveness of the state aid with respect to the limited funds available. Indeed, this activity allowed the government to identify coverage targets, instruments and financial needs according to the characteristics of each

area. The whole territory has been subdivided into 94.645 homogeneous sub-areas<sup>107</sup> which, in turn, have been grouped into 4 clusters (A, B, C, D).

The clustering criteria being employed were the following: population concentration, ground characteristics, industry density, rural premises, supply of pre-existing or scheduled ultra-broadband infrastructure.

Ahead of the punctual outline of each cluster, it is our way of envisaging that a synthetic albeit exhaustive multi-dimensional array (as in table 10) may be helpful for an overall understanding of the clusters' scenario.

Table 10 - Clusters - Summary Table

Cluster	A	B	C**	D
EU classification under Broadband Guidelines	Black	Black/Grey	Grey	White
Current coverage	30 Mbps (FTTC)	30 Mbps (FTTC) in 102 municipalities	ADSL	ADSL (97%)
Planned coverage	30 Mbps (FTTC)	30 Mbps (FTTC)	ADSL	ADSL
Target	Upgrade from 30 to 100 Mbps	Upgrade from 2-30 to 100 Mbps	Upgrade from 2 to 30/100 Mbps	Upgrade from 2 to 30 Mbps
Cost EUR 30 Mbps	-	-	1.055.432.252,00 €	1.075.517.066,00 € *
Cost EUR 100 Mbps	7.564.003.835,00 €		3.834.688.815,00 €	-
State aid discipline	No state aid, only private investments	Proportional state grants	Grants proportionally larger than the cluster B	Direct intervention
Incentive measures	Tax exemption	Tax exemption	Tax exemption	-
	Subsidized credit	Subsidized credit	Subsidized credit	

<sup>107</sup> The areas are “homogenous groups of ISTAT census areas. [...] Each municipality is divided into sub-areas belonging to one or more clusters. Reference database with the map of the clustered municipalities will be managed by Infratel”, PCDM, The Italian Strategy for next generation access network, p. 11.

Source: our elaboration from "The Italian Strategy for Next Generation Access Network" - Presidenza

Consiglio dei Ministri – p. 40.

(\*) The possibility to have upgraded services of 100 Mbps through G.Fast and vectoring is considered. (\*\*)

The appraisal for cluster C foresees the achievement of FTTC network to be upgraded into a FTTB.

Cluster A: It is the cluster<sup>108</sup> with the best cost-benefit ratio; in other words, it is the area where private companies are more likely interested in investing their resources.

This is because of the high forecastable demand of more speed connections.

Under the binding strategic context, no direct state aid is possible in this area.

Cluster B: It is the cluster<sup>109</sup> where private operators have or are going to realize networks at 30 Mbps, but market conditions are such that the investment for high-speed broadband network (at 100 Mbps) will not be justified. Since it encompasses both “black” and “grey areas”, it has been divided into two sub-clusters: B1 for black areas and B2 for grey ones (where a public intervention is in place or scheduled). In order to achieve the coverage target of 100 Mbps, investments may be partially co-financed by public straight grants.

Cluster C: It is the cluster<sup>110</sup> of marginal areas, rural areas included, where the investment for ultra-fast broadband network is to be sustained through state support.

Hence, the cluster hosts the so-called “market failure” areas currently covered at 2-30 Mbps. The strategic objective for 2020 is to raise the coverage speed to 30 Mbps

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<sup>108</sup> It comprehends 15 big “black” municipalities and the main industrial districts covering up to the 15% of the whole Italian population (9,4 million citizens).

<sup>109</sup> 1.120 municipalities are included. 45% of the population lives in these areas (about 28,2 million).

<sup>110</sup> It covers more than 15,7 million citizens (25% of the population) in about 2.650 municipalities.

and to 100 Mbps (in specific areas). The foreseen instruments to pursue such targets are state grants (higher with respect to cluster B) accompanied by context measures (facilitated access to capital and tax cuts).

Cluster D: Typically, market failure areas <sup>111</sup> where the state intervention is *conditio-sine-qua-non* for the development an ultra-broadband network. By 2020, a faster 30 Mbps connectivity is targeted to be reached with massive public aids. Especially, the government was expecting to employ a direct intervention model for infrastructural deployment or, at least, an incentive-based model with the highest state contribution (as against the private one).

### 3.3.2. Fast broadband in Italy: The scenario

At the moment of the roll-out of the 2015 MP, Italy was lagging well behind with respect to the majority of the EU MS for a number of reasons that will not be object of our study<sup>112</sup>.

To this extent, this part of the work is designed with the purpose of giving a comprehensive portrait of the broadband in Italy. Since the massive strategy was issued in March 2015, all the rankings that will be presented are glazed at 2015.

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<sup>111</sup> Englobing about 4.300 municipalities (located above all in southern Italy), that is 15% of the population resides in these areas.

<sup>112</sup> Recital (7) of the state aid measure SA.41647 (EC C(2016)3931 final) provides a recapitulatory albeit incomplete roster of the main reasons *inter alia*: geographical reasons, widespread presence of archeological sites, lack of cable providers and low level of digital skills of the population. Various relevant literature has emphasized also the negative effect of massive bureaucratic processes.

One of the most significant quantitative measures allowing scholars and experts to throw light on the full situation is the Digital Economy and Society Index <sup>113</sup> (for simplicity, DESI) which takes into account simultaneously five main variables (often known as DESI dimensions). DESI is a normalized indicator ranging from 0 to 1, thus: the bigger the score, the better the country performance.

Every dimension is weighted according to the subsequent scheme: (1) Connectivity [25%]; (2) Human Capital [25%]; (3) Use of Internet [15%]; (4) Integration of Digital Technology [20%]; and (5) Digital Public Services [15%].

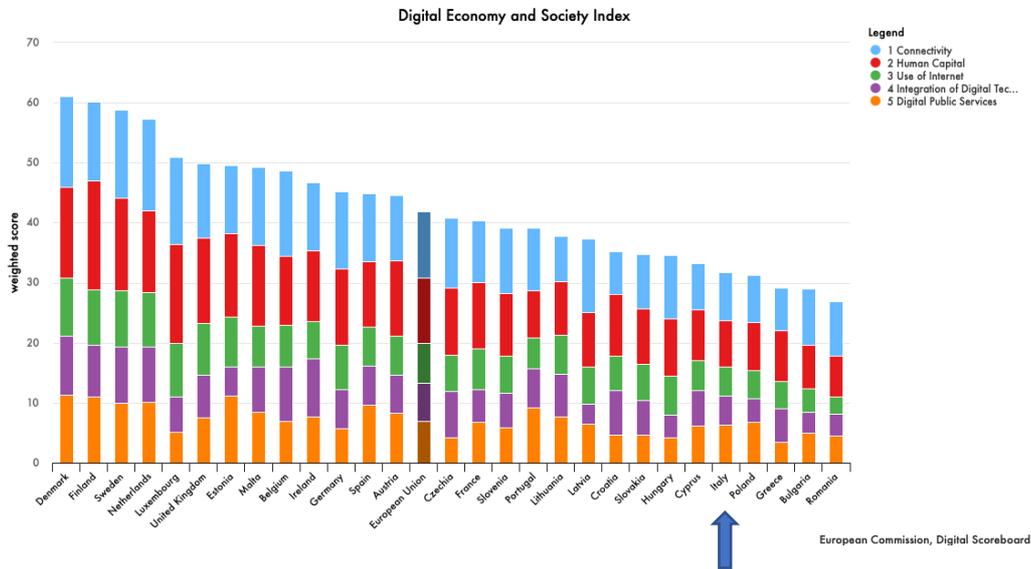
Figure 15 brings out a standstill graphical representation of the DESI overall index in EU-28. Italy was ranked 24<sup>th</sup> out of 28 countries with a noteworthy gap to the leader (Denmark, 60,99) and the EU mean (41,79). Italy was better ranked only to some less-developed countries (Poland, Greece, Bulgaria and Romania)<sup>114</sup>.

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<sup>113</sup> “The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. [...] For more information about the DESI please refer to <http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard>. ” (DESI 2016 Country Profile – Italy).

<sup>114</sup> For instance, take as benchmark of the economy’s development degree the EUR per-capita GDP PPS (in 2015): Italy (27.800€), Poland (19.800€), Greece (19.600€), Bulgaria (13.600€) and Romania (16.500€). By considering GDP PPS, the influence of different purchasing powers is thrown away, thus, the comparison is far more than legitimate. All late comers are well below Italy.

Figure 15 - DESI (2015)



Source: EC Digital Scorecard.

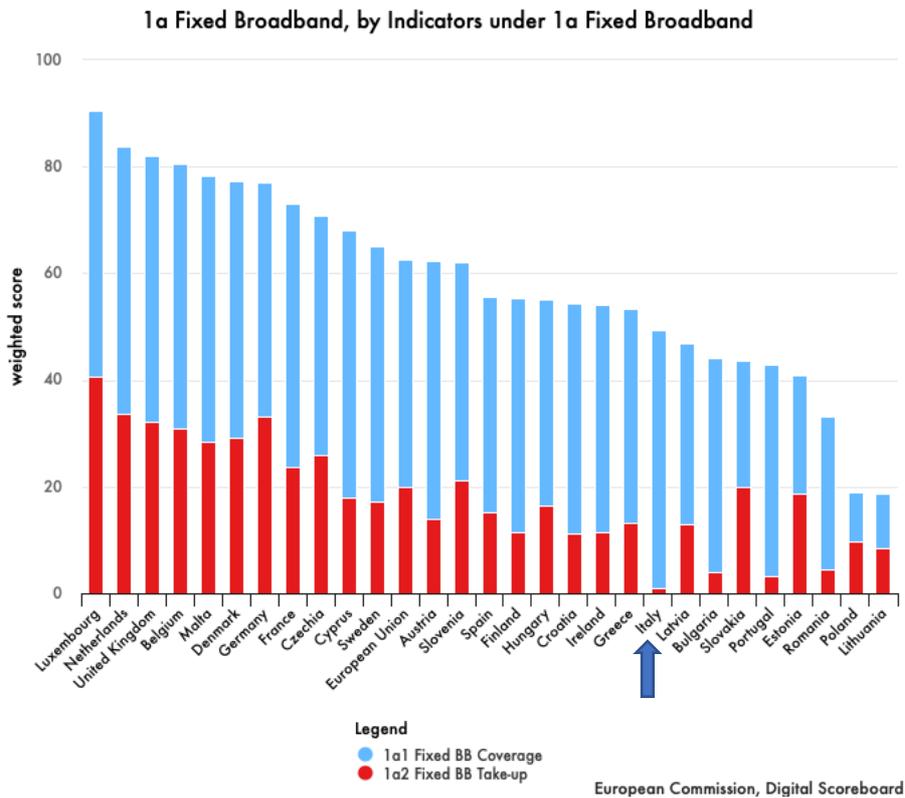
The blue arrow is for Italy (31,83). The grey-colored mid-column is the one for the EU-28 average (41,79).

Though, it may be argued that DESI is not the most appropriate dimension for making an evaluation of the broadband scenario in Italy seeing as how it considers other dimensions that are not perfectly aligned with our investigation.

Therefore, DESI has been broken down in its sub-dimensions and our attention was laid down on the first one: connectivity. Once again, the latter seemed to be a too wide estimator; thus, its sub-components have been explored: fixed, mobile, fast, ultra-fast broadband and broadband prices respectively.

Figure 16 provides a histogram of the fixed broadband indicator (1a), a composite index of coverage (weighted 50%) and take-up (50%). Italy was ranked 20<sup>th</sup>.

Figure 16 - Fixed Broadband (coverage + take-up)

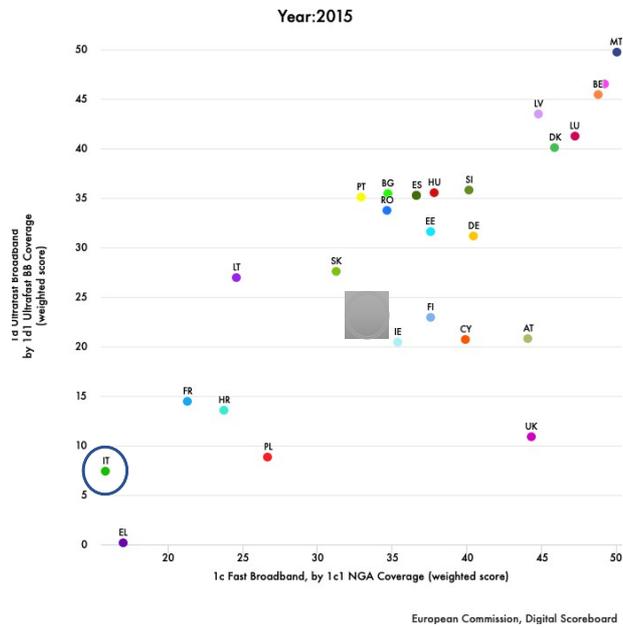


Source: EC Digital Scorecard.

The blue arrow is for Italy. In terms of fixed broadband coverage, Italy is well above the EU threshold (99,1 vs. 96,4). In spite of its notable ranking in coverage (10<sup>th</sup>), the process of getting to the full coverage (i.e. the number of newly subscribed households) is far the slowest.

If the situation seemed to give concern, the piled-up delay exponentially increased when the analysis addressed faster broadband technologies. Faster technologies for broadband means: NGA broadband (>30 Mbps) and ultra-fast broadband (>100 Mbps). To this end, figure 17 offers a comprehensive representation of the Italian positioning in the EU when the latter enabling technologies are considered.

Figure 17 - Fast and ultrafast broadband



Source: EC Digital Scorecard.

Blue round highlights Italy, grey for EU. The graph is a scatter plot. On the horizontal axis there is the NGA coverage (ranging from 0 to 50), while on the vertical one there is the Ultrafast BB coverage (from 0 to 50). Both variables exist from 0 to 50 because the scores pointed out is computed as the sub-component of a broader indicator (which, in turn, weights one half the coverage and the other the take-up). The closer to the axes' origin, the poorer the performance.

At a first sight, it is rather blatant that Italy was in an alarming condition.

Additional representations of the broadband scenario are hosted in appendix 2.2.

### 3.3.3. The Italian Strategy for Next Generation Access Network

This formal document dated March 2015 envisaged the realization of the ultra-broadband infrastructure development in Italy in accordance with the framework of the SA discipline to the deployment of NGA networks and the DAE2020 targets.

First and foremost, the compliance with the EU binding framework has been secured by the EC clearance through the measure SA.41647 which has been widely inspected before.

Secondly, at this point, it is our purpose to state whether DAE2020 objectives have been consistently translated under the 2015 strategy for NGAN.

Briefly recalling the aims of DAE2020, MS are required to: (i) provide full basic (<2 Mbps) broadband coverage (by 2013); (ii) ensure a 100% coverage with SGB networks by 2020 (>30 Mbps) and, finally, (iii) grant a 50% penetration of ultra-fast broadband access (>100 Mbps) by 2020. If the objective (i) has not required policy measures (conditions were already met), the latter (ii) and (iii) needed additional public sector interventions in order to be reached.

Table 11 recaps the targeted coverage as in the provision of the Italian policymaker, from the baseline (i.e. 2015) to the final target through an intermediate mean target.

Table 11 - The Italian Strategy for NGAN - Coverage Targets

Summary of the coverage targets			
Target	Initial Target 2015	Mean Target 2018	Final Target 2020
Population covered to at least 30 Mbps	45%	75%	100%
Population covered to at least 100 Mbps	1%	40%	85%

Source: retrieved from "The Italian Strategy for Next Generation Access Network" - Presidenza Consiglio dei Ministri – p. 86

At this stage, it becomes feasible to compare the two strategies, so as to make an evaluation of their “cross-compliance”.

The second DAE2020 target was matched according to the thresholds set in the MP, whilst, on the other hand, the third objective required a further in-depth analysis. A problem has arisen. DAE2020 target (iii) was spelled-out in terms of fixed broadband network penetration, instead the Italian Plan set coverage in terms of infrastructure deployment.

Cambini et al. (2016) widely investigated this topic and concluded that for the sole purpose of meeting the 50% ultra-fast penetration target, a take-up rate around 60% was needed. However, it was far upon the predictions and the initial empirical evidence being gathered by the EC scorecard.

More accurate forecasts could be phrased if and only if the results of the BUL tenders are acknowledged and systematically recorded (i.e. when there is real availability of SGB networks), that is when the focus of the policymaker will be placed on stimulating the demand-side of the fixed broadband market. Nevertheless, those interventions will come after and, at this moment, it is very challenging to make adequate speculations in such a fast-changing incomplete scenario.

In any case, it can be fairly figured out that the achievement of the threshold of ensuring a 100 Mbit/s coverage to 85% of citizens would not have been per se sufficient to produce a penetration consistent with DAE2020 mandates without an integrated and synergic set of measures on both demand and supply.

Moving forward with our concise description of 2015 MP, the lawmaker provided also an estimation of the foreseen expenditures for reaching the MP targets. Thus, table 12 portrays the financing sources and the allocated intervention budget.

Table 12 - The Italian Strategy for NGAN - Funding Sources

Summary of the possible funding sources		
funding sources	Decision input	Resources
ongoing private operators investments	Results of the public consultation carried out by Infratel Italia SpA on behalf of MISE ended in 2014	€2 billion
ongoing BUL Strategic Plan	"Italy Digital Plan - Super-fast broadband" for the coverage of 639 municipalities (being neglected by private operators)	€419 million
Regional Operational Programs (ERDF and EAFRD) 2014-20	European Funds 2014-20 for the the objective "improving the access to information and communication technologies"	€2,4 billion*
National Operational Programs ERDF (2014-20)	"Digitalizing to increase the competitiveness of firms in the South" in synergy and complementary to the 2nd DAE goal	€230 million
Development and Cohesion Fund (2014-20)	Fund Development and Cohesion for the completion of the Italian Strategy	up to €5 billion

Source: our elaboration on data from "The Italian Strategy for Next Generation Access Network" -

Presidenza Consiglio dei Ministri – p. 88.

(\*) 722 million for the four convergence regions, 26 million for the transition regions, 196 million for the competitiveness regions, 256 million related to EAFRD resources.

Since the Italian territory is heterogeneous and incorporates different cluster areas with dissimilar legal disciplines, the strategy behind the 2015 MP was conceived as a two-step process:

1. First phase: the earliest juncture of the plan pertained to interventions on the supply-side of the market and to the public sector involvement in the process of ensuring ultra- and ultra-fast broadband in clusters C and D (which according to EU Guidelines are under the framework of white areas).
2. Second phase: the next-in-line step of the plan is expected to be announced in the next months and concerns interventions operating on the demand-side of

the market. The attention of the MISE is now on the coverage on grey and black areas (whose public consultation has been launched in 2019).

In coherence with our research scope and the information at our disposal, the analysis will be concentrated on the first phase of the MP, which, in the light of what has been previously mentioned, has absorbed the majority of the allocated public resources.

#### 3.3.4. Models for infrastructure deployment

The current strategical context, previously delineated, has been designed and implemented in accordance to the EC regulations, as amended (e.g. Decision C(2016)3931 SA.41647 and EU Guidelines 2013/C 25/01).

However, the intervention models for infrastructure deployment are those framed in the “Strategic Plan Ultra-wide broadband”, - state aid no. SA.34199 (2012/N) – designed by the MISE (pursuant to art. 30<sup>15</sup> of decree-law no. 98/2011) and formally authorized by the EC decision C(2012)9833.

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<sup>115</sup> Art. 30 – “Financing Broadband” – comma 1 – “To the purpose of achieving the objectives of Europe Digital Agenda, regarding the common right to access the Net at a connection speed higher than 30 Mbit/s [...], MISE together with private companies and entities [...] designed a strategical project in which, on the basis of the principles of horizontal subsidiarity and public-private partnerships – and institutional coordination between regions and government (as assessed by the Constitutional Court) – specific interventions are identified in order to realize telecom broadband and ultra-broadband infrastructures, even with the exploitation, the modernization and the coordination of existing infrastructures. [...]”

This section will be devoted to a brief discussion of the main four public intervention models for the construction of ultra-fast broadband networks.

Hence, accompanying context measures (such as simplification of the regulatory framework, provision of financial solutions to improve access to capital, tax cuts, and so on) will be neglected.

