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Higher Education Instruments and Smart Specialisation Innovative Industrial Doctorates and Higher Technical Institutes in Puglia

Elisabetta Marinelli, Alessio Cavicchi, Annamaria Fiore, Gigliola Paviotti, Elisa Gerussi, Simona Iammarino

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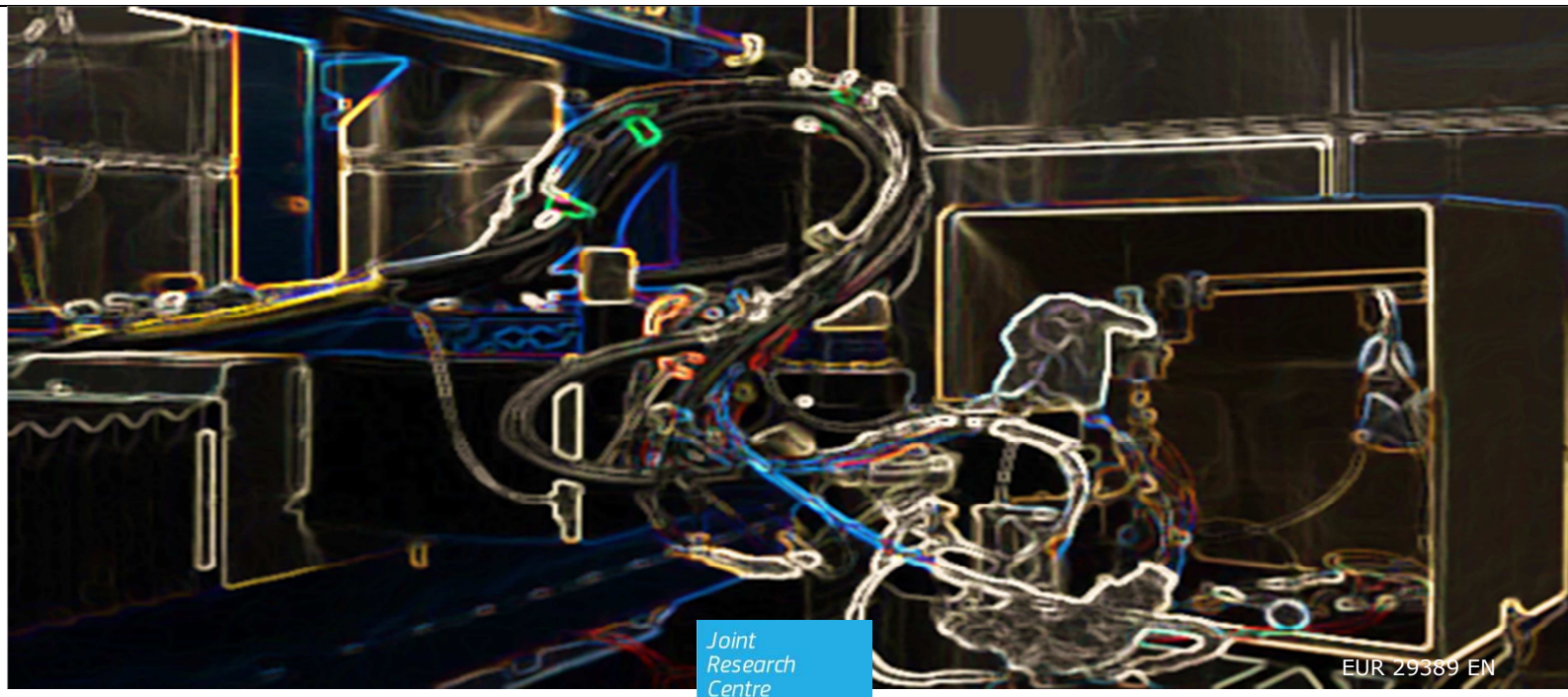

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Abstract

Universities have been mainly included in the S3 debate as creators or vectors of knowledge, their higher education mission has been somewhat overlooked. For this reason, in March 2016, the Joint Research Centre of the European Commission has started a project on the role of Higher Education in Smart Specialisation (HESS).

This document reports the action-research activities conducted under the HESS project in the region of Puglia (IT). The authors explored two instruments at the opposite end of the higher education spectrum:

- Istituti Tecnici Superiori (ITSs), i.e. Higher Technical Institutes, a form of technology-based vocational education and training.
- Innovative Industrial Doctorates (IIDs)[1].

These new instruments have not been explicitly taken into account during the development and early implementation of the strategy; however, it has become increasingly important to reflect on the process of human capital creation for S3. The two instruments appear suited to this reflection as they implement curricula designed in collaboration with the local private sector and with an explicit focus on technological development and employability. The report explores the challenges and opportunities ITSs and IIDs pose, as a first step to understand their potential contribution to Smart Specialisation.

[1] More specifically, this report was developed as part of the project HESS (Higher Education and Smart Specialisation), which funded the analysis of Higher Technical Institutes) and LAGREG (Targeted Support to Lagging Regions), which funded the analysis of Innovative Industrial PhDs.

List of abbreviations and definitions

S3	Smart Specialisation Strategy
ITS	Istituti Tecnologici Superiori (Higher Technical Institutes)
IID	Innovative Industrial Doctorates
ARTI	Agenzia Regionale per la Tecnologia e l'Innovazione della Regione Puglia.
ERDF	European Regional Development Fund
ESF	European Social Fund
ESIF	European Structural Investment Funds
HEI	Higher Education Institutions

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Institutional websites

https://www.researchitaly.it/en/strategies-and-programmes/

Italian University and Tertiary Education System

Higher Education in Italy: http://www.miur.it/guida/guide.htm

CIMEA Information Centre on Academic Mobility and Equivalence: http://www.cimea.it/en/index.aspx

Istituti Tecnici Superiori

http://www.miur.gov.it/its

http://www.indire.it/progetto/its-istituti-tecnici-superiori/numeri-its/

http://www.sistemaits.it/

Dottorati Innovativi a caratterizzazione industriale

http://www.ponrec.it/ponri/

http://www.ponrec.it/ponri/opportunit%C3%A0/dottorati-innovativi/

http://www.ponrec.it/ponri/opportunit%C3%A0/dottorati-innovativi-ciclo-33/

Apulia Region

Website of S3 in Apulia Region:

http://www.sistema.puglia.it/SistemaPuglia/smart_puglia2020

http://por.regione.puglia.it/ssi

Strategic Regional Agency for Technology and Innovation: http://www.arti.puglia.it/

Data on Puglia

https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/puglia

https://www.arti.puglia.it/apulian-innovation-overview/

POR-FESR
http://fesr.regione.puglia.it/portal/pls/portal/FESR.DYN_DOCUMENTO_VIEW.show?p_arg_names=id_documento&p_arg_values=176

1.Introduction

The EU Cohesion Policy has placed increasing attention on knowledge-based development, with the adoption of smart specialisation (EC, 2010). Smart Specialisation Strategies (S3) pursue national and regional competitive advantages through the bottom-up identification of a set of investment priorities. Priorities are identified through the interaction of stakeholders across the quadruple helix of government, industry, academia and society at large. This is because entrepreneurial knowledge is distributed across all actors in the regional system. This continuous process is referred to as an Entrepreneurial Discovery Process (EDP). Needless to say, Higher Education Institutions (HEIs) are crucial actors for S3, contributing to the definition of regional priorities and to the implementation of the vision embedded in the S3.

The involvement of HEIs in S3 has been largely linked to the so-called "third-mission" of universities (European Commission 2011): universities have been mainly included in the S3 debate as creators or vectors of knowledge. The higher education mission of universities has been somewhat overlooked. For this reason, in March 2016, the Joint Research Centre of the European Commission started a new project, HESS – Higher Education for Smart Specialisation - focusing on how higher education can contribute to the successful implementation of S3.

The project has three broad aims:

- To conceptualise and analyse the role of HEIs in Smart Specialisation.
- To help build innovation capabilities by strengthening the role of HEIs in regional partnerships.
- To promote the integration of higher education with research, innovation and regional development in S3 policy mixes, particularly in the use of European Structural and Investment (ESI) Funds.

HESS main activities include 'action research' and capacity building in selected European regions. This document reports the work conducted under the HESS project in the region of Puglia, where the authors explored two instruments at the opposite end of the higher education spectrum:

- Istituti Tecnici Superiori (ITSs), i.e. Higher Technical Institutes, a form of technology-based vocational education and training.
- Innovative Industrial Doctorates (IIDs).

Both instruments are relatively new in the Italian education system and are characterised by a focus on applied education, with a strong innovative component and engagement with the private sector. By analysing two instruments that approach university-industry (U-I) linkages at different levels of research-intensity (vocational vs. doctoral training), in a region characterised by moderate levels of innovation, it is possible to appreciate the broad set of challenges involved in preparing a territory for technological diffusion and development.