Prior to the description of the four intervention models, some considerations about the reference infrastructure architecture are needed in order to better understand how public and private players have behaved. To this extent, the reader is provided with table 13, a synthetic bi-dimensional array of its main characteristics.

Table 13 -The Italian Strategy for NGAN - Reference Infrastructure The Italian Strategy for Next Generation Access network	
Adopted reference infrastructure characteristics	
Technological neutrality	The infrastructure will not favor or exclude any technology or platform. The choice of the technological solutions to be implemented is responsibility of the operators.
Technical openness	The reference architecture scheme is the FTTB (Fiber To The Building) to allow the wholesale unbundled access to all operators. Passive infrastructures and optic fiber cables are deployed in accordance to the reference scheme.
Economical Advantageousness	The infrastructure has to be suitable for any NGA network architecture telecom operators will decide to implement, without favoring any in particular.
Ability to refuse access	If the intervention model is "wholesale-only", the ability of refusing access to passive infrastructure is granted in order to safeguard the investments made.
Maximum integration	The primary access network is optimized for the connection of radio stations and distribution cabinets of existing copper networks, thus maximizing the integration between the fixed and the mobile.

Source: our elaboration from “The Italian Strategy for Next Generation Access Network” – Presidenza del Consiglio dei Ministri

In a nutshell, all the above traits are conceived to safeguard the rival framework, preventing the occurrence of non-competitive outcomes. Since the infrastructure development is co-financed with public sector and EU funds, the state aid “is

limited to the correction of market failures in order to strengthen the competitiveness and competition”<sup>116</sup>.

As noted in the previous chapter, the intervention is “the less and the better targeted aid”; thus, another characteristic of primary relevance is the integration with existing broadband infrastructure, both publicly and privately owned<sup>117</sup>. In fact, the reuse and the modernization of present systems would have likely resulted in significant cost savings and a better management of the public monetary resources. The strategy has encompassed four diverse intervention models, ideally conceived so as to serve only one specific cluster area. Anyhow, the same Italian policymaker acknowledged the fact that the application of the intervention models in different clusters as compared to the stylized scenario was to be meant as flexible and non-binding. This is because “the socio-economic conditions of Italy are such that make it unavoidable to adopt different solutions according to the targeted area’s features, thus minimizing the public investment necessary”<sup>118</sup>.

The first model being audited is the so-called “direct intervention”. The table below describes its key features emphasizing a composite relationship among:

- the procuring authority, responsible for the tendering process,

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<sup>116</sup> PCDM, The Italian Strategy for Next Generation Access Network, p. 61.

<sup>117</sup> EU, Directive 2014/61 on measures to reduce the cost of deploying high-speed electronic communications networks, 05.15.2014.

<sup>118</sup> PCDM, The Italian Strategy for Next Generation Access Network, p. 69.

- the concessionaire, i.e. the private company or consortium who won the competitive selection process,
- the private operators asking access to the passive ultra-broadband infrastructure,
- the telecom regulatory authority, i.e. AGCOM.

Table 14 - Direct intervention model

<b>Direct Intervention</b>	Choice of aid beneficiary	The aid beneficiary is to chosen through a competitive selection process. The award criterion is "most economically advantageous offer" (ratio price/quality).
	Ownership of the infrastructure	The awarded operator offers the passive access and leases the rights of use to third parties. Operators, in accordance with SLAs, provide connection to end users. The infrastructure remains public.
	Length of the concession	The concession will be time-limited. Its lenght is related to the nature of the investment and to the amortization's process endured by the concessionaire.
	Management principles	The infrastructure is to be managed guaranteeing the superior public interest, maximizing openness and fairness in the competition among all operators that request access to passive infrastructure.

Source: our elaboration from “The Italian Strategy for Next Generation Access Network” – Presidenza del Consiglio dei Ministri

Consistently with our research objective, this model is of paramount importance since it was the one being employed in the BUL tenders for white areas (object of the following section). In fact, this standard was expected to be used in areas belonging to the “cluster D” as well as across all other clusters, on restricted areas proven not to be attractive for the private backing.

Moreover, for the sake of completeness, it has been demonstrated that in this specific sector<sup>119</sup> and under the same circumstances (white areas) this model is the most effective and guarantees the best outcomes in terms of public interest.

Despite being enlisted, the residual three systems have only been marginally employed, indeed, they will be only described as corollary.

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<sup>119</sup> Public tender’s SOA OS19.

The second model is the Public-Private Partnership (therein PPP). The main aspect of this pattern is that it allows bigger investments because of the co-financing of private entities. The award of contracts occurs one-shot, and both parties (i.e. the procuring authority and the private company) are engaged in a long-lasting partnership covering a whole strategic plan – and not only a sub-part of it. The drawback of the PPP is that the property of the newly completed infrastructure will be given to a different legal entity, company or network. Severe implications in the competitive context must be carefully accounted by the antitrust authority (i.e. AGCM), since its application may lead to the emergence of a monopolistic player. The next standard is the “incentive model<sup>120</sup>” whose main attributes may be recapped as it follows:

- The coordination of public and private funds (at least equal to 30% of the foreseen need) ensures high efficacy.
- The public sector grants a public contribution (at most to 70%) to operators being selected through public tenders.
- The ownership remains to the beneficiary who, as counter-performance, commits to be compliant with the conditions imposed by AGCOM.

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<sup>120</sup> The incentive model has been widely used in preceding broadband tenders (e.g. Eurosud and val Sabbia). Generally, the outcomes of these tenders have been positive (e.g. growth of the penetration rate, higher coverage of private properties as against the forecasts, ...), notwithstanding, a crucial drawback soon arose. With the incentive model the ownership of the infrastructure remains to the beneficiary, hence, the state aid represents a non-refundable straight grant (AGCOM, 2017).

Last but not least, the “intervention for demand aggregation<sup>121</sup>” is made of parts of the three models broken down above. It was devised to aggregate demand in specific restricted areas such as industrial districts whose connectivity requirements, under the strategic legal in-force background, are at 100 Mbps.

A final mention has to be set apart to the monitoring activity of the PA who regularly verifies not only the correct implementation of the measures, but also whether beneficiaries gain extra-profits. If so, a claw-back mechanism is triggered, and the same PA is refunded of any over-compensation.

On March 2, 2016 the COmitato per la Banda Ultra Larga (COBUL) decided to focus the public intervention in clusters C and D, so-called “market-failure areas”, with the “direct intervention model”.

### **3.4 INFRATEL ITALIA: PUBLIC TENDERS FOR WHITE AREAS**

In accordance with the afore-mentioned strategic and legal framework, Infratel Italia S.p.A., in-house society of the MISE, was the legal authority in the driving seat of the tendering procedures. Object of the tenders has been “the concession of

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<sup>121</sup> The “intervention for demand aggregation” model has been designed on purpose in order to back up the transition to more performing technologies (e.g. FTTH vs FTTC). The analysis of Eurosud tenders displayed that a significant sub-part of the population unaware of potential benefits of more advanced technologies has not passed to these services (AGCOM, 2017).

construction, the maintenance and the commercial exploitation of a passive ultra-broadband infrastructure in white areas”.

The massive infrastructural investment for the development of ultra-broadband has interested all the Italian regions (except the autonomous province of Bolzano).

Regions have been grouped as in the scheme<sup>122</sup> below:

- First tender: Abruzzo and Molise; Emilia-Romagna; Lombardia; Toscana; Veneto.
- Second tender: Piemonte, Valle d’Aosta and Liguria; Friuli Venezia-Giulia and Province of Trento; Marche and Umbria; Lazio; Campania and Basilicata; Sicilia.
- Third tender: Calabria; Puglia; Sardegna.

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<sup>122</sup> The proposed scheme enlists the regions by taking into account the parcels of the tender, as deductible from the official concession notices.

Figure 18 - BUL tenders - Map of Italian regions



Source: Our elaboration.

Yellow filling is for the first tender, light green for the second and baby-blue for the third. The darker blue round is for the autonomous province of Bolzano which has not being included in these competitive calls for tendering.

The related chronogram of the three BUL tenders has been synthetized as in the following table 15 where the time frames of each competitive call for tender are displayed from June 2016 (beginning of the first tender) to January 2019 (signature of the covenant agreement of the third one).

To this extent, a Gantt <sup>123</sup> chart is provided in order to grant an easy-to-read albeit complete picture of the tenders' processes.

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<sup>123</sup> A Gantt chart is “Type of bar-chart that shows both the scheduled and completed work over a period. A timescale is given on the chart's horizontal axis and each activity is shown as a separate horizontal rectangle (bar) whose length is proportional to the time required (or taken) for the activity's completion. In project planning, these charts show start and finish dates, critical and non-critical activities, slack time, and predecessor-successor relationships. Also called chronogram, it



competitive calls for tendering whose award principle was the “most economically advantageous tender” (herein forward, for simplicity, MEAT)<sup>126</sup>.

Furthermore, since the overall value of the public works contracts exceeded the EU application threshold (contracts higher than 5.548.000€, as mandated by Directive 2014/24/EU), the EU in-force regulation did apply in combination with EU Broadband Guidelines and reference SA measures.

MEAT is a composite performance indicator appraising simultaneously both the technical quality and the price; thus, taking the form of a quality-price ratio.

This latter expresses the combination of various elements, cost-based and non-cost related, as evaluated by the contracting authority as against the official requirements.

Infratel appraised the offers on the basis of the overall score (OS) represented in equation [8] below<sup>127</sup>, computed by the summation of a technical quality score (TQS, weighted 70/100) and a price score (PS, valued 30/100) “expressed as the offered rebate on the initial price, like in a first-price sealed bid auction” (Matteucci, 2019).

Hence, the overall score of the  $i$ -th bid is calculated as it follows:

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tender” – as amended by legislative decree 56/2017 with deliberation no. 424 of 02/05/2018 published in the Italian OJ no. 120 of 25/05/2018.

<sup>126</sup> Also known as “Economically most advantageous tender”, EMAT.

<sup>127</sup> The scoring rule hereby described is based on Matteucci N. (2019), The EU State aid policy for broadband: An evaluation of the Italian experience with first generation networks, in press, <https://doi.org/10.1016/j.telpol.2019.101830>.

$$OS_i = \alpha TQS_i + \beta PS_i \quad [8]$$

where  $OS_i$  ranges from 0 to 100 (full score),  $\alpha$  is equal to 0,70 and  $\beta$  equal to 0,30.

The TQS score as designed by Infratel took into account 6 sub-criteria<sup>128</sup>:

1. Technical plan of construction, management and maintenance (technical plan score, TPS);
2. Adopted measures to regulate equivalence as against retail operators (equivalence score, ES);
3. Enhancement of the coverage plan (coverage score, CS);
4. Improvement of the services provided to other operators (service improvement score, SIS);
5. Rebate on construction time and management initiation (time score, TS);
6. Degree of vertical integration of operators (vertical integration score, VIS)<sup>129</sup>.

As in equation [9], the TQS of the  $i$ -th bid is:

$$TQS_i = \alpha TPS_i + \beta ES_i + \gamma CS_i + \delta SIS_i + \epsilon TS_i + \zeta VIS_i \quad [9]$$

Where  $TQS_i$  depends positively on all its components, except from  $VIS_i$ .

<sup>128</sup> The award criteria have been retrieved from the official concession notices published on EU TED:

- First tender: EU OJ 2016/S 107-190845-IT of 04/06/2016.
- Second tender: EU OJ 2016/S 153-277343-IT of 10/08/2016.
- Third Tender: EU OJ 2018/S 076-170394-IT of 19/04/2018.

<sup>129</sup> The Vertical Integration Score (VIS) of the  $i$ -th bid is such that a wholesale operator, i.e. it is not vertically integrated, will get a score of 0, unless it commits to create a new separated legal entity. Rumors say that the degree of vertical integration has accounted for the 20% of the TQS.

As cited above, the PS achieved by the i-th bidder depends from the its offered allowance ( $A_i$ ) as against the amount made up of auction and the rebates of the j-th bidder (where  $j=1, 2, \dots, n-1$  and  $n$  is the number of tenderers).

Equation [10] provides a stylized calculation<sup>130</sup>:

$$PS_i = f(A_i, A_j) \quad [10]$$

where  $A_j$  is the allowance of the j-th bid.

$PS_i$  depends positively to  $A_i$  and negatively to  $A_j$ , that is:

$$\frac{\partial PS_i}{\partial A_i} > 0 \quad \frac{\partial PS_i}{\partial A_j} < 0 \quad [11] \quad ;$$

Bergman & Lundberg (2013)<sup>131</sup> have formalized a scoring rule that specifies equation [10] consistently with the most common method employed by procurers:

$$PS_i = PS_{max} \frac{P_{lowest} - P_i}{P_{lowest} - P_{highest}} \quad [12]$$

Where  $PS_{max}$  is the maximum attainable price score,  $P_{lowest}$  is the lowest-price bid and  $P_i$  is the tendered price of the i-th bidder.

Once all the competitive bids have been evaluated consistently, they are ranked from the highest to the lowest. To the first-ranked operator, a twenty-year concession is granted in accordance with the “direct intervention model” (as previously described in section 3.3.4.).

<sup>130</sup> Due to lack of information about the computation basis for the calculus of the price score (PS), equation [3] is, on purpose, general.

<sup>131</sup> Bergman M., Lundberg S (2013), Tender evaluation and supplier selection methods in public procurement, in: Journal of Purchasing & Supply Management (19), p.79.

The awarded operator will receive a compensation up to 100% of the foreseen expenditures as in equation [13]<sup>132</sup>:

$$P_i = MVW_i - DCF_i \quad [13]$$

Where  $P_i$ , i.e. the public sector contribution for the construction and maintenance of the  $i$ -th passive network, is equal to the market value of the  $i$ -th work completed ( $MVW_i$ ) net of the discounted cash flows ( $DCF_i$ ) deriving from the commercial exploitation of the same  $i$ -th network.

$$DCF_i = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_k}{(1+r)^k} \quad [14]$$

Where  $CF_n$  is the cash flow of  $n$ -th period and  $r$  is the discount factor.

Since the length of contract is 20 years, equation [14] is true for  $n = 1, 2, \dots, 20$ .

The following sub-paragraphs will be dedicated to a more rigorous analysis of the BUL tenders with consideration of the same tender process, the offers, the awards and, finally, some initial considerations about the outcomes.

#### 3.4.1. First BUL tender

Infratel launched the first ultra-broadband tender for white areas in June 2016, allocating more than 1.400 EUR million for the construction, the maintenance and

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<sup>132</sup> Palmerini M. (n.d.), Piani di Infrastrutturazione Pubblica a Banda Ultralarga, <https://www.ucer.camcom.it/comunicazione/notizie/pdf-2018/infratel-marco-palmerini>.

the commercial exploitation of an ultra-fast broadband infrastructure in 5 parcels (Abruzzo and Molise; Emilia-Romagna; Lombardia; Toscana; Veneto).

Infratel outlook were such that 6,5 million citizens, 3,5 million building units (for simplicity, BU) and more than 500.000 PAs and industries would have been covered via this competitive tender.

From the publication of the call for tendering (04/06/2016) to its conclusion, i.e. the signature of the agreement between the concessionaire and Infratel (20/06/2017), a little bit more than one year has passed.

Table 16 displays all the steps occurred within this time frame.

Table 16 - Milestones of the first BUL tender

<b>INFRATEL ITALIA SpA - FIRST BUL TENDER</b>			
<b>ID</b>	<b>DAY</b>	<b>EVENT - DESCRIPTION</b>	<b>NOTES</b>
1	04/06/16	Publication of the call for tendering in the Official Journal of the EU 2016/S 107-190845-IT	-
2	03/06/16	Publication of the call in the Italian Official Journal " V^ serie speciale" (public contracts) n. 63/03.06.2016	-
3	18/07/16	Dadline for the submission of pre-qualification requests - till 1.00 pm - online	-
4	25/07/16	Extended deadline for the request submission (publication in the Italian Official Journal n. 81/15.08.16)	-
5	09/08/16	Dispatch of invitation letters to the pre-qualified bidders (Oper Fiber, Telecom, Retelit, Metroweb, Fastweb, Estra)	6 pre-qualified bidders
6	17/10/16	Deadline for the submission of offers (technical + economical)	no offers Fastweb and Metroweb
7	07/12/16	First public session - opening of administrative envelopes	no bidder excluded
8	10/01/17	Second public session - opening of technical envelopes	no bidder excluded
9	24/01/17	Third public session - opening of economical envelopes	-
10	03/03/17	Fourth public session - Adjudication	winning bidder: Open Fiber S.p.A.
11	07/03/17	Decision of Infratel Italia Board - Approval of the adjudication proposal	-
12	15/03/17	Publication of the tender's outcome in the Official Journal of the EU 2017/S 052-096721-IT	
13	17/03/17	Publication of the tender's outcome in the Italian Official Journal n. 32/17.03.2017	-
14	16/05/17	Decision of Infratel Italia Board - Effective Adjudication	-
15	16/06/17	Signature of the contract between Infratel Italia S.p.A. and Enel Open Fiber S.p.A.	-
16	20/06/17	Signature of the parcel agreements between Infratel Italia S.p.A. and Enel Open Fiber S.p.A. (OJ 78/10.07.17)	no publication in EU OJ is needed

Source: Our elaboration on data from Infratel Italia S.p.A., Italian Official Journal and TED OJ.

The pre-qualification phase of this tender ended with six qualified bidders: Open Fiber, Telecom, Retelit, Metroweb, Fastweb and Estra. However, only four of them opted for making a bid. If Metroweb has not submitted its bid because of its upcoming acquisition by Enel Open Fiber S.p.A.<sup>133</sup>; Fastweb not only has not

<sup>133</sup> Through a merger by acquisition, Enel Open Fiber S.p.A. incorporated all the companies within the holding Metroweb S.p.A. and gave birth to a NewCo "Open Fiber S.p.A.". The merger with Metroweb in early 2017 allowed OF to capitalize on the biggest ultra-broadband fiber network in Italy (in 2016), to leverage core competencies and crucial knowhow in the development of ultra-

placed its offer but, as it will be seen in few lines, appealed to TAR Lazio for some illegitimacies in the tender notice.

For the instance being, take a look to some tender proceedings.

The following table exhibits the allocated funds per parcel and divided in: construction, final design and executive design costs. The overall amount made up of auction slightly exceeded 1.400 EUR million, whereas, the awarded tender bid was of 675 EUR million.

Table 17 - Value of the first BUL tender

Parcel	Area	CIG	Value of the Tender						Total maximum amount
			Building	%	Final Design	%	Executive Design	%	
1	Abruzzo, Molise	671083001C	120.812.076,00	98,21%	1.051.396,00	0,85%	1.144.665,00	0,93%	123.008.137,00
2	Emilia Romagna	671083543B	228.359.664,00	98,28%	1.913.680,00	0,82%	2.083.442,00	0,90%	232.356.786,00
3	Lombardia	671085658F	431.876.617,00	98,33%	3.511.167,00	0,80%	3.822.639,00	0,87%	439.210.423,00
4	Toscana	67108619AE	218.377.554,00	98,28%	1.834.409,00	0,83%	1.997.139,00	0,90%	222.209.102,00
5	Veneto	6710873397	382.070.940,00	98,32%	3.122.770,00	0,80%	3.399.794,00	0,87%	388.593.504,00
			<b>1.381.496.851,00</b>	<b>98,30%</b>	<b>11.433.422,00</b>	<b>0,81%</b>	<b>12.447.679,00</b>	<b>0,89%</b>	<b>1.405.377.952,00</b>

Source: Our elaboration on data from Infratel Italia S.p.A.

All values hereby mentioned are expressed in €, apart from the percentages in the fifth, seventh and ninth column. The higher the values in the seventh and ninth columns, the more complex is the project organization. Despite no prior history occurred and disregarding the tough competition, the awarded tender offers offset less than one half of the allocated budget (overall allowance of 51,9542%).

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broadband infrastructure and, last but not least, ameliorating the financial standings of its interventions in clusters A and B (where no state aid is granted).

Table 18 - Upshots of the first BUL tender

Parcel	Area	CIG	Total maximum amount (in €)	Awarded tender (in €)	Δ (absolute value)	Δ (relative terms)
1	Abruzzo, Molise	671083001C	123.008.137,00	70.573.121,00	52.435.016,00	42,6273%
2	Emilia Romagna	671083543B	232.356.786,00	119.357.968,00	112.998.818,00	48,6316%
3	Lombardia	671085658F	439.210.423,00	303.311.393,00	135.899.030,00	30,9417%
4	Toscana	67108619AE	222.209.102,00	40.946.017,00	181.263.085,00	81,5732%
5	Veneto	6710873397	388.593.504,00	141.035.942,00	247.557.562,00	63,7060%
			<b>1.405.377.952,00</b>	<b>675.224.441,00</b>	<b>730.153.511,00</b>	<b>51,9542%</b>

Source: Our elaboration on data from Infratel Italia S.p.A.