The project responds to the need of the regional administration to engage with the local higher education system, promoting dialogue within the 4-ple helix and emphasising their role in S3 and regional development. Several reasons induced Puglia to take part to this study. First, in the early stages of strategy development, limited attention has been placed (in Puglia and elsewhere) to the process of human capital creation, there is an increasing awareness of the need to fill this gap. This is partly because, whilst in the Italian system HEIs are mostly governed by policies at national level, the increasing relevance of the third mission has affected the awareness of the regional role of universities and other higher education institutions. Secondly, Italy and in particular the Southern regions are characterised by an extremely high youth unemployment and difficult transition from study to work. The ITS and IID may provide an opportunity to improve such transition and as such are of extreme policy interest. Thirdly, vocational

and doctoral training – whilst mainly funded at the national level - can potentially receive regional funding, opening opportunities (and therefore questions) for synergies between the two.

Within this context, the case study in Puglia explores how ITS and IID are being implemented, the challenges they face and their potential role in S3 implementation.

Following this introduction, the report is organised as follows:

- Chapter 2 provides an overview of the innovation system and S3 both in Italy and Puglia.
- Chapter 3 provides a general overview of the Education and Training System in Italy, and of transition from education to work. It then focuses on the features of the two instruments addressed by the study, at both the national and Apulian level.
- Chapter 4 outlines the methodology and main findings of the fieldwork.
- Chapter 5 provides some policy recommendations.

2. Overview of the techno-economic system and the Smart Specialisation Strategies in Italy and Puglia

2.1 Italy[2]

According to the European Semester Country Report 2016 (European Commission, 2018), Italy is still characterised by low R&D investment compared to other EU countries. In 2014, the country's R&D expenditure as a share of GDP amounted to 1.29%, compared to an EU average of 2.03%. Furthermore, the gap with the EU average is higher for R&D expenditure by private businesses (0.72% of GDP in Italy compared to an EU average of 1.3%) than by the public sector (0.53% of GDP in Italy compared to an EU average of 0.72%). As pointed out by the same report, the 2009 crisis caused a slowdown in the growth of Italy's R&D intensity. The trend has worsened also due to the fiscal consolidation strategy implemented in the last few years: the share of research and innovation in government expenditure decreased from 1.32% in 2007 to 0.99% in 2014.

Italy shows some significant bottlenecks in the innovation system. First, firms, especially young and small innovative ones, have to cope with the existing R&D funding gaps, as they lack sufficient internal resources to fund their projects. They can neither rely on well-developed funding channels (such as business angels or venture capitalists), nor can bank lending be a suitable financial source.

Second, the limited availability of skilled human resources hinders innovative performance: the lack of career prospects and competitive salaries has inevitably increased brain drain.

Third, the innovation system is still characterised by weak cooperation between academia and business.

The Italian industrial demography also mirrors the challenges in the innovation system. The country is characterised by a low share of high-tech knowledge-intensive services and of high-tech manufacturing activities. At the same, there is a significant share of

[2] This section of the report builds significantly on the 2018 European Semester Country Report for Italy (EC, 2018) and on Nascia et al. (2018).

low-tech and medium-low-tech manufacturing activities, a large proportion of small and family-owned firms and a comparatively low level of inward foreign direct investment.

During the last years, a number of policy initiatives have been taken to support Italy's research and innovation system Nascia et al. (2018). Despite that the governance of the Italian R&I system has been fragmented with many initiatives overlapping between national and regional levels, without clear coordination in a subsidiarity perspective (*ibid*). Furthermore, the delays in the implementation of planned measures and the uncertainty about budget availability represented major problems during the economic crisis started in 2008.

The large differences between the North and the South regions concerning economic structures, technological activities, incomes, unemployment, female participation, etc. is a structural issue dating back to the Unification of Italy (1861).

2.1.1 The national Smart Specialisation Strategy

The National Strategy of Smart Specialisation (NSSS)[3], released by MISE and MIUR (Ministry of Economy and Ministry of Education, University and Research, respectively), was approved in April 2016 by the European Commission. In 2016, the Agency for Territorial Cohesion, in charge of monitoring the NSSS, published the national strategic document, outlining the efforts towards integration of policy measures and R&I programmes.

Based on the analysis of the strengths and weaknesses of the Italian research system, the five priority areas at the national level reflect and harmonise those chosen from the 20 regions, and are indicated below:

- Intelligent and sustainable industry, energy and the environment
- Health, nutrition, quality of life
- Digital Agenda, Smart Communities, Intelligent Mobility Systems
- Tourism, cultural heritage and creativity industry
- Aerospace and defence.

The Strategy is implemented through direct initiatives of the National Operational Programme (NOP) Research and Innovation (Ricerca e Innovazione) and the NOP Business and Competitiveness (Imprese e Competitività) and through the National Research Plan. MIUR adopted the National Research Plan (NRP) 2015-2010. The NRP identifies 6 intervention programmes that will implement the S3, each having specific macro-objectives, actions and dedicated resources: Internationalization, Human Capital, Research Infrastructures, Public-Private Collaboration, Southern Italy, Efficiency and Quality of Expenditure. The NOP Research and Innovation and the NOP Business and Competitiveness focus mainly on the regions of the South of Italy. As such, the implementations of national and regional S3 raise questions of multi-level governance, requiring coordination between the national and regional level in order to maximise effectiveness of the two levels of intervention.

2.2 The Apulian techno-economic system and S3

2.2.1 Economic overview

Puglia (Apulia) is an Italian region located in the Southeast of the country, in the heel of the iconic boot. With an overall surface of 19.540,9 km², it is the seventh largest Italian

[3] The strategy is available here: http://www.agenziacoesione.gov.it/opencms/export/sites/dps/it/documentazione/S3/S3nazionale/all_2_Strategia_Nazionale_di_Specializzazione_Intelligente_Italia.pdf

region. It is also one of the most densely populated regions with its 4.1 million residents and an average density of 208 inhabitants per square kilometre (ISTAT 2018, data 2017).

Puglia lags behind the national economy in terms of economic development: in 2016, the regional nominal GDP per capita, with a value of 17,400 euros, was lower of 37% compared to national average (27,718 euros). Moreover, in the same year, GDP per inhabitant in purchasing power standard (PPS) in relation to the EU-28 average was 62% (EUROSTAT). During the last decade, the Apulian contribution to the Italian GDP has been quite constant (about 4.4%, for 6.6% of the total population).

During the period 2006-2016, the Apulian contribution to the national export has been about 2%, reaching 8,262 million euros in 2017 (provisional data). The leading sectors of the regional foreign trade have been transport (the main industry in the 2014-2017 period), pharmaceuticals (main industry in 2013 and second exporting sector in the period 2014-2017) metallurgy (main sector between 2004 and 2012), and agri-food (third industry in 2017).

The economic crisis affected the regional employment significantly: in 2016, the unemployment rate reached 19.4%, quite above the national average (11.7%). In 2016, there has been also considerable difference between the **regional youth unemployment** rate and the national average (49.6% versus 37.8%). The NEET figure is also worrying: 215 thousand young people from Puglia in 2016 were not employed or included in education and training courses.[4]

Nevertheless, over the period 2004-2017, employment by qualification levels sees the share of high-school graduates in work raising from 37.7% to 41.2% of the total (with an increase of about 9.3%), while the share of workers with a university degree passed from 12% to 19.4%, with an increase of more than 60% (ISTAT database[5]): this means that a higher level of education is associated with a higher chance of being employed. Looking at the employment in high technology sectors in 2016, Puglia showed a share of 1.4%, lower than the national average of 3.4%. Finally, regarding the distribution of employment by economic sector, as it is typical of advanced economies, the tertiary sector has maintained in Puglia in the last decades a constant advantage over primary and secondary sectors (69.4% vs. 8.9 and 21.8%, respectively, in 2016). However, as share on total employment, agriculture is still much more important in Puglia than in the rest of the country (8.9% vs. 3.9% in 2016): Puglia is also the region with the highest Italian olive oil production levels, at 36,6%, and it supplies hundreds of oil mills all over Italy. Looking at the manufacture, analysing national and regional value added, sectors where Puglia has been particularly specialized in 2015 were pharmaceutical (NACE C21), transports (NACE C29-C30) and agri-food (NACE C10-C12) industries.

Apulia shows a higher percentage of employment in the secondary sector compared to the average of the other region of Southern Italy (21.8% vs. 19.8%, in 2016). The main industrial areas are in Bari, Brindisi and Taranto, but with significant presences also in Capitanata and in Salento. The largest production units (with northern and foreign capital) operate in the sectors of iron and steel, basic and fine chemicals, rubber, glass, energy, automotive, aerospace, agri-food, ICT and building materials.