When not differently stated, all values hereby mentioned are expressed in €.

To this extent, it may be interesting to pinpoint that the maximum percentile mark-down (81,5732%) has been reached in the parcel no. 4, which was the tender sup-part where the favored operators (i.e. OF and Telecom) achieved their lowest score (for the first, 96,629; for the latter, 68,497).

As one can see from the subsequent table, Open Fiber achieved a quasi-perfect score (in TQS as well as PS) in all the parcels with an average score of 97,601.

Table 19 - Scores of the first BUL tender

Parcel	Area	CIG	Pre-qualified offering companies				Winning Company
			Open Fiber	Telecom	Retelit	Estra S.p.A.	
1	Abruzzo, Molise	671083001C	98,090	70,718	n.s.	n.s.	Open Fiber
2	Emilia Romagna	671083543B	97,270	73,915	63,610	n.s.	Open Fiber
3	Lombardia	671085658F	98,593	80,614	n.s.	n.s.	Open Fiber
4	Toscana	67108619AE	96,629	68,497	n.s.	72,830	Open Fiber
5	Veneto	6710873397	97,4240	71,1170	n.s.	n.s.	Open Fiber

Source: Our elaboration on data from TLC blogs and magazines.

All values hereby mentioned are out of 100 and encompass both the price and the qualitative score (whose summation is equal to 100). The term [n.s.] stands for not submitted.

This bid, however, has been qualified as “abnormal”<sup>134</sup>. An abnormally low bid is such that a competing operator achieves a score higher than the four fifths in both TQS and PS. Under this circumstance, Infratel had to launch an additional verification procedure in order to assess whether the bid of the transient awarded concessionaire was congruous, serious, sustainable and realizable. These things so as to make sure that the winning operator will be in a position to be compliant with its same bid<sup>135</sup>.

For the sake of discussion, before getting to the effective adjudication to Open Fiber, the contracting authority had to deal with two appeals from Telecom and Fastweb. The petition of the former regarded the guidelines for the future wholesale tariffs; whilst, on the contrary, the latter point considered illegitimate the penalization of vertically integrated operators, that is, in other words, rewarding with extra-points wholesale-only operators.

After long legal lawsuits, both legal allegations came to nothing and the first tender was completed. Open Fiber won undisputedly.

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<sup>134</sup> Pursuant to the Italian Code for Public works (legislative decree no. 50/2016 as amended by law-decree 32/2019), art. 97 comma 3 – “Abnormally low bids” – “When the selection criterion is the most economically advantageous tender, the bids congruity is evaluated on the bids that exhibit either for the points related to the price or those related to other elements of appraisal, both equal or higher than the four fifths of the correspondent maximum points as provided by the tender notice”.

<sup>135</sup> In order to avoid redundancies (since this process is common to all three tenders), these notes about the “abnormally low bid” will be neglected in the following sections 3.4.2. and 3.4.3..

Table 20 - Score differentials from the awarded tender

$\Delta$ (score to Telecom)	$\Delta$ (score to Retelit)	$\Delta$ (score to Estra)	$\Delta$ (on average)
-27,372	-	-	<b>-27,372</b>
-23,355	-33,660	-	<b>-28,508</b>
-17,979	-	-	<b>-17,979</b>
-28,132	-	-23,799	<b>-25,966</b>
-26,307	-	-	<b>-26,307</b>
			<b>-25,226</b>

Source: Our elaboration on data from TLC blogs and magazines.

The depicted values are computed as the difference between among the offers and the awarded one. The hyphen [-] is used when no information is available, that is when no other offers have been submitted.

Table 20 illustrates the score differentials to OF as against Telecom, Retelit and Estra. With an average gap of  $|-25,226|$ , Open Fiber tender bid blew away the competition and mortgaged the future tenders.

#### 3.4.2. Second BUL tender

With a slight delay to the first BUL tender, the second competitive call for tendering was launched by Infratel Italia in mid-August 2016. The object of the tender notice was the same (i.e. the construction, maintenance and commercial exploitation of a passive broadband infrastructure) covering about 4,7 million BU, assembled as in the subsequent scheme:

- 1,1 million BU with connections above 100 Mbit/s (50 Mbit/s in upload);
- 2,8 million BU connected above 30 Mbit/s (15 Mbit/s in upload);
- 0,8 million provisional BU above 30 Mbit/s (15 Mbit/s in upload).

As displayed in table 21, the allocated budget for achieving the prior targets (in 11 regions clustered as below) was slightly lower than EUR 1.300 million.

Table 21 -Value of the second BUL tender

Parcel	Area	CIG	Value of the Tender						
			Building	%	Final Design	%	Executive Design	%	Total amount
1	Piemonte, Valle d'Aosta, Liguria	6773240E74	358.567.391,00	98,34%	2.938.459,00	0,81%	3.128.037,00	0,86%	364.633.887,00
2	Friuli Venezia-Giulia, Trento	6773259E22	166.274.719,00	98,27%	1.418.148,00	0,84%	1.509.641,00	0,89%	169.202.508,00
3	Marche, Umbria	6773268592	154.588.277,00	98,26%	1.324.248,00	0,84%	1.409.683,00	0,90%	157.322.208,00
4	Lazio	6773278DD0	171.020.415,00	98,27%	1.456.223,00	0,84%	1.550.173,00	0,89%	174.026.811,00
5	Campania, Basilicata	67732842C7	198.917.938,00	98,29%	1.679.968,00	0,83%	1.788.353,00	0,88%	202.386.259,00
6	Sicilia	677329295F	184.193.587,00	98,28%	1.561.650,00	0,83%	1.662.402,00	0,89%	187.417.639,00
			<b>1.233.562.327,00</b>	<b>98,29%</b>	<b>10.378.696,00</b>	<b>0,83%</b>	<b>11.048.289,00</b>	<b>0,88%</b>	<b>1.254.989.312,00</b>

Source: Our elaboration on data from Infratel Italia S.p.A.

All values hereby mentioned are expressed in €, apart from the percentages in the fifth, seventh and ninth column. The higher the values in the seventh and ninth columns, the more complex is the project organization. Differently from the first BUL tender, the second one concerned a far broader territory from Valle d'Aosta to Sicilia. Although all areas belonged to clusters C & D, table 22 portrays some puzzling evidences deserving a more attentive investigation.

Table 22 - Second BUL tender – Upshots

Parcel	Area	Total maximum amount	Awarded tender	Δ (absolute value)	Δ (relative terms)
1	Piemonte, Valle d'Aosta, Liguria	364.633.887,00	187.747.764,00	176.886.123,00	48,511%
2	Friuli Venezia-Giulia, Trento	169.202.508,00	87.429.567,00	81.772.941,00	48,328%
3	Marche, Umbria	157.322.208,00	69.488.313,00	87.833.895,00	55,831%
4	Lazio	174.026.811,00	82.003.373,00	92.023.438,00	52,879%
5	Campania, Basilicata	202.386.259,00	196.528.950,00	5.857.309,00	2,894%
6	Sicilia	187.417.639,00	183.465.692,00	3.951.947,00	2,109%
		<b>1.254.989.312,00</b>	<b>806.663.659,00</b>	<b>448.325.653,00</b>	<b>35,723%</b>

Source: Our elaboration on data from Infratel Italia S.p.A.

When not differently stated, all values hereby mentioned are expressed in €.

On average, the mean tender markdown was 35,723% (EUR 448 million).

The results of parcels five and six distinguished themselves as the areas with the lowest allowances (2,894% and 2,109%, respectively), far below the recorded

upshots of the other parcels (and the prior tender). At a first sight, it may be fairly assessed that there were significant differences among the involved areas.

A complete analysis cannot disregard the competition setting in which operators fought for the tender's award. The parcels of Campania, Basilicata and Sicilia were characterized by the presence of a sole operator willing to accept the challenge of deploying a future-proof broadband network. Thus, it can be rather self-evident that the absence of rivals allowed the awarded company (OF) to offer lowered markdowns. Nonetheless, this situation was also present in the first parcel.

As a consequence, the mere competitors' absence is not sufficient to make predictions ex-ante about the possible offers at a low ebb.

On the basis of the evidence collected, a plausible explanation may concern the weighing of rural/remote areas. In fact, the regions with the lowest rebates were widely cabled through prior MP and, especially, with the Eurosud<sup>136</sup> 2013 Plan.

Additional reflections will be made in section 3.6 when assessing the results of the BUL tenders as a whole.

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<sup>136</sup> The Eurosud plan framed in the "Italy Digital Plan – Super-fast broadband" (approved by the EC with the decision C(2012)9833 of 18.12.2012 SA.34199) has involved seven regions in central-southern Italy (Basilicata, Calabria, Campania, Lazio, Molise, Puglia, Sicilia) and Val Sabbia (in the province of Brescia). Yard works have begun in the period 2014-2016 after 2013 public tenders. For the purpose of this work, it is our way of envisaging only to highlight the differences with the BUL tenders. Firstly, the intervention model is based on public contributions covering up to 70% of private investment with the ownership of the infrastructure being held by the awarded private operator. Secondly, tenders have been assigned to the incumbent Tim S.p.A.

Yet another time, before adjudging the tender effectively, Infratel Italia had to face the legal allegations of Eolo<sup>137</sup>, which resulted for being unsupported.

Before passing by to the third tender, table 23 enlists the attained scores by the offering telco operators. Even though the OF scores of the first tender were extremely high, the company with the widest broadband network made it possible to ameliorate its record with a mean score of 98,388 (parcels 1, 2 and 3 have not been considered due the lack of reliable information).

Table 23 - Scores of the second BUL tender

Parcel	Area	CIG	Pre-qualified offering companies				Winning Company
			Open Fiber	Acea	Retelit	Estra S.p.A.	
1	Piemonte, Valle d'Aosta, Liguria	6773240E74	n.a.	n.s.	n.s.	n.s.	Open Fiber
2	Friuli Venezia-Giulia, Trento	6773259E22	99,168	n.s.	84,023	n.s.	Open Fiber
3	Marche, Umbria	6773268592	98,164	77,152	n.s.	66,249	Open Fiber
4	Lazio	6773278DD0	97,833	88,313	n.s.	n.s.	Open Fiber
5	Campania, Basilicata	67732842C7	n.a.	n.s.	n.s.	n.s.	Open Fiber
6	Sicilia	677329295F	n.a.	n.s.	n.s.	n.s.	Open Fiber

Source: Our elaboration on data from TLC blogs and magazines.

All values hereby mentioned are out of 100 and encompass both the price and the technical quality score (whose summation is equal to 100). The term [n.s.] stands for not submitted. The term [n.a.] is used when no information is available.

### 3.4.3. Third BUL tender

The last BUL tender has involved Calabria, Puglia and Sardegna.

The choice of concluding the first phase of the Italian ultrabroadband plan for the white areas with these three regions was not casual. They have taken advantage of

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<sup>137</sup> Eolo contested the fact that some areas covered by the tender notice were already under OF investment plan through prior public sector interventions.

prior public interventions with the “Eurosud tenders” and, soon after, become ones of the most cabled Italian regions (i.e. with a significantly elevated or above-average cable-connectivity as compared to the others).

This is particularly true for Calabria. In fact, the state allocations for the building, maintenance and commercial exploitation of a fiber passive infrastructure (briefly recalling the object of the tender) are consistently lowered with respect to Puglia and Sardegna<sup>138</sup>.

In addition, for the same logical reasoning, the overall budget for the third tender has accounted only for less than one tenth of the previous BUL tenders.

The third tender has started with a significant delay<sup>139</sup> as against the forecast of the Italian government 2015 BUL strategy. The main root cause of the postponement is to be found in the belated signature of both the framework agreement and the operational agreement between Calabria and MISE (Fiordalisi, 2018)<sup>140</sup>.

In accordance with the government MP, more than a hundred EUR million have been assigned for the coverage of an area of more than 378 thousand citizens, 317 thousand BU and 882 municipalities.

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<sup>138</sup> The budget appropriation for Calabria (29.209.194€) is the lowest allocation in all the 14 parcels.

<sup>139</sup> For further information about the steps undertaken by the procuring authority, see the appendix 2.6.

<sup>140</sup> Fiordalisi M., Banda ultralarga, la Calabria “inchioda” la gara Infratel, 14.03.2018, <https://www.corrierecomunicazioni.it/telco/banda-ultralarga/banda-ultralarga-la-calabria-inchioda-lultima-gara-infratel/>.

Table 24 unveils the allocated public funds with detail of the three parcels (i.e. the three regions previously cited) including the specifications of the maximum costs of the building activity, the final design and the executive design stages.

Table 24 - Value of the third BUL tender

Parcel	Area	CIG	Value of the tender						
			Building	%	Final Design	%	Executive Design	%	Total maximum amount
1	Calabria	7453162FD6	28.542.194,00	97,72%	323.000,00	1,11%	344.000,00	1,18%	29.209.194,00
2	Puglia	7453181F84	33.716.418,00	97,78%	370.000,00	1,07%	394.000,00	1,14%	34.480.418,00
3	Sardegna	745320100A	38.692.357,00	97,80%	420.000,00	1,06%	451.000,00	1,14%	39.563.357,00
			<b>100.950.969,00</b>	<b>97,77%</b>	<b>1.113.000,00</b>	<b>1,08%</b>	<b>1.189.000,00</b>	<b>1,15%</b>	<b>103.252.969,00</b>

Source: Our elaboration on data from Infratel Italia S.p.A.

All values hereby mentioned are expressed in €, apart from the percentages in the fifth, seventh and ninth column. The higher the values in the seventh and ninth columns, the more complex is the project organization. Assuming that the allocated resources for the design phases are good indicators of the organizational complexity of the projects (i.e. the higher their weight, the more complex the project), it can be concluded that the third BUL tender has represented a great challenge for the involved operators. This is owing to:

- Final design: 1,08% > 0,83% > 0,81%.
- Executive design: 1,15% > 0,88% > 0,89%.

An additional scrutiny of its peculiarities will be hosted in section 3.5 when talking about tenders' results.

Moving on with our investigation, the analytical focus has been placed to the examination of the tender's upshots in order to double-check with the empirical evidence whether our prior thoughts would have been reflected into reality.

The hypothesis on the test bench concerned the inverse relationship linking the price mark-down and the number of (potential) competitors.

Without any major doubts, the story of the third tender has been strongly influenced by the outcomes of the previous two, even though prior history did not account in the mere score, rather to the strategic thinking of telcos.

The dominant position of Open Fiber with respect to its main competitors (e.g. Telecom, Retelit or Estra) emerged right after the conclusion of the first and second tenders together with the Telecom/Tim withdrawal in the competition have profoundly affected the dynamics of the tenders' procedures.

Table 25 - Upshots of the third BUL tender

Parcel	Area	CIG	Total maximum amount	Awarded tender	Δ (absolute value)	Δ (relative terms)
1	Calabria	7453162FD6	29.209.194,00	29.176.077,00	33.117,00	0,1134%
2	Puglia	7453181F84	34.480.418,00	34.457.761,00	22.657,00	0,0657%
3	Sardegna	745320100A	39.563.357,00	39.537.040,00	26.317,00	0,0665%
			<b>103.252.969,00</b>	<b>103.170.878,00</b>	<b>82.091,00</b>	<b>0,0795%</b>

Source: Our elaboration on data from Infratel Italia S.p.A.

When not differently stated, all values hereby mentioned are expressed in €.

Table 25 displays the rebates from the allocated eligible cost of the infrastructure.

Coherently with our initial expectations, the average allowance is extremely low, i.e. 0,0795%, meaning that the records of the prior competitive tenders and the relative absence of threatening rivals reinforced the position of the company owned by Enel and CDP (Cassa Depositi e Prestiti).

Moreover, the strength's position of Open Fiber has also benefited from the award criteria. The price weighted much less than the qualitative connotations of the offer.

As a result, the perception of the tangible quality (as surfaced in prior tenders) echoed by the same tender structure legitimized OF to reduce as much as possible the offered mark-down, triggering potential superior performances and above-average returns.

### **3.5 THE RESULTS OF THE TENDERS**

Prior to a more reflective investigation of BUL tenders' outcomes, it may be beneficial to emphasize some key aspects emerged from the tendering procedures. The topic of coverage has not been fully addressed hitherto, hence, at this stage, a comparison among the coverage requirements (as summarized in the tender notices) and the offered coverage has been performed. This assessment is crucial in order to understand whether the DAE2020 objectives are more likely to be reached within the targeted deadline<sup>141</sup>.

As it can be seen in figure 19<sup>142</sup>, the operators had a significant discretionary power seeing as how the procuring authority left 15% of the BU at the bidders' determinations. In a nutshell, the goodness of the OF offer is evident.

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<sup>141</sup> It is being assumed that the offer of the award-winning bidder is to be considered serious, congruous and possible in accordance to the additional verification procedure pursuant to art. 97 (3) legislative decree no. 50/2016.

<sup>142</sup> The graphical representations of figure 19 depicts only the BU coverage of the first and second tender. This is because the lack of viable information regarding the third competitive call for tender.

Figure 19 - BU coverage - Tender Notice vs. Awarder offer



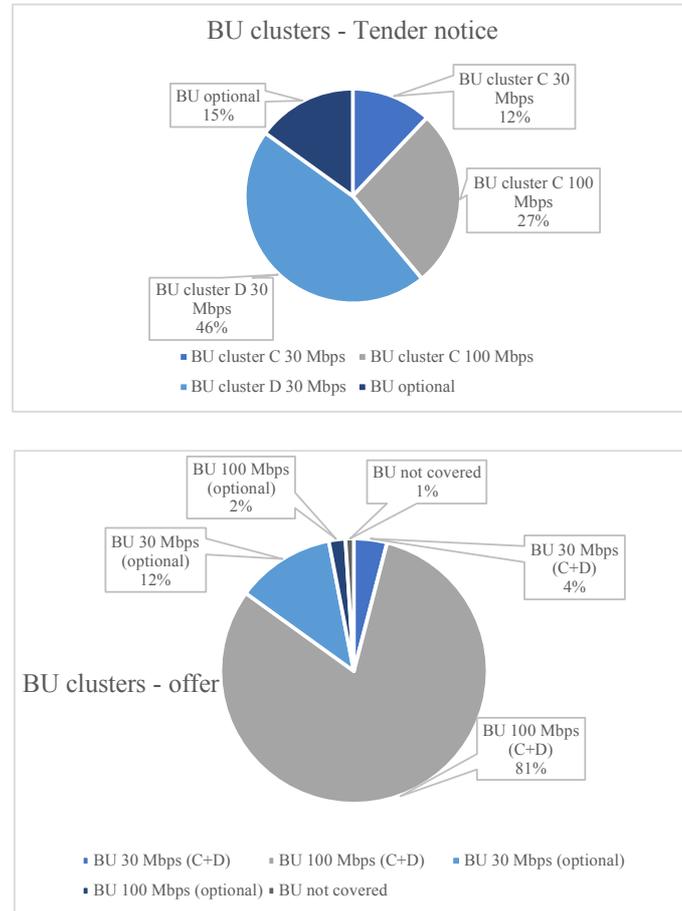
Source: our elaboration on data from Infratel Italia S.p.A.

The main insights from the graphs above are:

- Additional 55,54% of the BU will be covered above 100 Mbps;
- Only 0,73% will not be object of intervention (as against the free 15%).

An even more compelling picture is depicted by figure 20 which takes into account, at the same time, the evidence of all three tenders.