In addition, there are small, medium and in some cases large companies of local entrepreneurs working in the agri-food industry, textiles-clothing-footwear, wood-furniture, fine mechanics, in plastics, ICT and in building materials in various smaller centers across the Region.

[4] In addition, the level of gender inequalities has been high if compared to the rest of Italy, with the female unemployment rate higher than that for men (22.7% vs. 17.5%).

[5] For more details: https://www.arti.puglia.it/apulian-innovation-overview/indicatore.php?id_ac=1&id_ad=32&id_at=114.

2.2.2 Overview of the innovation system in Puglia

According to the Regional Innovation Scoreboard (European Commission, 2017), Puglia is a moderate innovator and innovation performance has decreased slightly over time. The table here below shows the indicators normalised scores (they are composite indicators) and relative results compared to the country and the EU in 2017.

Table 1– RIS: Normalised Scores

			% Relative to	
	Data	Normalised score	IT	EU
Tertiary education	18.6	0.205	64	37
Lifelong learning	5.6	0.296	82	63
International scientific co-publications	466	0.274	72	66
Most-cited scientific publications	10.9	0.673	102	123
R&D expenditures public sector	0.72	0.539	108	99
R&D expenditures business sector	0.28	0.188	56	41
Public-private co-publications	39.1	0.177	72	59
EPO patent applications	0.94	0.175	57	45
Trademark applications	2.85	0.273	70	69
Design applications	0.64	0.394	71	75
Employment MHT manuf./KIS services	10.1	0.362	65	68
Exports of MHT manufacturing	32.5	0.371	63	59

Source *Regional Innovation Scoreboard 2017 (EC, 2017)*

In Puglia, the amount of investment in R&D was, in 2015, about 715.6 million euros (EUROSTAT, 2015) equal to 1.01% of regional GDP. The regional contribution to Italian investment in R&D was about 3.2% in 2015. The higher education sector accounts for about 50% of this investment, followed by the business enterprise sector that accounts for 36.8% and by the government sector that accounts for 11.9%. People with tertiary education and employed in science and technology represent 11.2% of active population, below the national and EU28 average (14% and 20.1%, respectively in 2013).

In 2012, with a total number of 38.65 patent applications at the European Patent Office (EPO), Puglia accounts for 1.08% of all the national applications. In 2015, there were 95 active academic spin-off in the region, out of a national total of 1,239. The leading sector was scientific research and development (NACE M72). The analysis of the patents in Apulia (period 1980-2010) highlights the prevalence of the macro-sectors "Mechanics" and "Chemistry", representing namely the 40% and the 19% of the total registered patents in the region.

The research infrastructure in Puglia comprises 4 public Universities, 1 private University, and various sites of CNR, the National Research Council (6 Institutes, 19 territorial subdivisions and 1 organisational support units). Puglia also hosts a research centre of ENEA, the National Agency for New Technologies, Energy and Sustainable Economic Development, and some research units of CREA, the Council for research in agriculture and the agrarian economy analysis. In 2016, more than 13.2 thousand Apulian students have graduated from the regional universities, with a prevalence of those in the social sciences (37.4%), and hard sciences (31.2%). Puglia also hosts 6 Higher Technical Institutes (ITS), created – as discussed above - to fulfil the demand by companies of new high technical and technological skills.

The table below provides some summary indicators for the techno-economic systems of Puglia, comparing them to Italy and the EU.

Table 2- Key indicators for smart growth

Indicator (year)	PUGLIA	ITALY	EU-28
Employment in technology and knowledge-intensive sectors			
Percentage of total employment – 2016			
High-Tech Sectors	1.4%	3.4%	4.0%
High-Tech Manufacturing	0.3%	1.0%	1.1%
Low-Tech Manufacturing	6.3%	6.6%	5.5%
Manufacturing	13.3%	18.2%	15.4%
Knowledge Intensive High-Tech Activities	1.0%	32.9%	36.1%
Total Services	69.3%	70.0%	71.2%
Human Resources in Science and Technology			
Percentage of Total Population – 2016	26.1%	35.7%	46,0%
Total R&D personnel by sectors of performance			
Researchers (FTEs) – 2015			
All Sectors	7,805	259,167	(e)2,874,137
Business	2,597	136,725	(e)1,572,764
Government	1,430	38,669	(e)374,210
Higher Education	(e)3,563	76,858	(e)901,713
Private non profit	215	6,915	(e)25,450
Patent applications to the EPO by priority year			
Number per million inhabitants – 2012	(p)9,543	4,333.62	56,771.67
Total intramural R&D expenditure (GERD)			
Euro per inhabitant – 2015	175.0	364.5	591.1
Percentage of GDP – 2015	0.99%	1,3%	2.03%
Business Enterprise Sector	0.36%	0.67%	(e)1.13%
Government Sector	0.12%	0.51%	(e)0,63%
Higher Education	(e)0.47%	0.01%	(e)0.02%