Figure 20 - BU Cluster - Tender notice vs. Offer

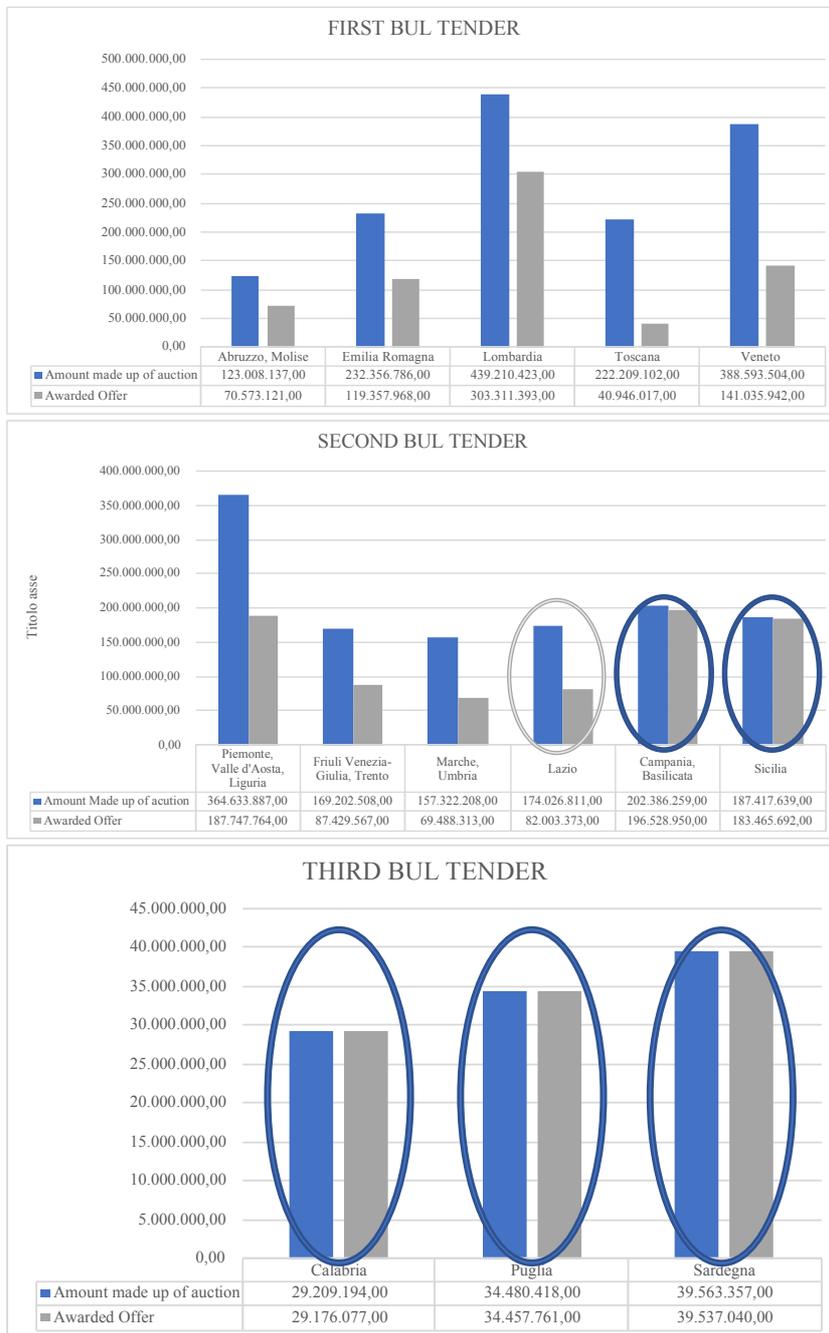


Source: our elaboration on data from Infratel Italia S.p.A.

The pie charts provide an instant standstill portrait of the OF offer in terms of coverage and, under the scoring framework described in section 3.5, it is rather crystal clear that OF CS (coverage score) was standing out.

So far, a major sub-component of the TQS has been examined; thus, moving on, the focus shifts on the price dimension of the awarded bids.

Figure 21 - BUL tenders - Upshots



Source: Our elaboration on data from Infratel Italia S.p.A.

Figure 21 shows OF rebates on the auction's reserve values.

Consistently with the initial comments provided above, it is particularly interesting to point out that the Italian peninsula is clustered into two heterogeneous sub-parts: the former with appreciably high allowances, and the latter characterized by mean markdowns close to zero. The latter group is composed by: Campania and Basilicata, Sicilia, Calabria, Puglia and Sardegna.

Altogether these regions (which have been marked with a blue ellipse) do have something in common: they have been subject of prior public sector supply-side intervention within the framework of the Eurosud tenders.

Notwithstanding, another district belonged to the 2013 MP, that is Lazio (grey highlighted) which, in turn, presents a totally different situation. To this purpose, since the competition of ACEA was hardened, OF could not risk the adjudication by offering an allegedly lowered rebate.

Coming back to the Eurosud regions as grouped above, a viable and reasonable explanation of this thought-provoking fact must include the simultaneous audit of two different phenomena: (i) there was no competition (i.e. OF was the only bidder) and, last but not least, (ii) the prior state support widely covered the most convenient sub-areas and left behind the most remote (e.g. rural) ones which required increasingly high investments (inversely correlated to the offered allowances).

Therefore, as a consequence of point (ii), this scenario was also reflected in the no. of Fixed Wireless Access (herein forward, FWA) projects in comparison with the

no. of fiber cable-based projects. By definition, the higher number of FWA sub-interventions, the more remote the areas.

Table 26 exhibits the BUL projects (per type of technological solution and district).

Table 26 - BUL projects - Italian Regions

TENDER ID	REGIONS	FIBER		FWA		TOTAL	
		#	%	#	%	#	%
1	Abruzzo	192	2,58%	189	2,47%	<b>381</b>	<b>2,53%</b>
2	Basilicata	131	1,76%	131	1,71%	<b>262</b>	<b>1,74%</b>
3	<b>Calabria</b>	<b>263</b>	<b>3,54%</b>	<b>364</b>	<b>4,76%</b>	<b>627</b>	<b>4,16%</b>
2	Campania	546	7,35%	546	7,14%	<b>1.092</b>	<b>7,24%</b>
1	Emilia-Romagna	340	4,58%	340	4,45%	<b>680</b>	<b>4,51%</b>
2	Friuli-Venezia Giulia	216	2,91%	216	2,83%	<b>432</b>	<b>2,87%</b>
2	Lazio	369	4,97%	369	4,83%	<b>738</b>	<b>4,90%</b>
2	Liguria	235	3,16%	235	3,07%	<b>470</b>	<b>3,12%</b>
1	Lombardia	1.516	20,40%	1.514	19,81%	<b>3.030</b>	<b>20,10%</b>
2	Marche	234	3,15%	234	3,06%	<b>468</b>	<b>3,10%</b>
1	Molise	136	1,83%	136	1,78%	<b>272</b>	<b>1,80%</b>
2	Piemonte	1.206	16,23%	1.206	15,78%	<b>2.412</b>	<b>16,00%</b>
3	<b>Puglia</b>	<b>228</b>	<b>3,07%</b>	<b>251</b>	<b>3,28%</b>	<b>479</b>	<b>3,18%</b>
3	<b>Sardegna</b>	<b>198</b>	<b>2,66%</b>	<b>293</b>	<b>3,83%</b>	<b>491</b>	<b>3,26%</b>
2	Sicilia	390	5,25%	390	5,10%	<b>780</b>	<b>5,17%</b>
1	Toscana	268	3,61%	268	3,51%	<b>536</b>	<b>3,56%</b>
2	Trentino-Alto Adige (Province of Trento)	217	2,92%	217	2,84%	<b>434</b>	<b>2,88%</b>
2	Umbria	92	1,24%	92	1,20%	<b>184</b>	<b>1,22%</b>
2	Valle d'Aosta	74	1,00%	74	0,97%	<b>148</b>	<b>0,98%</b>
1	Veneto	579	7,79%	579	7,57%	<b>1.158</b>	<b>7,68%</b>
	TOTAL	<b>7.430</b>	<b>100,00%</b>	<b>7.644</b>	<b>100,00%</b>	<b>15.074</b>	<b>100,00%</b>

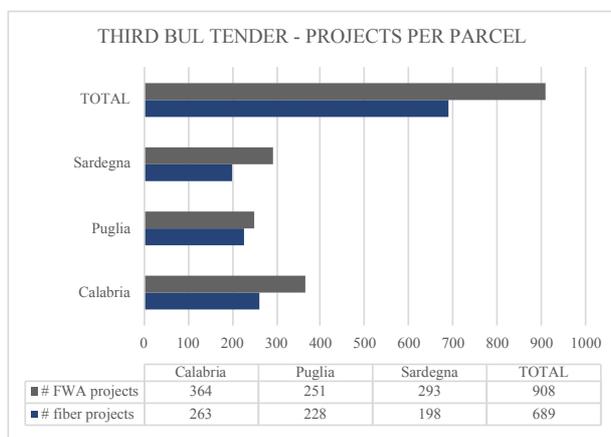
Source: Our elaboration from Infratel Italia S.p.A.

The number of projects being displayed takes into account both fiber and FWA projects.

The above provided reasoning seems to be working with the empirical evidence of Calabria, Puglia and Sardegna (as in figure 22) which, in turn, were ones of the most touched (i.e. the most widely cabled) by the Eurosud MP<sup>143</sup>.

<sup>143</sup> The case of Calabria will be subject of a more in-depth analysis hosted in chapter 4.

Figure 22 - Third BUL tender - Projects per parcel



Source: Our elaboration from Infratel Italia S.p.A.

The number of projects being displayed takes into account both fiber and FWA projects.

### 3.5.1. Status of the Infratel Italia tenders

In order to make a more evidence-based appraisal of the possibility to achieve at least the DAE2020 targets, a descriptive analysis of the tenders' status <sup>144</sup> has been run (as in table 27).

If Cambini et al. (2016) already concluded that the sole spelling-out of the Italian 2015 targets was to be meant as unlikely aligned with the EU2020 strategy, the gathered data from Infratel Italia (updated at July 2019) seems to give high concern.

<sup>144</sup> Appendix 2.7 exhibits the description of the projects' advancement status.

Table 27 - Status BUL projects - Update July 2019 – Template excel sheet

STATUS BUL TENDERS' PROJECTS - UPDATE JULY 2019 - FIBER						
ID	Region	Province	Municipality	Procom	STATUS	Agreement
1	Abruzzo	Chieti	Ari	69003	Final design in approval	YES
2	Abruzzo	Chieti	Arielli	69004	In execution	YES
3	Abruzzo	Chieti	Atessa	69005	Final design endorsed	YES
4	Abruzzo	Chieti	Bomba	69006	Executive design in approval	YES
5	Abruzzo	Chieti	Borrello	69007	In execution	YES
6	Abruzzo	Chieti	Canosa Sannita	69010	In execution	YES
7	Abruzzo	Chieti	Carpineto Sinello	69011	In execution	YES
8	Abruzzo	Chieti	Carunchio	69012	In execution	YES
9	Abruzzo	Chieti	Casalanguida	69014	Final design endorsed	YES
10	Abruzzo	Chieti	Casalbordino	69015	Final design in approval	NO
11	Abruzzo	Chieti	Casoli	69017	In execution	YES
12	Abruzzo	Chieti	Castelguidone	69019	In execution	YES
13	Abruzzo	Chieti	Celenza sul Trigno	69021	Final design endorsed	YES
14	Abruzzo	Chieti	Chieti	69022	Final Design	YES
15	Abruzzo	Chieti	Civitaluparella	69023	In execution	YES
16	Abruzzo	Chieti	Civitella Messer Raimondo	69024	Executive design in approval	YES
			....			
7421	Veneto	Vicenza	Valli del Pasubio	24113	Final design endorsed	YES
7422	Veneto	Vicenza	Valstagna	24114	Final design endorsed	YES
7423	Veneto	Vicenza	Velo d'Astico	24115	Final design in approval	YES
7424	Veneto	Vicenza	Vicenza	24116	Final design endorsed	YES
7426	Veneto	Vicenza	Villaga	24117	Final design endorsed	YES
7427	Veneto	Vicenza	Villaverla	24118	Executive design in approval	YES
7428	Veneto	Vicenza	Zanè	24119	In execution	YES
7429	Veneto	Vicenza	Zermeghedo	24120	Works completed	YES
7430	Veneto	Vicenza	Zovencedo	24121	Final design in approval	YES
7431	Veneto	Vicenza	Zugliano	24122	Final design endorsed	YES

Source: Our elaboration from Infratel Italia S.p.A.

Thereafter, the projects have been grouped accordingly to the project advancement status (as shown by table 28). For investigative purposes, the distinction of fiber and FWA projects is kept under monitoring.

Table 28 - Projects advancement status - Italy

PROJECT ADVANCEMENT STATUS	FIBER		FWA		TOTAL	
	#	%	#	%	#	%
Final Design	1.120	15,07%	961	12,57%	<b>2.081</b>	<b>13,81%</b>
Final Design In Approval	1.286	17,31%	1.876	24,54%	<b>3.162</b>	<b>20,98%</b>
Final Design Endorsed	2.960	39,84%	4.031	52,73%	<b>6.991</b>	<b>46,38%</b>
Wait For Authorizations	542	7,29%	42	0,55%	<b>584</b>	<b>3,87%</b>
Executive Design In Approval	147	1,98%	113	1,48%	<b>260</b>	<b>1,72%</b>
In Execution	1.209	16,27%	442	5,78%	<b>1.651</b>	<b>10,95%</b>
Works completed	166	2,23%	179	2,34%	<b>345</b>	<b>2,29%</b>
<b>TOTAL</b>	<b>7.430</b>	<b>100,00%</b>	<b>7.644</b>	<b>100,00%</b>	<b>15.074</b>	<b>100,00%</b>

Source: Our elaboration from Infratel Italia S.p.A.

The number of projects being displayed takes into account both fiber and FWA projects.

Since the third tender (effectively adjudicated barely in early-April 2019) accounts for about one tenth of the total amount of the projects, the situation depicted above gets more and more worrisome.

In total, only 2,29% of the works have been completed and sole 10,95% of the works are “in execution”. The scenario becomes even more alarming if the analysis takes as benchmark the percentage of FWA running projects (5,78%).

A complete reading of this evidence cannot disregard the fact that, between the first tender completion and the time of the data collection, more than two years have passed. Scholars and IT experts have widely debated on the reasons of this delay and the majority of them got to the conclusion that the main responsibility is to be assigned to the reigning bureaucracy and the intricate relationships among national and sub-national authorities.

### 3.5.2. Will the 2020 objectives be reached?

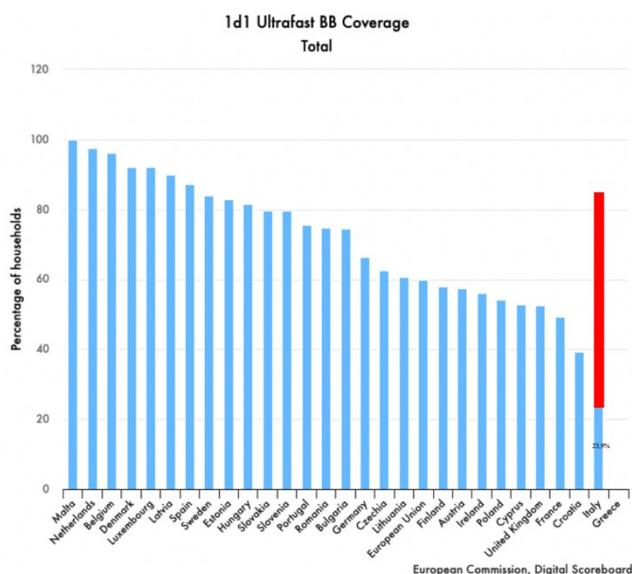
The analysis of the status, however, is not sufficient to forecast whether Italy is in a position to achieve its 2020 targets, which were:

- Provide coverage to 85% of the population with connections above 100 Mbps;
- Ensure that the total population will be connected above 30 Mbps.

Therefore, additional scrutiny is needed. To this aim, evidence from the EC Digital scorecard was retrieved in order to make more precise estimations.

Starting with the first objective, figure 23 depicts the ultra-fast broadband coverage EU-ranking in which, unfortunately, Italy is by far the lowest ranked country.

Figure 23 - Ultra-fast broadband coverage (2019)



Source: our elaboration on EC Digital Scorecard.

Red line exhibits the gap with respect to the goal of covering 85% of the population above 100 Mbps.

Pursuant to our scope, the ranking is not as relevant as the measure (expressed in percentile points). Italian score of 23,9% is lagging well behind its own 2020 target.

Coherently with the evaluated evidence hereby presented, there are severe concerns about the likelihood of achieving this target. Seeing as how the possibility of a sudden unexpected take-up appears to be remote, current forecasts expect to reach the target with a delay bigger than one year (as in table 29).

Table 29 - Ultra-fast broadband coverage - 2018/2021

	2018 VHCN	2019 VHCN	2020 VHCN	2021 VHCN
Friuli Venezia Giulia	5,2%	21,9%	50,3%	90,9%
Veneto	11,1%	24,6%	55,6%	84,4%
Trento	29,7%	31,8%	76,4%	78,0%
Molise	0,0%	38,6%	64,5%	68,5%
Lazio	11,9%	40,4%	57,3%	65,2%
Marche	4,5%	28,8%	52,8%	61,7%
Valle d'Aosta	29,7%	15,6%	57,1%	60,6%
Piemonte	9,6%	32,8%	58,7%	60,5%
Umbria	22,3%	44,7%	58,1%	60,3%
Lombardia	16,1%	29,3%	53,5%	58,5%
Liguria	22,3%	32,3%	53,6%	57,8%
Emilia Romagna	14,5%	33,5%	53,2%	57,7%
Toscana	11,3%	30,7%	47,7%	53,2%
Italia	12,1%	28,0%	45,4%	53,2%
Abruzzo	6,9%	29,7%	45,4%	49,6%
Campania	17,1%	28,6%	37,7%	41,0%
Sicilia	14,2%	27,8%	35,2%	38,7%
Basilicata	2,0%	26,8%	30,0%	33,0%
Puglia	6,4%	12,7%	15,5%	23,3%
Sardegna	5,8%	8,4%	10,1%	20,1%
Bolzano	17,9%	18,0%	18,1%	18,8%
Calabria	3,9%	7,3%	8,9%	15,0%

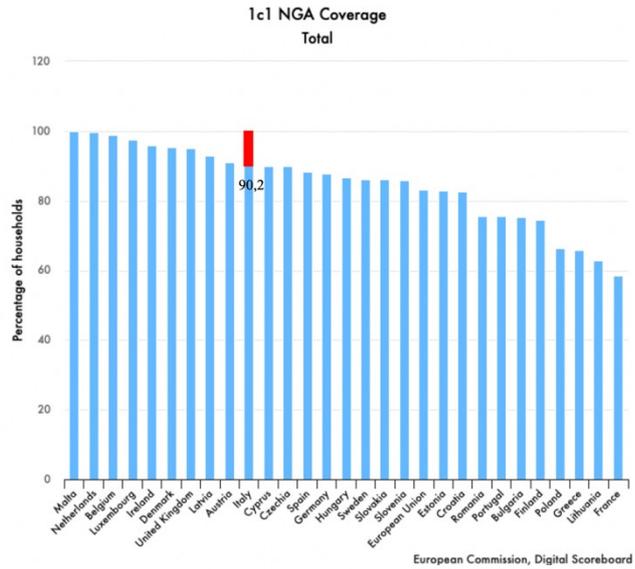
Source: Agendadigitale.eu.

The Province of Bolzano was not covered by the BUL tenders; thus, coverage improvements are due to current and foreseen private investments.

By contrast, the situation of the NGA coverage (as exhibited in figure 24) awakens very different expectations. In fact, 90,2% of the whole Italian population is already served by fast broadband networks (above 30 Mbps).

A complete reading of this data in combination with the scores of the NGA take-up (which is significantly higher than the ultra-fast one, 23,6 vs. 8,91%) suggests that this objective may be within easy reach in the forthcoming months.

Figure 24 - NGA coverage (2019)



Source: our elaboration on EC Digital Scorecard.

Red line exhibits the gap with respect to the goal of covering 100% of the population above 30 Mbps.

In any case, even more accurate appraisals depend on the operational strategy for both grey (with the same model hereby discussed) and black areas (which, in turn, will likely be supported through demand-side interventions such as vouchers to both citizens and companies) whose formalization is expected before year end.

### 3.6 CONCLUSION

This chapter explored the Italian 2015 MP strategy as embedded in the wider umbrella of the “Digital Agenda for Europe” and the EU “broadband guidelines”.

BUL tenders legitimated OF leading role, nearly comparable to the market-power of a natural monopolist and launched the Italian catching-up process to bridge the gap with the other EU member states.

Initially, the premises seemed to indicate a fast take-up, nonetheless the current scenario is leaving numerous concerns about the real feasibility of the strategic MP. With the more challenging targets of the “Gigabit Society”<sup>145</sup>, the Italian delay worries its policymakers whose current agendas are overflowed by the completion of the first MP phase and the formalization of the interventions for black and grey areas together with the demanding task of handling the incumbent network divestiture.

One thing is for certain, even though targets become unattainable hopes, this is the direction to go after for the future years. And, this is not a choice, but a need.

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<sup>145</sup> EC, COM(2016)587 final, Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society. By 2025, MS are expected to ensure the full coverage of the population with connections faster than 100 Mbps.





## **CHAPTER 4: AN EMPIRICAL ANALYSIS OF ULTRABROADBAND DEPLOYMENT IN CALABRIA**

### **4.1. INTRODUCTION**

Based on paragraphs 3.4.3. and 3.5, this last chapter of the work is addressed to investigate with a significantly higher degree of profoundness some salient traits of the massive infrastructure deployment 2015 MP and, subsequently, operationally declined in the launch of the Infratel Italia BUL tenders.

To this particular point, the case of the last competitive call for the tender (involving the regions of Calabria, Puglia and Sardegna) is exceptionally interesting since it leaves wide room for reflection and attentive analysis.

Due to the fact the latter public tender targeted regions already subjected to direct state grants through the Cohesion Action Plan, namely “Eurosud” (SA measure SA.34199 cleared in 2012), at the very beginning, our research attention is riveted towards the discussion of how prior public interventions influence the coverage target of subsequent measures.

In other words, for the sake of simplicity, it has been argued that the higher differentials between the number of FWA projects as against Fiber (Cable-based) projects are mainly affected by how former State Master Plans shaped the scenario. The design of an additional intervention is deeply correlated with the operational upshots of the previous similar (or, even better, equivalent) public tender. As a consequence, table 30 has been built with the aim of showing the ranking of Italian regions as per the no. of FWA projects net of Fiber projects.

Table 30 - Ranking of Italian Regions as per the no. of FWA projects net of Fiber Projects

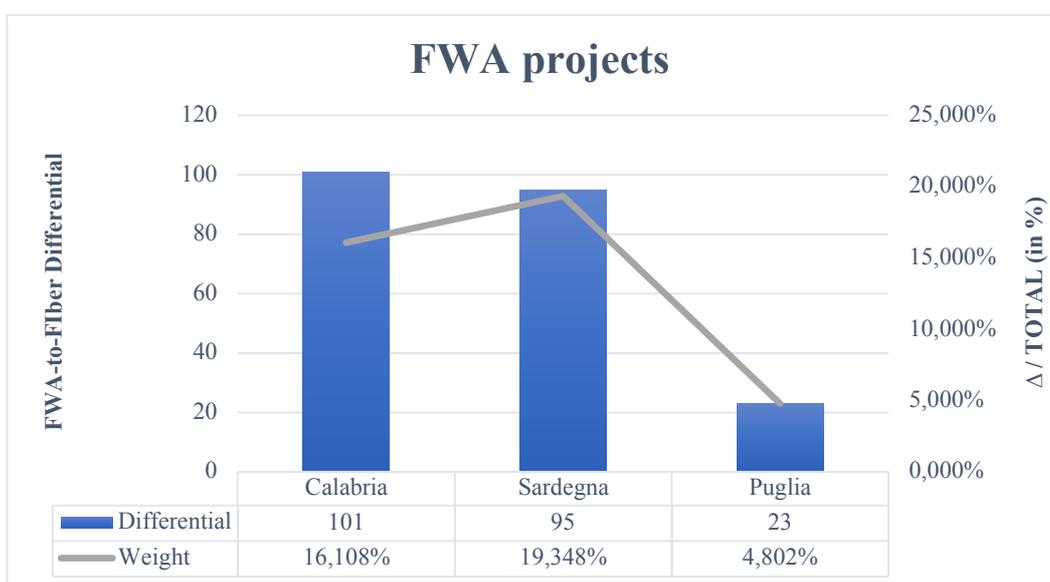
RANK	REGIONS	EURO SUD	FIBER		FWA		TOTAL		Δ	Δ/TOTAL (in %)
			#	%	#	%	#	%		
1	<b>Calabria</b>	✓	<b>263</b>	<b>3,54%</b>	<b>364</b>	<b>4,76%</b>	<b>627</b>	<b>4,16%</b>	<b>101</b>	<b>16,108%</b>
2	Sardegna		198	2,67%	293	3,83%	491	3,26%	95	19,348%
3	Puglia	✓	228	3,07%	251	3,28%	479	3,18%	23	4,802%
4	Lombardia		1.516	20,41%	1.514	19,81%	3.030	20,11%	2	0,066%
5	Abruzzo		188	2,53%	189	2,47%	377	2,50%	1	0,265%
6	Basilicata	✓	131	1,76%	131	1,71%	262	1,74%	0	0%
7	Campania	✓	546	7,35%	546	7,14%	1.092	7,25%	0	0%
8	Emilia-Romagna		340	4,58%	340	4,45%	680	4,51%	0	0%
9	Friuli-Venezia Giulia		216	2,91%	216	2,83%	432	2,87%	0	0%
10	Lazio	✓	369	4,97%	369	4,83%	738	4,90%	0	0%
11	Liguria		235	3,16%	235	3,07%	470	3,12%	0	0%
12	Marche		234	3,15%	234	3,06%	468	3,11%	0	0%
13	Molise	✓	136	1,83%	136	1,78%	272	1,80%	0	0%
14	Piemonte		1.206	16,24%	1.206	15,78%	2.412	16,01%	0	0%
15	Sicilia	✓	390	5,25%	390	5,10%	780	5,18%	0	0%
16	Toscana		268	3,61%	268	3,51%	536	3,56%	0	0%
17	Trentino-Alto Adige		217	2,92%	217	2,84%	434	2,88%	0	0%
18	Umbria		92	1,24%	92	1,20%	184	1,22%	0	0%
19	Valle d'Aosta		74	1,00%	74	0,97%	148	0,98%	0	0%
20	Veneto		579	7,80%	579	7,57%	1.158	7,68%	0	0%

Source: our elaboration on data from Infratel Italia (2019).

Italian Regions have been ranked accordingly to the no. of FWA projects net of the no. of Fiber projects (as in the second last column of the array). The last column, namely “Δ/TOTAL (in %)”, expresses the weight of the same differentials over the total number of projects (FWA + Fiber). The third column displays with a flag (✓) the regions being subject of prior State measures formed in the Eurosud Master Plan (SA.34199). Calabria, which is ranked 1<sup>st</sup> out of 20 regions (in terms of absolute variation; 101>95), is highlighted in bold.

In a nutshell, it is rather self-evident that only three regions <sup>146</sup>, i.e. Calabria (101; 16,108%), Sardegna (95; 19,348%) and Puglia (23; 4,802%), do exhibit significant discrepancies in the FWA-to-Fiber differential (displayed in the last but one column of table 30 and more explicitly in figure 25 below).

Figure 25 - FWA Projects (as against Fiber) - Top-3 of table 30



Source: Our elaboration on data from Infratel Italia (2019)

Moreover, within the ranking podium, i.e. the three better classified regions as per the column “differentials”,  $\Delta$ ; two regions (Calabria and Puglia), previously touched by the recalled Eurosud Plan, cover the first and the third place, respectively.

<sup>146</sup> The case of Lombardia ( $\Delta=2$ ) and Abruzzo ( $\Delta=1$ ) are considered to be negligible for the purpose of this work, since the differentials over the total no. of regional project is lower than 0,3%.

Therefore, in order to directly select one region to be object of our descriptive investigation, the Eurosud upshots expressed in terms of Building Units (BU) coverage have been retrieved from AGCOM (Autorità per le Garanzie nelle COMmunicazioni) Deliberation no. 292/2018/CONS.

This cross-comparison of the implemented design of measures within the 2015 MP (The Italian Strategy for NGAN, cleared in 2016 with SA.41647) and the upshots of Eurosud Tenders is a key preliminary step undermining our research questions so as to legitimate the above-mentioned considerations.

Table 31 - Ranking of Eurosud Regions in terms of BU coverage at the end of the works

RANKING	REGIONS	TOTAL BU	COVERED BU	BU COVERAGE
<b>1</b>	<b>Calabria</b>	<b>1.260.778</b>	<b>796.133</b>	<b>63,146%</b>
2	Puglia	2.126.377	1.217.690	57,266%
3	Basilicata	340.210	170.162	50,017%
4	Sicilia	2.897.279	1.248.651	43,097%
5	Campania	2.610.339	986.314	37,785%
6	Molise	209.572	31.101	14,840%
7	Lazio	2.929.196	174.072	5,943%
	<b>TOTAL</b>	<b>12.373.751</b>	<b>4.624.123</b>	<b>37,370%</b>

Source: our elaboration on data from AGCOM (2018) and Tim

As it can be instantly seen in table 31, Calabria is, by far, the most covered region (63,146%), followed by Puglia (57,266%). Paralleling these results with the mean coverage in the seven regions (37,370%), it becomes clear that the direct intervention model of 2012 reaches its highest efficiency in these two regions<sup>147</sup>.

<sup>147</sup> In order to make an appraisal of the measure effectiveness, matching the reached coverage as against the allocated CAPEX (CAPital EXPenditures) is needed.

No coincidence that in the last massive public intervention for ultra- and ultra-fast broadband development, the latter regions were left behind with respect to the other 17 Italian regions<sup>148</sup>.

In coherence with these relevant outcomes, the forthcoming empirical analysis will take as reference the case of Calabria. The latter seems to be instantly superimposable to Puglia and, with all due abstractions, even to Sardegna. The expandability of the empirical findings to other regions, that is capacity to adopt the same analytical framework, is feasible place that the influence of possible exogenous variability sources is isolated.

To what it may directly concern Sardegna, the empirical findings exhibited in table 30 are also suggesting that the latter is worth additional scrutiny just like Calabria seeing as how the percentage FWA-to-Fiber differential (over the no. total regional projects) is higher (19,348% vs. 16,108%). Recalling that Sardegna was not covered through the public interventions of the Eurosud Plan, this discrepancy may be explained by taking into account other interventions for infrastructure deployment financed by private Telcos. Since it is more problematic to gather precise information on private investments than on public (which must be transparent as in TFEU provisions) in specific geographical areas, the analysis of Calabria seems to be more feasible. Thus, the case of Sardegna may load future research agenda.

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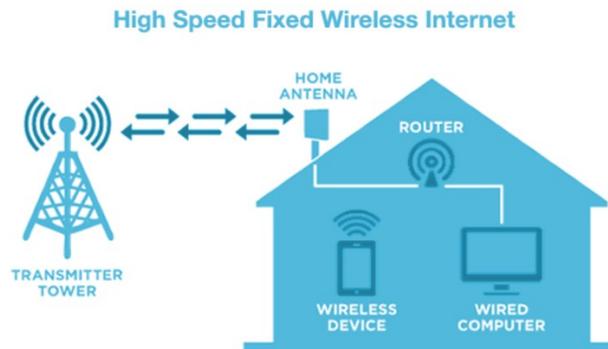
<sup>148</sup> It is useful to recall up that all Italian regions have been targeted by the 2015 Government Master Plan, except from the autonomous province of Bolzano.

## **4.2. TECHNOLOGIES AND RESEARCH HYPHOTESES**

Prior to the punctual discussion of the empirical analysis, it may be beneficial to talk over the technological choice between Fixed Wireless Access (FWA), i.e. the so-called Fiber-mixed-Radio or FTTT (abbreviation of Fiber To The Tower) and Fiber, i.e. all sub-architectures under the acronym FTTx (standing for Fiber To The x, where x is the point where fiber is delivered). Given that the principle of Net Neutrality holds, the awarded tenderer may decide which technology to adopt place that it allows the achievement of the intended coverage targets as in the agreement with the contracting authority. Therefore, it is evident that the choice relies essentially on mere economic evaluations expressed by time- and cost-savings in construction and maintenance.

First and foremost, Fixed Wireless Access (FWA) is a microwave-based point-to-multipoint technology allowing the connectivity of two fixed sites through the installation of a transmission tower. Inheriting the legacy of its technological ancestor, that is the WiMax, the FWA infrastructure (exhibited in figure 26) is in a position to challenge the cable-based Fixed Broadband (FBB) in all the areas where no wireline infrastructure is present or only copper wireline is available.

Figure 26 - Simplified FWA architecture



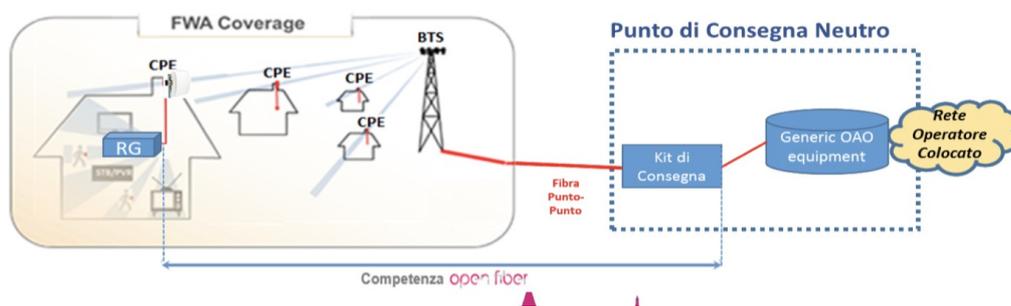
Source: Getprovider.com

The basic scheme depicted in the figure above is straightforward albeit too simplified so as to define FWA. To this extent, FWA substitutes FTTx in the last mile of the broadband and ultrabroadband infrastructure. A wired technology links the Telephone Central Office (CO) to the base transceiver station (BTS) which is, in turn, connected to consumer premises (CPs) via different radio frequency (RF) signals that are caught by domestic consumers' routers which transform the radio signals into a wireline and wireless home connection.

As per the Italian case, OF, throughout all Italian Regions, was awarded of the competitive auctions for the licensed bands 26 – 28 GHz which, in combination with the current technological state-of-the-art, are expected to guarantee performances in terms of mean down- and up-load speed, latency as well as bandwidth comparable to Fiber-mixed-copper solutions.

Open Fiber is covering all the areas belonging to clusters C and D for which it is requested to provide connection speed above 30 Mbps through the exploitation of the above-described technological framework, as displayed in figure 27.

Figure 27 - OF FWA infrastructure



Note that, as in the illustration above, Open Fiber is responsible for the construction and the maintenance of FWA network only to what it may concern its sub-part linking the neutral delivery point to the consumer premise; whereas the management of the CPE-router network is deemed responsibility of the retail operator.

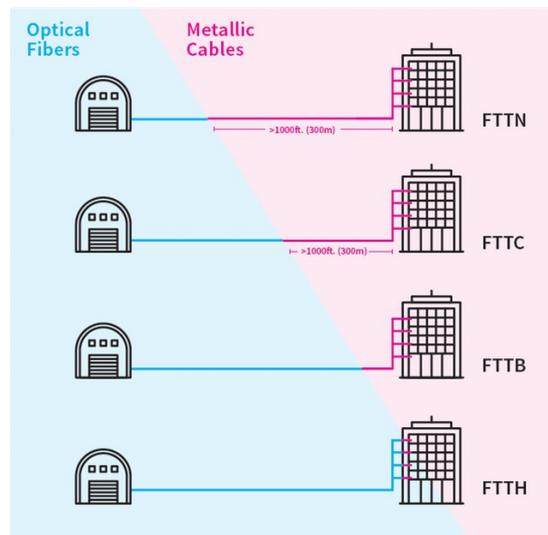
Moreover, for the sake of completeness, FWA operators (inter alia Linkem, Retelit, Tiscali, Fastweb and Intracom) under the CFWA consortium advocate that in the next future, with the advent of 5G connections, FWA may yield connection performances analogous to those of FTTH networks (up to 1 Gbit/s).

By contract, the “classic” fiber wireline infrastructure is based on the deployment of buried and aerial cable for the wired coverage of building units through a point-to-point cabled connection.

The term FTTx is, often, fruitfully employed so as to define a scalable hybrid infrastructure in which fiber is accompanied (or, in besting-class scenario, substitutes) copper.

Figure 28 displays all the main types of FTTx technologies including FFTN (Fiber To The Node), FTTC (Fiber To The Cabinet), FTTB (Fiber To The Building) and, finally, FTTH (Fiber To The Home).

Figure 28 - FTTx infrastructure



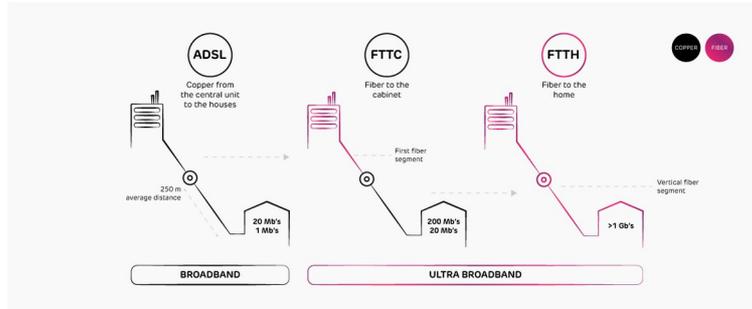
Source: Broadband Technology Report (2019),

FTTx technologies are ranked from the poorest performer (FTTN) to the highest (FTTH).

At a very first sight, it may be rather self-evident that each FTTx technology delivers different connectivity speeds up to 1 Gbit/s, as in the case of “ultimate in scalable bandwidth delivery” (McCool, 2018<sup>49</sup>), i.e. FTTH. The latter network employs a fully fiber-optic-based link to replace existing copper-based infrastructure (ADSL, VDSL, ..) of telephone wires and coaxial cables.

<sup>149</sup> McCool R. (2018), FTTH – The Ultimate in Scalable Bandwidth Service, Communication Today.

Figure 29 - VDSL vs. FTTC vs. FTTH



Source: Open Fiber (2019)

At this stage of the analysis, recalling that operators can freely choose which type of infrastructure to deploy, it is necessary to explore the decision-making rationale. The latter entails a choice between alternative network infrastructures place that the most desirable one, i.e. FTTx, may not be always viable or economically convenient. This is especially the case of suburban and rural areas where low business potential does not justify massive investments that are not going to be recovered. It has been proven out that if no wireline infrastructure does exist and if population density is sufficiently low, the only viable solution to overcome digital divide is the usage of FWA networks. On the contrary, in the densely populated areas of the city centers, where a copper-based infrastructure is already existing, a relatively contained investment may guarantee high performance gains.

Although there is paucity of research<sup>150</sup>, some foreign studies including Celentano (2018)<sup>151</sup> and FWA company reports extensively advocated the adoption of FWA in all areas seeing as how it secures significant cost savings. Vice versa, FTTx retail operators likely argue that apart from entailing numerous advantages in terms of network stability and speed, the cost convenience of this technology chiefly emerges if: (i) there is a high business potential or (ii) if the expenditures related to the transformation of a copper-based infrastructure are significantly lower than the cost of constructing a new one ex novo (or, even, the cost of a FWA network). Anyhow, there is universal consensus that FWA is the most suitable solution for rural and remote areas (especially mountainous), and FTTx for all the others where the Cost per Home Passed (CHP) is allocated to numerous connected homes<sup>152</sup>.

In coherence with the outlined scheme and accordingly to the OF strategy, the following four research hypotheses have been formulated:

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<sup>150</sup> The 2015 Italian Strategy for NGAN provide estimates solely on the FTTx architecture, whilst, on the contrary, there is no indication of the mean total cost per house in the FWA case . The following table exhibits the mean cost of connecting a building unit depending on the cluster to which it belongs and on the selected technological solution.

Technology	Cluster	Cost Range (€)
FTTB	A	200 – 250
FTTB	B	200 – 250
FTTB	C	450 – 550
FTTC	C	150 – 180
FTTC	D	> 200

Therefore, no direct cost comparison is feasible.

<sup>151</sup> Celentano J. (2018), FWA vs. FTTH: What Debate?, Inside Towers.

<sup>152</sup> According to Celentano (2018), CAPEX for constructing a network are mainly given by: Cost per Home Passed (CHP) and Cost per Home Connected (CHC), as in the following equation:

$$HTC = CHP + CHC$$

Where HTC is the Home Total Cost.