Source *Eurostat* (u) low reliability; (e) estimated; (p) provisional.

2.3 The Apulian S3

The S3 in Puglia is the result of a participative process launched in 2013 by the Region supported by the Regional Agency for Technology and Innovation (ARTI). The involvement of all the relevant stakeholders and productive and technological districts was a crucial to the process.

The Smart Specialisation Strategy for Puglia, SmartPuglia 2020, has the following aims:

- strengthening the integration between 'transectoral' policies for research, innovation, competitiveness, internationalisation, training and work, improving their connection with 'vertical' policies for the environment, transport, welfare and health;
- strengthening the competitiveness of the private sector with the use of technology;
- promote development via the use of human capital;
- supporting emerging social and environmental challenges linking local needs with innovation;
- spreading digitisation to support local communities and promote the implementation of a 'open government' approach;
- promoting networks to facilitate the circulation of knowledge beyond the local dimension.

Taking into account regional strengths and weaknesses, and according to the dialogue with stakeholders, the Puglia Region has chosen the following specialisation areas, articulated in Innovation Value Chains and Innovation Fields:

Table 3 - Puglia Smart Specialisation priority areas

Priority Area: SUSTAINABLE MANUFACTURING	
Innovation Value Chains	**Innovation Fields**
● Aerospace	● Aerostructures ● Engine design, Propulsion ● Avionics, Systems, Equipment ● Design, simulation, validation and management systems
● Transport	● Engine design, Propulsion ● Other mechanical parts and subsystems ● Systems, Equipment ● Design, simulation and management systems
● Mechatronics	● Control and actuating systems, robotics ● Design, simulation and management systems
● Other Manufacturing o Textiles and clothing o Furniture o Chemistry o ...	● Advanced manufacturing systems ● New materials ● Design, simulation and management systems ● Logistics
Priority Area: HUMAN AND ENVIRONMENTAL HEALTH	
Application Sectors	**Innovation Fields**
● Agro-food	● Food safety ● Food products shelf-life prolongation, packaging ● Functional foods
● Pharmaceutical	● Drug design
● Medical & Healthcare	● Medical diagnostics ● Advanced therapies ● Active aging and self-management of health
● Sustainable Energy	● Storage and smart distribution of energy ● Distributed production of renewable energy ● Energy efficiency
● Environment	● Sustainable management of natural resources and safeguarding of biodiversity and terrestrial and marine ecosystems ● Risks prevention, defence and securing of land and coastal areas ● Sustainable management of wastes and valorisation of scraps and by-products ● Environmental remediation
Priority Area: DIGITAL, CREATIVE AND INCLUSIVE COMMUNITIES	
Application Sectors	**Innovation Fields**
● Cultural industry	● Integrated management of cultural heritage ● Production and communication of cultural and artistic contents ● Promotion of dialogue and collaboration between creative industry and traditional manufacturing sectors
● Social innovation	● Empowerment of social networks and social inclusion

3.The Italian Educational and Training System

According to Italian Law 53/2003, all young people have the right/duty ("diritto/dovere") to pursue their education and training for at least 10 years before reaching age 18, which is in Italy the mature age. Compulsory education lasts from age 6 to age 16 at least. Young people complete lower secondary education at age 14 through a State exam to acquire a certificate (EQF level 1) that allows admission to the upper secondary level, that can be of general education or vocational education and training (VET).

The Italian **Education System** is based on principles of subsidiarity and of autonomy of institutions: the State, through the Ministry of Education and Research (Ministero dell'Istruzione e della Ricerca Scientifica – MIUR) has legislative power on the organisation and standards of Education (e.g., curricula, school staff, quality assurance), whereas Regional School Offices guarantee application of legislative provisions.