- H<sub>1</sub>: FTTx networks are (mostly) deployed in the most densely populated areas;
- H<sub>2</sub>: FWA networks are (mostly) deployed in the least densely populated areas;
- H<sub>3</sub>: FTTx architectures are (mostly) deployed in the least high areas<sup>153</sup>;
- H<sub>4</sub>: FWA architectures are (mostly) deployed in the highest areas.

### **4.3. MODEL AND DATA**

In order to run a descriptive analysis aimed at verifying the research hypotheses just defined, it may be useful to recall up some key aspects:

- According to the principle of net neutrality, the awarded tenderer may autonomously decide which technological architecture to deploy given that it ensures the compliance with the strategic objectives as widely defined in formal government documents as well as in tender notices.
- If an area or a cluster of areas has been already touched by prior interventions, the residual areas are, by means of construction, the least convenient, i.e. the districts in which no private infrastructure development is feasible.
- To the latter point, the most interesting case is the one of the ultrabroadband development in Calabria, forasmuch as there is wealth of relevant and authoritative evidence.

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<sup>153</sup> By saying “least high areas”, the analysis refers to the flat areas and to the uplands.

- As per the technological scenario briefly outlined above, according to the characteristic of the area, Open Fiber and Infratel Italia decided to cover the most remote areas (i.e. scarcely populated and non-flat) through FWA, whilst, on the contrary, all the other areas, where an existing viable copper-based infrastructure already exists, have been covered with the transition to more performing network infrastructure (i.e. the FTTx architecture).

As it may be rapidly understood from the formulation of the research hypotheses, two main variables are object of in-depth investigation:

- Population density: expressed in the no. of inhabitants per square kilometer.
- Height: expressed in the no. of meters above sea level of the Municipal house.

On the one hand, the former variable is per se a quantitative representation of how remote an area is; on the other hand, the latter, which is, usually, negatively related to the previous one, may provide ameliorated information if jointly examined with the population density.

So as to address our main research question, the above variables are analyzed, firstly, within the sample of Calabria municipalities (covered and/or in coverage through the execution of the third BUL tender)<sup>154</sup> and, secondly, within the total number of the municipalities of Calabria.

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<sup>154</sup> The sample of Calabria municipalities has been retrieved from Infratel Italia S.p.A. database on status project advancements (latest available issue: July 2019).

To this extent, the work employs data originating from official documents of Infratel Italia S.p.A. as well as geo- and demo-graphic statistics retrieved from the Istat database. As per the former source, it enlists a sub-part of the Calabria municipalities targeted under the third BUL tender. According to the characteristics of the same municipalities, OF is deploying a double-faced intervention based on the adopted technological solution. Two samples are constructed:

- A “fiber sample” including 263 municipalities aimed at empirically testing hypotheses  $H_1$  and  $H_3$ .
- A “FWA sample” consisting of 364 municipalities in which hypotheses  $H_2$  and  $H_4$  are to be verified.

In a nutshell, it is self-evident that each sample is characterized by a different sample width. However, under the assumptions previously made, it is not possible to predict whether a larger part of Calabria population is going to be served by FTTx or FWA connections. To this purpose, the only feasible methodology is to extract from Istat ASC (Atlante Storico dei Comuni) the overall municipality population and, then, compare the share of the population served in the two provided samples. This comparison activity deemed to be propaedeutic to the conduction of the preminent analyses has been performed so as to provide an introductory test on how the empirical evidence may be consistent with our four research hypotheses. Results are shown in table 32.

However, for the sake of completeness, it has been acknowledged that the data of the served population are “raw”; in fact, the latter are not perfectly informative seeing as how the served population is computed as the population summation of the municipalities covered by Infratel and OF instead of the exact population share.

Table 32 - "Fiber sample" vs. "FWA sample": sample width and population covered

<b>"Fiber sample" - Coverage of municipalities and population coverage</b>								
<b>Provinces</b>	Served Municip.	Total Municip.	$\Delta$	Municip. Coverage	Served population	Total population	$\Delta$	Population coverage
Catanzaro	51	80	29	63,750%	330.352	358.316	27.964	92,196%
Cosenza	101	150	49	67,333%	643.347	705.753	62.406	91,158%
Crotone	19	27	8	70,370%	165.331	174.980	9.649	94,486%
Reggio di Calabria	57	97	40	58,763%	506.881	548.009	41.128	92,495%
Vibo Valentia	35	50	15	70,000%	141.752	160.073	18.321	88,555%
<b>Region</b>	<b>263</b>	<b>404</b>	<b>141</b>	<b>65,099%</b>	<b>1.787.663</b>	<b>1.947.131</b>	<b>159.468</b>	<b>91,810%</b>

<b>"FWA sample" - Coverage of municipalities and population coverage</b>								
<b>Province</b>	Served Municip.	Total municip.	$\Delta$	Municip. Coverage	Served population	Total population	$\Delta$	Population Coverage
Catanzaro	76	80	4	95,000%	343.190	358.316	15.126	95,779%
Cosenza	141	150	9	94,000%	676.719	705.753	29.034	95,886%
Crotone	11	27	16	40,741%	98.242	174.980	76.738	56,145%
Reggio di Calabria	88	97	9	90,722%	529.801	548.009	18.208	96,677%
Vibo Valentia	48	50	2	96,000%	154.427	160.073	5.646	96,473%
<b>Region</b>	<b>364</b>	<b>404</b>	<b>40</b>	<b>90,099%</b>	<b>1.802.379</b>	<b>1.947.131</b>	<b>144.752</b>	<b>92,566%</b>

Source: our elaboration on data from Infratel Italia (2019) and Istat (2019).

Served municipalities are the municipalities targeted by the joint intervention of OF and Infratel Italia. The same logic is employed for the definition of “served population”, that is the summation of the resident population of served municipalities.

Before assessing and commenting the results of this prefatory investigation, it is mandatory to highlight that though both datasets are updated to 2019, the Infratel Italia is relying on the administrative municipalities of 2016. In order to ensure the

cross-compliance of the data, given that some municipalities no more exists, 2019 population has been allocated as in following scheme depicted in table 33.

Provided that there no reliable data for the repealed municipalities, it has been decided to distribute the overall population of newly established municipality (i.e. Casali del Manco and Corigliano Rossano) consistently with the latest available share of population.

Table 33 - Municipalities Mergers

Regional Law n. 11 of 05/05/2017 entered into force on 05/05/2017 - Municipalities Merger - New Municipality: CASALI DEL MANCO											
Municipality	PROCOM	HEIGHT	SURFACE	FIBER	FWA	POP 2016	POP 2017	POP 2018	POP 2019	POP17 Share	POP DEN
Casole Bruzio	78028	647	3,94	✓	✓	2.578	2.562		2.515	25,33%	638
Pedace	78095	615	51,87	✓		1.907	1.906		1.871	18,85%	36
Serra Pedace	78141	726	59,27		✓	986	978		960	9,67%	16
Spezzano Piccolo	78144	743	49,22	✓		2.079	2.053		2.015	20,30%	41
Trenta	78151	618	4,65	✓	✓	2.633	2.614		2.566	25,85%	552
<b>Casali del Manco</b>	<b>78156</b>	<b>647</b>	<b>168,95</b>			<b>10.183</b>	<b>10.113</b>	<b>10.025</b>	<b>9.928</b>		<b>59</b>

Referendum of 22/10/2017 entered into force on 31/03/2018 - Municipalities Merger - New Municipality: CORIGLIANO ROSSANO											
Municipality	PROCOM	HEIGHT	SURFACE	FIBER	FWA	POP 2016	POP 2017	POP 2018	POP 2019	POP18 share	POP DEN
Corigliano Calabro	78044	210	195,64	✓	✓	40.427	40.426	40.478	40.505	52,52%	207
Rossano	78108	270	150,92	✓	✓	36.842	36.724	36.598	36.623	47,48%	243
<b>Corigliano Rossano</b>	<b>78157</b>	<b>210</b>	<b>346,56</b>			<b>77.269</b>	<b>77.150</b>	<b>77.076</b>	<b>77.128</b>		<b>223</b>

Source: our elaboration from ISTAT ASC (2019).

The flag, ✓ means that the municipality is served by Infratel BUL Tenders. Tables above (33a and 33b) have been fruitfully employed also for the calculus of the population density in 2019 as well as the altitude above sea level. As it will be seen soon after, population is going to play a key role for the conduction of the main empirical analysis.

After having outlined possible errors due to data imprecisions (e.g. raw data and allocation of population), it can be concluded that:

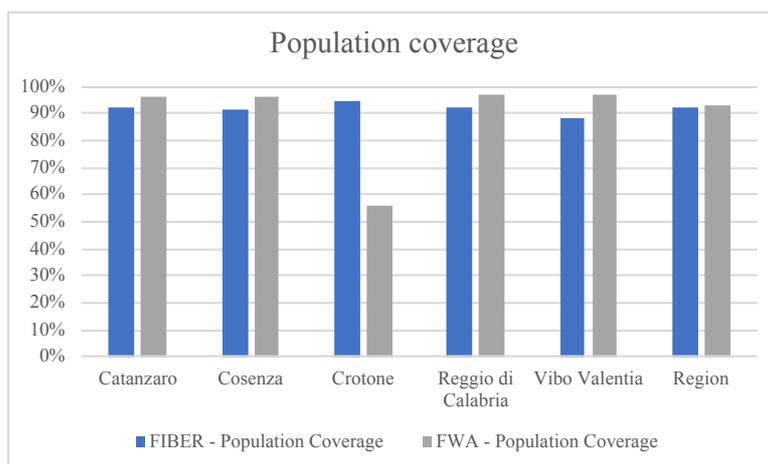
- FWA is being deployed in 364 municipalities leading up to an estimated served population of 1.802.379 citizens

- FTTx architecture is being employed in 263 municipalities results in an esteemed served population of 1.787.663.

Therefore, a gap in the no. of served municipalities equal to 101 (25% of the total cities) paves the way to a mere increase in the expected served of population of 14.716 inhabitants (corresponding to the 0,755% of the overall population).

An attentive reading of this initial finding is provided in figure 30 which exhibits percentage population coverages in the two samples.

Figure 30 - Population coverage in the two samples



Source: our elaboration on data from Infratel Italia (2019) and Istat (2019)

On average, as per the “FWA sample”, a significant increase of the sample width yields a minor growth of the served population. This result is acceptable and consistent with the discussion of the previous paragraph. The sole peculiarity is for the province of Crotona where the gap between FWA and Fiber population coverage is falling sharply ( $\Delta = - 38,341\%$ ). Notwithstanding, this result may be

explained by the fact the Crotona is the smallest province in terms of municipalities' numerousness and, thus, the potential exclusion of an above-average populated city may yield dramatic changes in the population served. Once again, it may be reasonably explained by the fact that population do not take into account the real part of the population being effectively served.

Given that the outcome of this preliminary evaluation is in line with the theoretical hypotheses previously formulated, the attention is, now, riveted to the chief testing of the latter research scope. In order to develop a feasible evidence-based investigation, two different analyses have been run:

- A. Cross-comparison of the sample arithmetic means of population density and height in the municipalities targeted by OF intervention with the arithmetic mean of the total number of Calabria Municipalities. Selected municipalities of the "Fiber sample" (i.e. 263) and of the "FWA sample" (i.e. 364) as well as total municipalities of Calabria (i.e. 404) have been grouped firstly in provinces and, then, in the regional cluster.
- B. Cross-comparison of the sample means of population density and height weighed for the share of population (as in the equation [15]) with the total weighed mean. As in the case of the simple mean, municipalities have been assembled in provinces and, in the end, in the regional cluster.

$$w_v = \frac{pop_{19}}{tot\_pop_{19}} \quad [15]$$

Where  $w_i$  is the weight for the  $i$ -th municipality,  $pop_{19_i}$  is the 2019 resident population of the same  $i$ -th municipality and  $tot\_pop_{19}$  is the summation of the 2019 resident populations of the  $n, m$  municipalities under OF intervention.

$$tot\_pop_{19} = \sum_{i=1}^{k,*} w_i pop_{19_i} \quad [16]$$

Where  $n, m$  are, respectively, the number of Fiber and FWA municipalities, i.e. 263 and 364.

The introduction of weighed means allow to assign a differentiated weight to cities in accordance with their population share over the regional “served” population.

Hence, the municipalities with the highest population (or population share) are, by means of construction, more influential than the ones with the lowest population.

The system of weights and weighed means appears to feasible, not only from the statistical point of view, but also because it represents a sufficiently adequate approximation of the OF CAPEX which, in general, are growing in population<sup>155</sup>.

Regardless of the type of the means, so as to test whether our four research hypotheses are verified through the implemented paralleling model, we must rephrase the latter assumptions.

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<sup>155</sup> Seeing as how covering two identical areas in terms of surface and height would cost differently accordingly to the no. of homes to connect, the overall capital expenditures for covering areas are considered to be growing in population. This assumption is explained below:

$$\frac{\partial CAPEX_i}{\partial pop_i} > 0$$

Where  $CAPEX_i$  is the cost of covering the  $i$ -th area and  $pop_i$  is the resident population of that area. The more populated the area, the higher the cost per home connected (CHC), the higher the total cost (CAPEX).

The varied research hypotheses are the following:

- H'<sub>1</sub>: In the “Fiber sample”, the sample mean of the population density (whether simple or weighed) is higher than the mean population density of the reference statistical population.
- H'<sub>2</sub>: In the “FWA sample”, the sample mean of the population density (whether simple or weighed) is lower than the mean population density of the reference statistical population.
- H'<sub>3</sub>: In the “Fiber sample”, the sample mean of the municipality height (whether simple or weighed) is lower than the mean municipality height of the reference statistical population.
- H'<sub>4</sub>: In the “FWA sample”, the sample mean of the municipality height (whether simple or weighed) is higher than the mean municipality height of the reference statistical population.

For the sake of simplicity, hypotheses H'<sub>1</sub> and H'<sub>3</sub> as well as H'<sub>2</sub> and H'<sub>4</sub> have been clustered since they refer, respectively, to the FTTx infrastructure and the FWA network deployment. Hence, two complementary analyses are performed: first and foremost, we compare the sample mean and the mean of the reference statistical population of both population density and height in the “Fiber sample”; secondly, employing the same analytical path, we test our hypotheses in the “FWA sample”. To our way of envisaging, we expect all our research hypotheses to be verified and, especially, the employment of the weighed means to enhance model efficiency.

However, we acknowledge that possible negative effect of imperfect data that may even lead up to rejecting one or more research hypotheses. In the following paragraph, the results of the analysis will be assessed and briefly commented.

#### 4.4. RESULTS AND CONCLUDING DISCUSSION

This paragraph is devoted to the evaluation of the gathered evidence and the discussion the main empirical findings. It has been decided only to show the most relevant results given that the model, by means of construction, is leaving a comparative choice between simple and weighed means.

In other words, for the sake of simplicity, we select the research methodology better aligned with our investigative purpose, while the others will find their place in the upcoming appendix.

As per hypotheses H<sub>1</sub> and H<sub>3</sub> tested in the “Fiber sample”, the most appropriate summary indicator is the weighed mean since it provides the best possible evidence.

Results are drawn up in table 34.

Table 34 - "Fiber sample" - comparison of weighed means

Provinces	Under BUL tenders		Overall		Δ in Weighed Height	Δ in Weighed Density	Δ% in Weighed Height	Δ% in Weighed Density
	Mean Weighed H.	Mean Weighed D.	Mean Weighed H.	Mean Weighed D.				
Catanzaro	63,3876	75,0475	86,1147	27,3497	-22,7271	47,6978	-35,8541%	63,5568%
Cosenza	131,1169	142,8308	173,1030	37,7876	-41,9862	105,0432	-32,0220%	73,5438%
Crotone	14,6037	19,8946	36,9013	9,3409	-22,2976	10,5537	-152,6853%	3,0480%
Reggio di Calabria	34,3347	139,9551	82,2277	48,4860	-47,8930	91,4691	-139,4888%	5,3560%
Vibo Valentia	29,3848	30,2947	32,2729	11,0219	-2,8881	19,2728	-9,8286%	63,6176%
<b>Region</b>	<b>272,8276</b>	<b>408,0227</b>	<b>410,6197</b>	<b>133,9862</b>	<b>-137,7920</b>	<b>274,0366</b>	<b>-50,5052%</b>	<b>67,1621%</b>

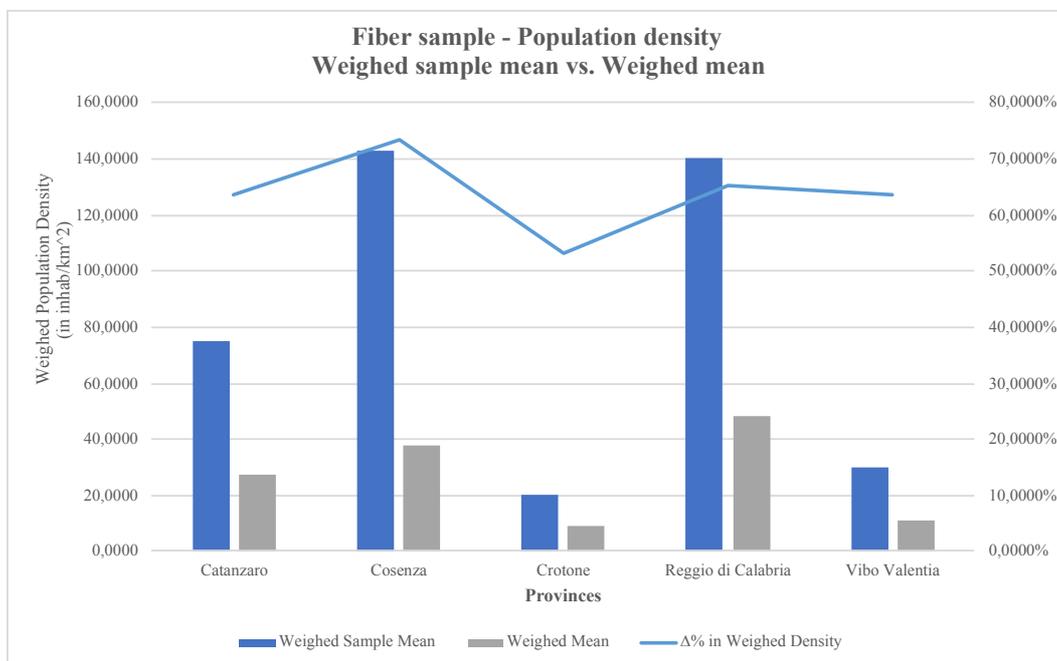
Source: our elaboration

Table 34 exhibits the results of the analysis in the “Fiber sample”. Results have been computed through the comparison of weighed means (as per population density and height). “ $\Delta$ in weighed H.” and “ $\Delta$ in weighed D.”, i.e. the last but two and three columns, display the gap between the weighed sample means and the weighed means. In addition, the last two columns (namely “ $\Delta\%$  in weighed Height” and “ $\Delta\%$  in weighed Density”) exhibit the percentage share of the latter differentials,  $\Delta$  over the weighed sample means (that is values displayed in the second and third column of the table).

In a nutshell, it is rather evident that hypotheses  $H_1$  and  $H_3$  are verified in all aggregations (i.e. in provinces and at regional level). We can fairly conclude that FTTx networks have been/are being deployed in areas wherein, on average: (i) the height is lower and (ii) the population density is higher.

An even more blatant picture of this conclusion is portrayed by figures 31 and 32.