Regions share with the State responsibility in certain sectors of the education systems (i.e., school calendar), and exclusive competence in the organisation of the regional vocational education and training system[6]. Remarkably, stakeholders play an important role in promoting company-level training plans (single or group of companies) to be financed by the Regions or by the joint Inter-Professional Funds[7] and have a general advisory role in VET policy, from which VET provision is then defined.

According to OECD (2017), the Italian education system "*needs to give more effective support to students and workers to develop the necessary skills to adapt to new jobs and tasks throughout their careers. Addressing this challenge will require a substantial change in teaching methods and in the content of curricula taught at school. Along with that, it is fundamental that Italy addresses the weak wage incentives, poor career progression provided to teachers while, at the same time, boosting the adoption of creative teaching methods. Similarly, it is fundamental to provide stronger incentives to young and talented Italians to pursue the teaching profession*".

As for the university system, it is organised in three cycles. The education contents of each degree course are determined autonomously by each single university, even if they are obliged to include certain educational activities (and the corresponding number of credits) fixed at a national level. These requisites are established in relation to each class of degree. The qualifications in the same class all have the same legal value. University qualifications confer on the holder different academic titles: a bachelor degree bestows the academic title of "Dottore", the Master's Degree is defined as "Dottore Magistrale"; a Doctorate bestows the title of "Dottore di ricerca" or "PhD" (CIMEA, 2018[8]).

In Italy, HEIs are regulated and depend directly on the Ministry of Education, therefore there is no regional legislative capacity. However, regions are delegated for some provisions that impact directly on the HEIs, such support to students (including financial

[6] As disposed in the Italian Constitution Law (art.117), the State has exclusive competence for:
- general rules on education;
- essential performance levels;
- fundamental principles on which the competing legislation of the regions should be based.

Regional competences regard:
- vocational training not included in the national education system;
- the planning of the integrated training offer between vocational education and training;
- programming of the education system, within the limits of the availability of human and financial resources, of the school network and personnel.

The last is a competence shared with the State, of a regulatory nature.

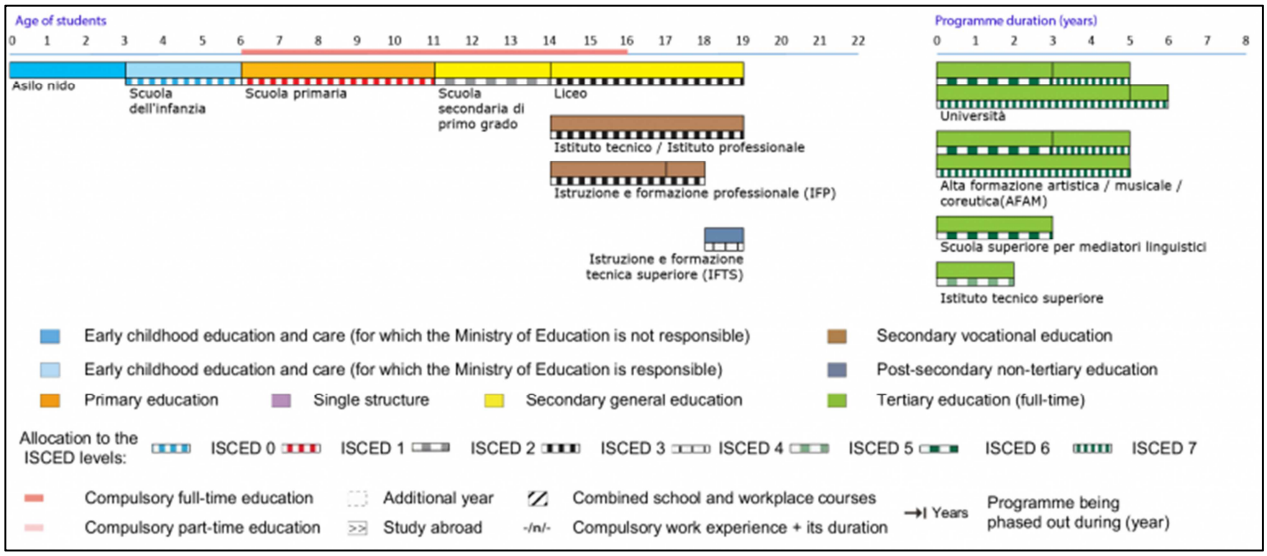
[7] The Inter-Professional Funds were established by Law 148 of 14/09/2011: they finance training plans for companies, sectors, and territories, that are implemented for employees by single or associated companies.