Figure 31 - Fiber sample - Population density - Weighed sample mean vs. Weighed mean



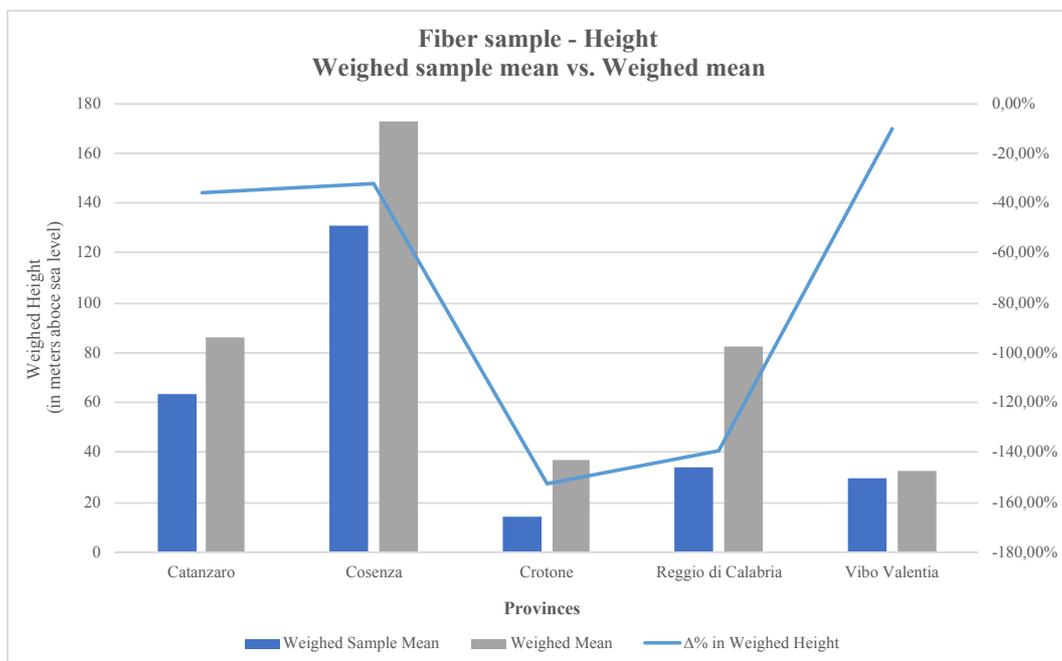
Source: our elaboration

Figure 31 exhibits the comparison of the weighed sample mean with the sample mean of height within the Fiber sample. The right vertical axis measures the gap,  $\Delta$  whilst, on the contrary, the vertical axis on the left-hand side measures the quote of the gap,  $\Delta$  over the weighed sample mean. Therefore, the higher the per cent gap (in absolute value), the more evident the hypothesis testing.

As it can be promptly appreciated, municipalities clustered in the province of Cosenza are the ones for which the hypothesis  $H'_1$  appears for being most evident.

To what it may concern the  $\Delta\%$  in weighed density, an almost stationary trend may be discovered since, as in table 34, per cent variations over the weighed sample means ranges from about 53 to 73%. The higher the latter values, the more positive the testing. As per the test magnitude, provincial clusters may be fruitfully ranked as it ensues: Cosenza; Reggio di Calabria; Vibo Valentia; Catanzaro; Crotona.

Figure 32 - Fiber sample - Height - Weighed sample mean vs. Weighed mean



Source: our elaboration

Figure 32 exhibits the comparison of the weighed sample mean with the sample mean of height within the Fiber sample. The right vertical axis measures the gap,  $\Delta$  whilst, on the contrary, the vertical axis on the left-hand side measures the quote of the gap,  $\Delta$  over the weighed sample mean. Therefore, the higher the per cent gap (in absolute value), the more evident the hypothesis testing.

The chart above suggests that the municipalities within the cluster of Crotona are the ones, on average, for which the third research hypothesis,  $H'_3$ , is more recognizable. To that extent, it may be of interest to highlight that, within the sample sub-part of Crotona, municipalities have the regional highest percentage gap,  $\Delta\%$  despite they have the lowest weighed height.

In addition, as previously done for the height, we can rank municipalities aggregated in the provincial cluster according to the magnitude of the favorable evidence being gathered. It follows that: Crotona; Reggio di Calabria; Catanzaro; Cosenza; Vibo Valentia.

Conversely, the empirical analysis of the “FWA sample” yields significantly poorer results via the employment of the weighed means.

Although research hypotheses  $H'_2$  and  $H'_4$  cannot be directly verified through the weighed-mean-based comparison, they may be indirectly positively appraised considering that the identification of the areas included in the “FWA sample” might have been performed later than in the “Fiber sample”.

In other words, for the sake of a chief comprehension, we are arguing that for all the residual areas left out of the “Fiber sample” there was no alternative option to

the deployment of an FWA network. This is because a coverage through the deployment of a wireline architecture would not have been economically viable.

This reflection is also consistent with the consideration that, as stated by the same lawmaker in the 2015 MP, the FTTx technology and, in detail, the FTTH was the most desirable technology. Hence, it may sound possible that coverage plan of Open Fiber might have been slightly favoring Fiber to FWA, seeing as how the latter technology, under the current technological state-of-the-art, is considered the last resort possibility for spreading a capillary diffused ultrabroadband network.



## GENERAL CONCLUSIONS

Ultrabroadband deployment is paramount for the economic growth of whatsoever developing and/or developed country in the world. As a consequence, a growing demand of stable and performing connectivity is spreading like wildfire.

The arising problem is, that, each nation presents a different situation, and, within the same country, each sub-area is characterized by a divergent scenario.

This discrepancy has reflected into the occurrence of equally pressing albeit conflicting matters. For instance, the requirement of an ultra-fast internet connection expressed by hi-tech industrial districts is contrasted by the even more urgent pressure to finally overlook digital divide.

From the standpoint of the public sector, dealing with a two-speed train encompasses a countless number of strategic challenges.

Consider, now, the Italian experience as framed in the wider umbrella of the EU statutory framework. Given that sovereignty is partially remised to supranational institutions, legal constraints may impede the central Italian government from freely determining its own political agenda.

To that extent, whichever public law-abiding intervention is subjected to the binding legislative provisions of the European lawmaker.

Whether the latter government meddling take the form of setting national regulation or, simply put, supporting strategic industries, it must be compliant with the consolidated body of community law governing public procurement.

Taking into account that the dynamic process of public purchasing is, usually, employed as a means of conferring direct state grants, it becomes self-evident that there are multiple sources of legally compulsory obligations: on the one hand, the government procuring regulations and, on the other hand, the state aid norms.

To what it may specifically concern publicly financed interventions in the field of broadband and ultrabroadband deployment, there are additional constraining mandates.

In this context of tight strategic interdependencies and binding legal constraints, public bodies and private stakeholders behaved in a coordinated and synergic manner with the purpose of addressing the issues briefly outlined above (i.e. overcoming digital divide and providing a more performing connectivity to the areas already reached by the First Generation Broadband - FGB).

To that extent, it has been demonstrated that a thoughtful action plan inspired by a shared dialogue between public and private is per se insufficient to safeguard the achievement of targeted objectives.

In other words, it has been argued that allocating massive public resources to the accomplishment of a strategic objective may not yield the attainment of the intended most desirable outcomes. So as to provide evidence-based explanations,

the analysis investigated the main economic models for public procurement and, subsequently, the Italian ultrabroadband scenario.

First and foremost, the economic theory widely explored the root causes for such misalignments and concluded that, in most cases, the optimality is unlikely to be reached. It has been discussed that the impossibility of reaching the first-best outcome is depending on the players' rationale behind their decision-making processes and on the same tenders structure which, in practice, encourage bidders to behave in a collusive way. At this stage, a possible way out has been presented in order to support public contracting authorities in fostering conducts which are in line with the general common interest.

Secondly, shifting the focus on ultrabroadband deployment in Italy, a renovated technological paradigm based on two advanced alternative solutions, the FTTx architecture and FWA platform, is likely going to reshape the whole reference industry. To this purpose, the joint examination of the strategic inputs and the implemented action plan allowed to conduct an empirical analysis aimed at assessing the capacity to bridge the severe gap with respect to the other EU Member States and the mandatory strategic targets.

Although expectations were brightly promising, the evidence is leaving numerous concerns about the plan effectiveness.

Italy is lagging well behind its own targets for broadband coverage and, currently, the real chance to reach the planned goals seems to be at least dubious.



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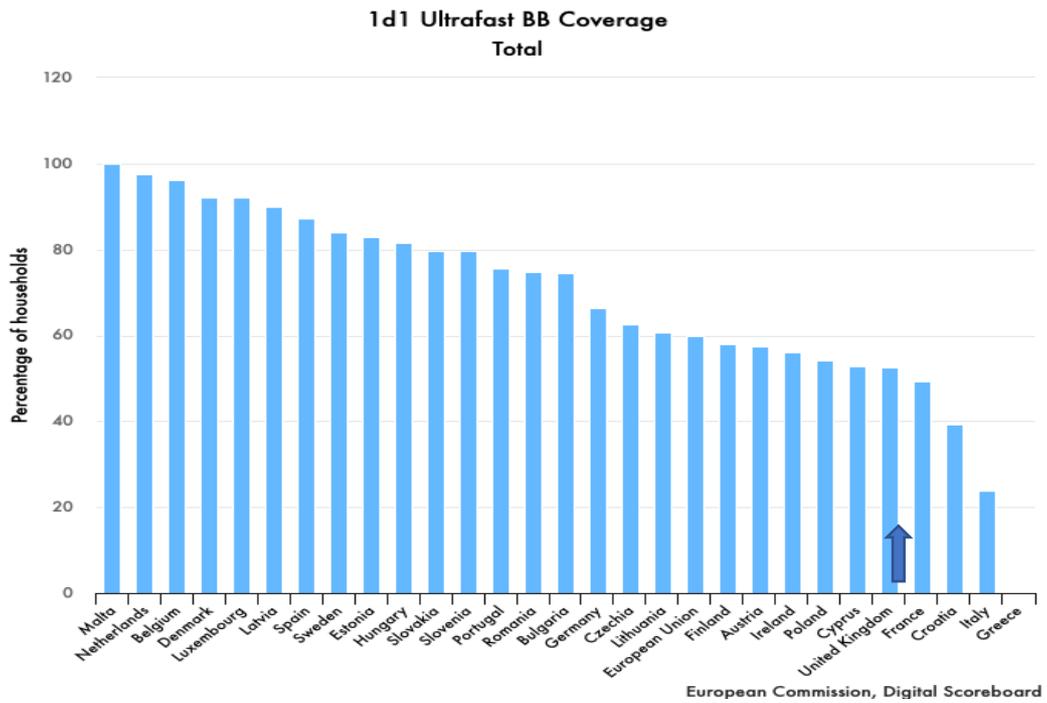
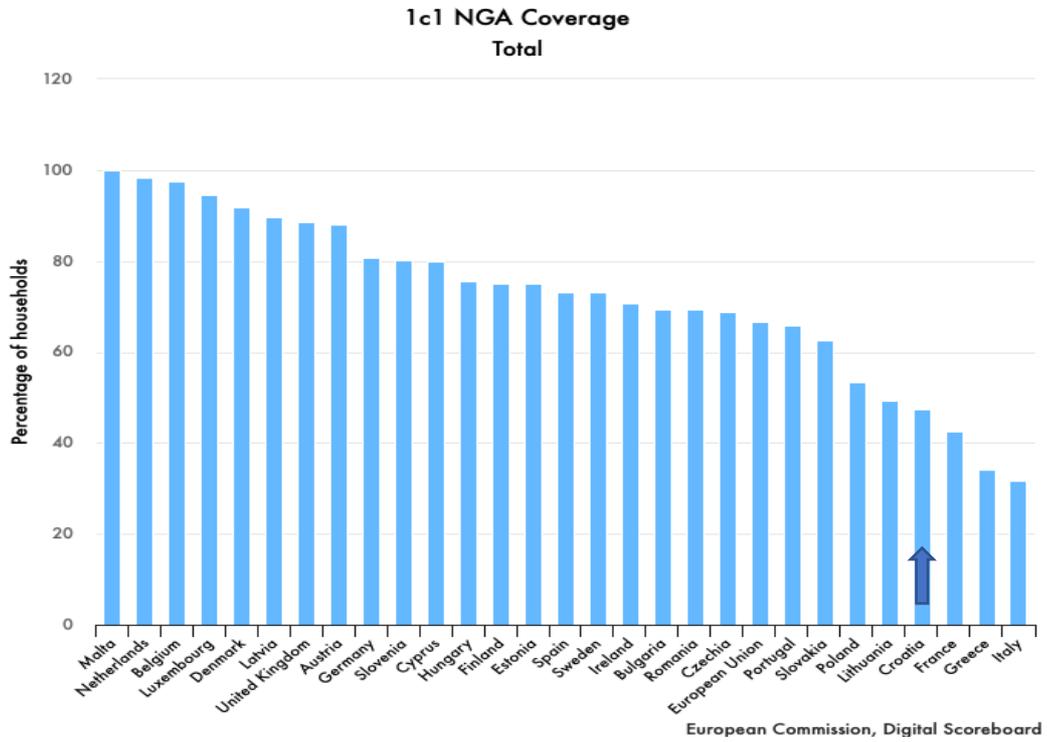
## APPENDIX TO CHAPTER 2

### 2.1 A DIGITAL AGENDA FOR EUROPE

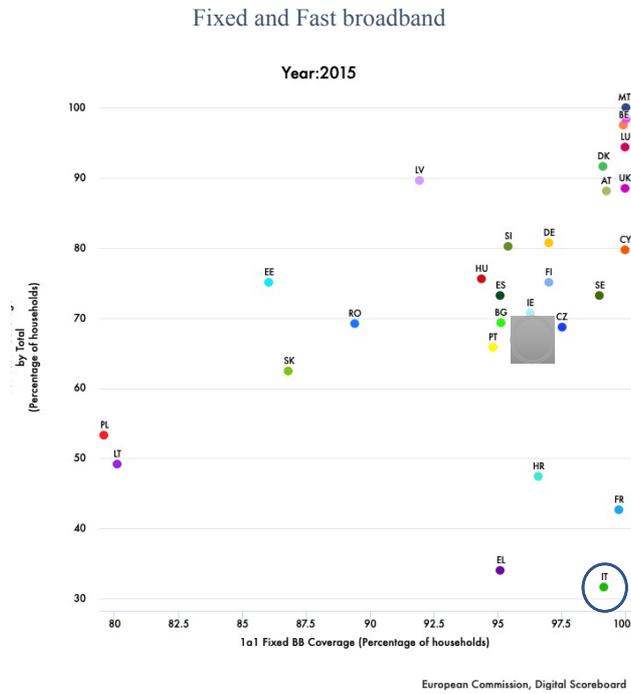
ACTIONS
<p><i>The Commission will:</i></p> <ul style="list-style-type: none"><li>• <b>Key Action 8:</b> Adopt in 2010 a Broadband Communication that lays out a common framework for actions at EU and Member State to meet the Europe 2020 broadband targets, including:<ul style="list-style-type: none"><li>• Reinforce and rationalise, in this framework, the <b>funding of high-speed broadband</b> through EU instruments (e.g. ERDF, ERDP, EAFRD, TEN, CIP) by 2014 and explore how to attract <b>capital</b> for broadband investments <b>through credit enhancement</b> (backed by the EIB and EU funds);</li><li>• Propose an ambitious <b>European Spectrum Policy Programme</b> in 2010 for decision by the European Parliament and the Council that will create a co-ordinated and strategic spectrum policy at EU level in order increase the efficiency of radio spectrum management and maximise the benefits for consumers and industry;</li><li>• Issue a Recommendation in 2010 to <b>encourage investment in competitive Next Generation Access networks</b> through clear and effective regulatory measures.</li></ul></li></ul>
<p><i>Member States should:</i></p> <ul style="list-style-type: none"><li>• Develop and make operational <b>national broadband plans</b> by 2012 that meet the <b>coverage and speed and take-up targets</b> defined in Europe 2020, using public financing in line with EU competition and state aid rules<sup>28</sup>, the Commission will report annually on progress as part of the Digital Agenda governance;</li><li>• Take measures, including legal provisions, to <b>facilitate broadband investment</b>, such as making sure that civil engineering works systematically involve potential investors, clearing rights of way, mapping available passive infrastructure suitable for cabling and upgrading in-building wiring;</li><li>• Use fully the <b>Structural and Rural Development Funds</b> that are already earmarked for investment in ICT infrastructures and services;</li><li>• Implement the <b>European Spectrum Policy Programme</b>, so as to ensure the co-ordinated allocation of the spectrum needed to meet the target of 100% coverage of 30mbps internet by 2020, and the <b>NGA Recommendation</b>.</li></ul>

Source: retrieved from: EC, COM(2010)245 final, A Digital Agenda for Europe, p. 21.

## 2.2 BROADBAND IN ITALY



Source: EC Digital Scorecard. The blue arrow is for Italy.



Source: EC Digital Scorecard. Blue round highlights Italy, grey for EU.

## 2.3 ITALIAN STRATEGY FOR NGAN

<b>The Italian Strategy for Next Generation Access network</b>	
<b>Summary Table</b>	
<b>Strategy targets</b>	Provide 85% of the population with access to broadband connection services above 100Mbps
	Provide access to broadband connection services above 30Mbps to 100% of the population
	Provide access to broadband connection services of at least 100Mbps for public administration, local schools, health care facilities, industrial parks, high demographic density areas
<b>Strategy</b>	Net neutrality, open networks, equivalent and non-discriminatory access conditions, integrated wired and wireless network approach
	Lower economic barriers for infrastructure deployment
	Coordinated management of underground facilities through the establishment of a Cadaster of utility infrastructure to monitor the roll-outs and to profit from existing infrastructure
	Division into clusters, based on NGA market competition and availability
	Uniform national limits to European ones in the field of electro-magnetism
<b>Tools</b>	Simplifying and reducing administrative charges, tax incentives for infrastructure deployment
	Incentives to stimulate demand conditions and implementation of the Digital Growth Strategy
	Facilitating access to economic resources, establishment of a center for the attraction of funds/guarantee fund and credit at subsidized rates
	Grants allocated to unserved/underserved areas to provide access to a broadband connection of at least 30Mbps
	Possible public direct infrastructure deployment in market failure areas
	Cadaster of utility infrastructure under and above ground
<b>Public resources</b>	FESR and FEASR funds
	National and regional funds (including Development and Cohesion Funds and residual programming funds 2007/2013)
<b>Coordination of actions</b>	The committee for the spread of ultra-fast broadband (COBUL) coordinates the implementation of the strategy and is participated by Government, MISE, AGID, Infratel, Agenzia Coesione
	The implementation of the strategy for the public sector is delegated to Infratel Italia SpA, possibly in coordination with Regional in-houses
	Regions, autonomous provinces and municipalities define the operational programs with the technical support of Infratel Italia SpA and the coordination of AGID
<b>Synergy</b>	The public plan is synergic to TLC operator's plans and fiber networks built for smart grid, smart city, street lighting, etc
	Bundle connectivity demand in more densely populated areas and with high industry concentration through the analysis carried out by MISE, Unioncamere and local Associations
	AGID ensures synergy with other public policies put in place to stimulate technology take up such as The Good School, Health and Digital Justice, as well as the Project of Inner Areas
	AGID ensures synergy with the Public Organization virtualization's development plan, optimizing and rationalizing public investments
<b>Coordination</b>	COBUL - in coordination with the National Regulatory Agency, as an independent authority and Agency for Cohesion for deployment of resources

Source: retrieved from "The Italian Strategy for Next Generation Access Network" - Presidenza Consiglio dei Ministri - pp. 17/18

<b>The Italian Strategy for Next Generation Access network</b>						
<b>Possible Scenarios according to the contribution of the private sector</b>						
<b>Scenarios</b>	<b>% public</b>	<b>% private</b>	<b>Cluster A</b>	<b>Cluster B</b>	<b>Cluster C</b>	<b>Cluster D</b>
<b>BEST</b>	50% (€6 billion)	50% (€6 billion)	15 most populous cities	1.130 municipalities	2.650 municipalities	4.300 municipalities
			upgrade from 30 to 100 Mbps	upgrade from 30 to 100 Mbps	upgrade from 2 to 100 Mbps	upgrade from 2 to 30 Mbps
<b>AVERAGE</b>	60% (€6 billion)	40% (€4 billion)	15 most populous cities	487 municipalities	2.650 municipalities	5.000 municipalities
			upgrade from 30 to 100 Mbps	upgrade from 30 to 100 Mbps	upgrade from 2 to 100 Mbps	upgrade from 2 to 30 Mbps
<b>WORST</b>	84% (€6 billion)	16% (€1 billion)	500 municipalities	7.600 municipalities	-	-
			upgrade from 30 to 100 Mbps	upgrade to 30 Mbps	-	-

Source: retrieved from "The Italian Strategy for Next Generation Access Network" - Presidenza Consiglio dei Ministri – p. 92

<b>The FTTx different option and future evolution</b>		
<b>Technologies</b>	<b>Current View</b>	<b>Future View</b>
FTTE: Fiber To The Exchange	ADSL2+ up to 20 Mbps and 2 Mbps upstream	VDSL2 evolution up to 50 Mbps DS and 10 Mbps US depending on copper length, copper quality and concurrent usage of pairs in a cable, vectoring to secure top speed on pairs bandwidth in a loop cable
FTTC: Fiber To The Cabinet	VDSL2 up to 30 to 100 Mbps DS and 3 to 30 Mbps US based on sub-loop length (up to 100Mbps for sub-loop<300m), vectoring being tuned to secure top speed on pairs bundled in a sub-loop cable	VDSL2 evolution to improve performance/distance trade-off, depending on copper quality and concurrent usage, vectoring to secure top speed on pairs bandwidth in a sub-loop cable - G.fast (sub-loops<100m)
FTTdp: Fiber To The Distribution Point	-	VDSL2 evolution and G.Fast, vectoring up to 500-1000 Mbps aggregate (DS+US)
FTTB: Fiber To The Building	-	VDSL2 and G.Fast, vectoring up to 1000 Mbps aggregate (DS+US)
FTTH: Fiber To The Home	scalable to >= 2 Gbps, Existing footprint Metro-Ring and P2P up to 100 Mbps DS and US. GPON: shared bandwidth up to 2.5/1 Gbps	scalable up to >= 1 Gbps Metro-Ring and P2P scalable to >= 1 Gbps GPON: shared bandwidth up to 10/2.5 Gbps NGPON2: shared bandwidth up to 80/80 Gbps

Source: retrieved from "The Italian Strategy for Next Generation Access Network" - Presidenza Consiglio dei Ministri – p. 114.

## 2.4 FIRST BUL TENDER

FIRST BUL TENDER NO. PROJECTS PER REGION	FIBER		FWA		TOTAL	
	#	%	#	%	#	%
Abruzzo	192	6,33%	189	6,25%	<b>381</b>	<b>6,29%</b>
Emilia-Romagna	340	11,22%	340	11,24%	<b>680</b>	<b>11,23%</b>
Lombardia	1516	50,02%	1514	50,03%	<b>3030</b>	<b>50,02%</b>
Molise	136	4,49%	136	4,49%	<b>272</b>	<b>4,49%</b>
Toscana	268	8,84%	268	8,86%	<b>536</b>	<b>8,85%</b>
Veneto	579	19,10%	579	19,13%	<b>1158</b>	<b>19,12%</b>
<b>TOTAL</b>	<b>3031</b>	<b>100,00%</b>	<b>3026</b>	<b>100,00%</b>	<b>6057</b>	<b>100,00%</b>

Source: Our elaboration from Infratel Italia S.p.A. The number of projects being displayed takes into account both fiber and FWA projects.

## 2.5 SECOND BUL TENDER

<b>INFRA TEL ITALIA SpA - SECOND BUL TENDER</b>			
<b>ID</b>	<b>DAY</b>	<b>EVENT - DESCRIPTION</b>	<b>NOTES</b>
1	10/08/16	Publication of the call for tendering in the Official Journal of the EU 2016/S 153-277343-IT	
2	08/08/16	Publication of the call in the Italian Official Journal " V^ serie speciale" (public contracts) n. 91/08.08.16	
3	30/09/16	Dadline for the submission of pre-qualification requests - till 1.00 pm - online	
4	05/12/16	Dispatch of invitation letters to the pre-qualified bidders (Open Fiber, Estra, Acea, Retelit)	4 pre-qualified bidders
5	20/02/17	Deadline for the submission of offers (technical + economical)	
6	13/04/17	First public session - opening of administrative envelopes	no bidder excluded
7	01/06/17	Second public session - opening of technical envelopes	no bidder excluded
8	15/06/17	Third public session - opening of economical envelopes	
9	20/07/17	Fourth public session - Adjudication	winning bidder: Open Fiber S.p.A.
10	26/07/17	Decision of Infratel Italia Board - Approval of the adjudication proposal	
11	02/08/17	Publication of the tender's outcome in the Italian Official Journal n. 88/02.08.2017	
12	02/08/17	Publication of the tender's outcome in the Official Journal of the EU 2017/S 146-302862-IT	
13	14/09/17	Decision of Infratel Italia Board - Effective Adjudication	
14	08/11/17	Signature of the contract between Infratel Italia S.p.A. and Enel Open Fiber S.p.A. (OJ 132/15.11.2017)	no publication in EU OJ is needed

Source: Our elaboration on data from Infratel Italia S.p.A., Italian Official Journal and TED OJ.

SECOND BUL TENDER	FIBER		FWA		TOTAL	
NO. PROJECTS PER REGION	#	%	#	%	#	%
Basilicata	131	3,53%	131	3,53%	262	3,53%
Campania	546	14,72%	546	14,72%	1092	14,72%
Friuli-Venezia Giulia	216	5,82%	216	5,82%	432	5,82%
Lazio	369	9,95%	369	9,95%	738	9,95%
Liguria	235	6,33%	235	6,33%	470	6,33%
Marche	234	6,31%	234	6,31%	468	6,31%
Piemonte	1206	32,51%	1206	32,51%	2412	32,51%
Sicilia	390	10,51%	390	10,51%	780	10,51%
Trentino-Alto Adige (Province of Trento)	217	5,85%	217	5,85%	434	5,85%
Umbria	92	2,48%	92	2,48%	184	2,48%
Valle d'Aosta	74	1,99%	74	1,99%	148	1,99%
<b>TOTAL</b>	<b>3710</b>	<b>100,00%</b>	<b>3710</b>	<b>100,00%</b>	<b>7420</b>	<b>100,00%</b>

Source: Our elaboration from Infratel Italia S.p.A. The number of projects being displayed takes into account both fiber and FWA projects.

## 2.6 THIRD BUL TENDER

INFRADEL ITALIA SpA - THIRD BUL TENDER			
ID	DAY	EVENT - DESCRIPTION	NOTES
1	19/04/18	Publication of the call for tendering in the Official Journal of the EU 2018/S 076-170394-IT	
2	20/04/18	Publication of the call in the Italian Official Journal " V^ serie speciale" (public contracts) n. 46/20.04.2018	
3	30/05/18	Dadline for the submission of pre-qualification requests - till 1.00 pm - online	
4	09/11/18	First public session - opening of administrative envelopes	
5	29/11/18	Second public session - opening of technical envelopes	
6	07/12/18	Third public session - opening of economical envelopes	
7	11/12/18	Fourth public session - Adjudication	winning bidder: Open Fiber S.p.A.
8	18/12/18	Decision of Infratel Italia Board - Adjudication	
9	21/12/18	Publication of the tender's outcome in the Italian Official Journal n. 149/21.12.2018	
10	21/12/18	Publication of the tender's outcome in the Official Journal of the EU 2018/S 246-566375-IT	
11	30/01/19	Decision of Infratel Italia Board - Effective Adjudication	
12	05/04/19	Signature of the contract between Infratel Italia S.p.A. and Enel Open Fiber S.p.A. (OJ 43/10.04.2019)	no publication in EU OJ is needed

Source: Our elaboration on data from Infratel Italia S.p.A., Italian Official Journal and TED OJ.

THIRD BUL TENDER NO. PROJECTS PER REGION	FIBER		FWA		TOTAL		Δ
	#	%	#	%	#	%	
Calabria	263	38,17%	364	40,09%	627	39,26%	101
Puglia	228	33,09%	251	27,64%	479	29,99%	23
Sardegna	198	28,74%	293	32,27%	491	30,75%	95
<b>TOTAL</b>	<b>689</b>	<b>100,00%</b>	<b>908</b>	<b>100,00%</b>	<b>1597</b>	<b>100,00%</b>	<b>219</b>

Source: Our elaboration from Infratel Italia S.p.A. The number of projects being displayed takes into account both fiber and FWA projects.

## 2.7 ADVANCEMENT STATUS OF PROJECTS

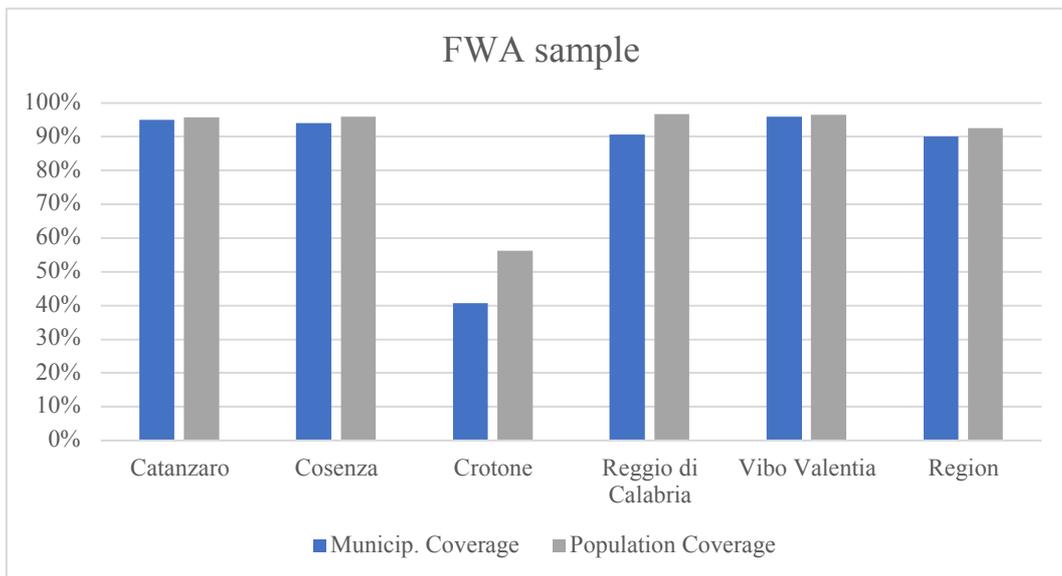
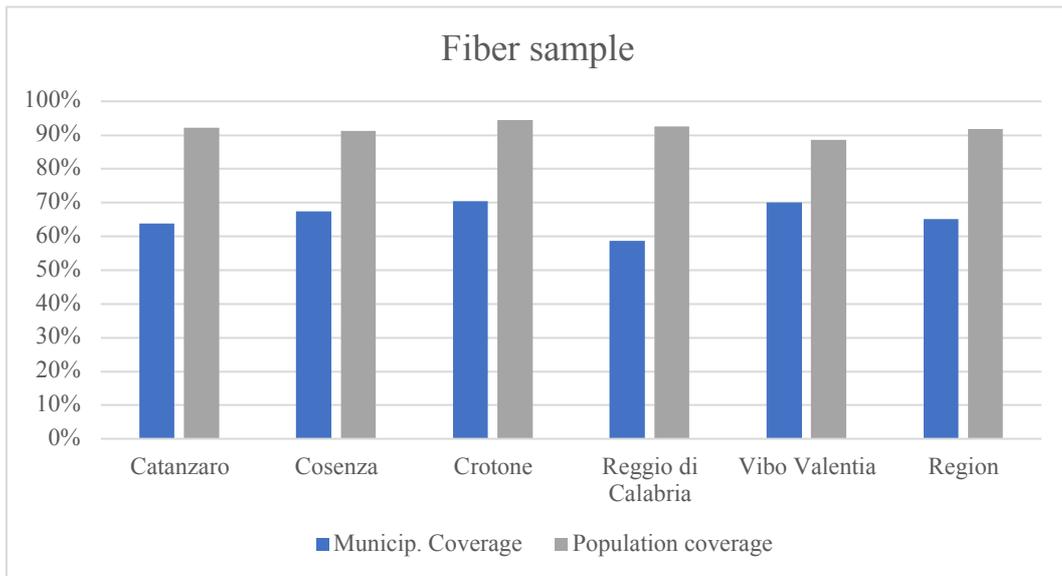
PROJECT ADVANCEMENT STATUS	DESCRIPTION
Final Design	The concessionary company has not completed yet the design
Final Design In Approval	The design has been handed over by the concessionary company and it is being evaluated by Infratel Italia
Final Design Endorsed	The design has been endorsed by Infratel Italia. The concessionary company has not submitted yet any instances for the authorizations
Wait For Authorizations	The concessionary company has initiated the stage of demanding and obtaining authorizations (if the municipality has signed the covenant agreement). Authorizations are waited to start with the yards
Executive Design In Approval	The executive design complete of all authorizations has been submitted by the concessionary company and it is being evaluated by Infratel Italia
In Execution	Yard works in progress
Works Completed	Yard works completed. Wait for the final testing phase

Source: Our elaboration from Infratel Italia S.p.A.



## APPENDIX TO CHAPTER 4

### 4.1. COVERAGE: FIBER VS. FWA



Source: Our elaboration on data from Infratel Italia S.p.A. and Istat ASC

## 4.2. EXCEL TEMPLATE SHEET

CALABRIA BUL TENDER - PROJECTS - FIBER										
ID	Province	Municipality	PROCOM	STATUS	Population	Weight	Density	Weighed D.	Height	Weighed H.
1	Catanzaro	Amaroni	79003	Final design in approval	1.793	0,00100299	181	0,18154037	378	0,3791285
2	Catanzaro	Badolato	79008	Final Design	2.939	0,00164405	79	0,12987962	240	0,39457101
3	Catanzaro	Borgia	79011	Final design in approval	7.564	0,00423122	179	0,75738884	341	1,44284689
4	Catanzaro	Botricello	79012	Final design in approval	5.235	0,00292284	338	0,98980065	19	0,05563968
5	Catanzaro	Carlopoli	79020	Final design in approval	1.497	0,00083741	91	0,07620396	924	0,77376329
6	Catanzaro	Catanzaro	79023	Final design in approval	89.065	0,04982203	790	39,3594039	320	15,9430497
7	Catanzaro	Chiaravalle Centrale	79029	Final design in approval	5.512	0,00308336	231	0,71225505	545	1,68042858
8	Catanzaro	Cicala	79030	Final design in approval	927	0,00051855	100	0,05185541	829	0,42988136
9	Catanzaro	Cortale	79034	Final Design	2.048	0,00114563	68	0,07790283	410	0,46970822
10	Catanzaro	Cropani	79036	Final Design	4.834	0,00270409	108	0,29204162	347	0,93831891
11	Catanzaro	Curinga	79039	Final design in approval	6.686	0,00374008	127	0,47498997	419	1,5670929
12	Catanzaro	Davoli	79042	Final Design	5.520	0,00308783	221	0,6824105	401	1,23821996
13	Catanzaro	Decollatura	79043	Final Design	3.137	0,00175481	62	0,10879791	765	1,34242584
14	Catanzaro	Falerna	79047	Final Design	3.938	0,00220288	164	0,36127167	550	1,21158182
15	Catanzaro	Feroleto Antico	79048	Final Design	2.050	0,00114675	92	0,10550087	280	0,3210896
16	Catanzaro	Gasperina	79056	Final design in approval	2.129	0,00119094	314	0,37395527	489	0,58236983
17	Catanzaro	Gimigliano	79058	Final Design	3.217	0,00179956	96	0,17275739	600	1,07973371
18	Catanzaro	Girifalco	79059	Final Design	5.789	0,00323831	134	0,43393302	456	1,47666758
19	Catanzaro	Gizzeria	79060	Final design in approval	5.248	0,00293568	141	0,41393037	630	1,8494761
20	Catanzaro	Guardavalle	79061	Final Design	4.505	0,00252005	75	0,18900374	225	0,56701123
21	Catanzaro	Isca sullo Ionio	79063	Final Design	1.581	0,00088439	67	0,05925446	188	0,16626624
22	Catanzaro	Lamezia Terme	79160	Final design in approval	70.598	0,03949178	435	17,1789258	216	8,53022522
23	Catanzaro	Maida	79069	Final Design	4.641	0,00259613	80	0,20769015	299	0,77624194
24	Catanzaro	Marcellinara	79072	Final Design	2.243	0,00125471	107	0,13425405	337	0,42283753
25	Catanzaro	Montauro	79080	Final Design	1.756	0,00098229	150	0,14734321	393	0,3860392

CALABRIA BUL TENDER - PROJECTS - FWA										
ID	Province	Municipality	PROCOM	STATUS	Population	Weight	Density	Weighed D.	Height	Weighed H.
1	Catanzaro	Albi	79002	Final Design	887	0,0004921	30	0,01476382	710	0,34941042
2	Catanzaro	Amaroni	79003	Final Design	1793	0,0009948	181	0,18005813	378	0,37603301
3	Catanzaro	Amato	79004	Final Design	816	0,0004527	39	0,01765666	480	0,21731278
4	Catanzaro	Andali	79005	Final Design	691	0,0003834	39	0,01495191	650	0,24919842
5	Catanzaro	Argusto	79007	Final Design	495	0,0002746	72	0,01977387	530	0,14555762
6	Catanzaro	Badolato	79008	Final Design	2939	0,0016306	79	0,12881919	240	0,39134943
7	Catanzaro	Belcastro	79009	Final Design	1302	0,0007224	24	0,01733709	495	0,35757774
8	Catanzaro	Borgia	79011	Final Design	7564	0,0041967	179	0,75120494	341	1,43106639
9	Catanzaro	Botricello	79012	Final design in approval	5235	0,0029045	338	0,98171916	19	0,0551854
10	Catanzaro	Caraffa di Catanzaro	79017	Final Design	1800	0,0009987	72	0,07190497	358	0,35752747
11	Catanzaro	Cardinale	79018	Final Design	2027	0,0011246	67	0,07534986	562	0,6320391
12	Catanzaro	Carlopoli	79020	Final Design	1497	0,0008306	91	0,07558177	924	0,76744569
13	Catanzaro	Catanzaro	79023	Final design in approval	89065	0,0494152	790	39,0380436	320	15,8128784
14	Catanzaro	Cenadi	79024	Final Design	530	0,0002941	44	0,01293846	539	0,15849608
15	Catanzaro	Centrache	79025	Final Design	385	0,0002136	48	0,01025312	458	0,09783181
16	Catanzaro	Cerva	79027	Final Design	1180	0,0006547	55	0,03600797	800	0,52375222
17	Catanzaro	Chiaravalle Centrale	79029	Final design in approval	5512	0,0030582	231	0,70643966	545	1,66670828
18	Catanzaro	Cicala	79030	Final Design	927	0,0005143	100	0,05143202	829	0,42637148
19	Catanzaro	Conflenti	79033	Final Design	1371	0,0007607	47	0,03575108	540	0,41075712
20	Catanzaro	Cortale	79034	Final Design	2048	0,0011363	68	0,07726677	410	0,46587316
21	Catanzaro	Curinga	79039	Final Design	6686	0,0037095	127	0,47111179	419	1,55429796
22	Catanzaro	Davoli	79042	Final Design	5520	0,0030626	221	0,67683878	401	1,22811018
23	Catanzaro	Decollatura	79043	Final Design	3137	0,0017405	62	0,1079096	765	1,33146525
24	Catanzaro	Falerna	79047	Final Design	3938	0,0021849	164	0,35832197	550	1,20168954
25	Catanzaro	Feroleto Antico	79048	Final Design	2050	0,0011374	92	0,10463948	280	0,31846798

Source: Our elaboration on data from Infratel Italia S.p.A. and Istat ASC

### 4.3. SIMPLE MEAN COMPARISON

<b>"Fiber sample" - Simple Means</b>						
Province	Under BUL tenders		Overall		$\Delta$ in Height	$\Delta$ in Density
	Mean Height	Mean pop density	Mean Height	Mean pop density		
Catanzaro	442,10	169,84	466	148	-23,90	21,84
Cosenza	441,35	176,45	481	105	-39,65	71,45
Crotone	341,32	94,84	399	101	-57,68	-6,16
Reggio di Calabria	235,02	238,75	290	171	-54,98	67,75
Vibo Valentia	375,91	210,94	407	139	-31,09	71,94
<b>Region</b>	<b>367,14</b>	<b>178,17</b>	<b>418</b>	<b>128</b>	<b>-50,86</b>	<b>50,17</b>

<b>"Fwa sample" - Simple Means</b>						
Provinces	Under BUL tenders		Overall		$\Delta$ in Height	$\Delta$ in Density
	Mean Height	Mean pop density	Mean Height	Mean pop density		
Catanzaro	474,91	119,98	466	148	8,91	-28,02
Cosenza	479,25	136,94	481	105	-1,75	31,94
Crotone	432,55	95,55	399	101	33,55	-5,45
Reggio di Calabria	288,60	165,63	290	171	-1,40	-5,38
Vibo Valentia	421,29	167,56	407	139	14,29	28,56
<b>Total</b>	<b>419,32</b>	<b>137,13</b>	<b>418</b>	<b>128</b>	<b>1,32</b>	<b>9,13</b>

Source: Our elaboration