[8] http://www.cimea.it/en/servizi/il-sistema-italiano-di-istruzione-superiore/il-sistema-italiano-di-istruzione-superiore-overview.aspx

support) and to areas that affect HEIs to different extents, such as lifelong learning; advanced apprenticeship schemes addressed to university graduates[9]; support to young people to participate post-degree courses at the university; traineeship schemes (funded or co-funded).

Furthermore, regions can (and do) support specific research curricula (that are anyway subject to national accreditation from the Ministry) with regional funds: structural funds have been used to hire also researchers in universities, to strengthen the research and innovation regional capacity.

Figure 1 ***The Italian education system at a glance***



Source *Eurydice* (*2016)*

In general, Italy under-achieves according to key indicators for education, training and labour market (2016), as confirmed in the table below:

Table 4 – Key indicators for Education, Training, and the Labour Market

Indicator	Italy	Europe
Early leavers from education and training (age 18-24)	13.8%	10.7%
Tertiary educational attainment (age 30-34)	26.2%[10]	39.1%
Employment rate of recent graduates by educational attainment (age 20-34 having left education 1-3 years before reference year) – ISCED 1-8	52.9%	78.2%
Unemployment rate for 20 to 34 year-olds	21.5%	11.8%
NEET rate for 18 to 24 year-olds	26.0%	15.2%
Employment rate for tertiary education (24-64 years old) – ISCED 5-8	79.8%	84.8%

Source *Eurostat 2016*

Italian school-to-work transitions are among the longest in the world: in 2011, according to Quintini and Martin (2014), the time needed to complete transition[11] was 1.7 years

[9] I.e. Apprendistato di alta formazione e ricerca.
[10] *National target for Italy: 26-27%; European target (Europe2020): 40%*
[11] *Completed transition* refers to the access to a stable work position.

and time needed to get 50% of the youth population into work after school leaving was 5.9 years.

Young people struggle to make the transition from education to work. The following barriers have been identified:

- limited access to career orientation services (OECD, 2017);
- limited previous work experience (especially before the introduction of the mandatory traineeship for all upper secondary students, known as "the Good School Act", 2015), or a sufficient range of skills needed on the job (cognitive and soft skills, OECD, 2017);
- lack of information about employment opportunities and services (OECD, 2017);
- high skills mismatch (OECD, 2017; Pastore, 2017).

In addition, the length of transitions depends on the labour market general trends: during the years of the crisis, youth employment has been particularly hit.

For these reasons, it is particularly interesting to explore educational tools that aim at alignment with labour market needs, such as ITSs and Industrial PhDs.

3.1 The Istituti Tecnici Superiori (ITS)

ITSs were introduced in Italy in 2010 through the Prime Ministerial Decree of January 25, 2008, with the aim to address the challenging process of entry in the labour market of Italian students. As high technology schools, they are closely linked to the production system, helping to govern and exploit the potential of Industry 4.0 solutions.

The ITSs must have the following characteristics:

- are organised as Foundations participated by enterprises, Universities/centres of scientific and technological research, local authorities, organisations from the education and training system (e.g. schools and VET organisations);
- have legal personality;
- must be linked to the six technological areas that are considered strategic for the country growth (sustainable mobility, new life-science technologies, new technologies for "Made in Italy" products, innovative technologies for cultural heritage and tourism, information and communication technologies, energy efficiency); the 6 technological areas are those considered "strategic" for the economic development and competitiveness of the country at the time of Prime Ministerial Decree in 2008 and substantially confirmed in NSSS in 2016.
- are accessible through competition by citizens with upper secondary education degrees or technical diploma (4 years), if they have completed an additional year of education for the access to tertiary education;
- have a duration from 4 to 6 semesters, for a total of 1800/2000 learning hours (of which 20% in traineeship);
- at least the 50% of teachers must be professionals from the labour market;
- foresee an examination body for the final exams that is composed by representatives of schools, universities, VET, and experts from the world of work;
- allow to achieve a High Technical Degree corresponding to level V of the European Qualification Framework;
- recognizes ECTS[12] according to Law 107/2015, modified then within Law Decree 42/2016 as follows "no less than 40 ECTS for pathways of four semesters, no less than 62 for pathways of six semesters".

The latest data (September 2018) shows the existence of 100 ITSs, distributed in the technological domains as indicated in table, for a total of 430 active programmes and 10,562 enrolled students.

[12] European Credit Transfer and Accumulation System (**ECTS**) credits are a standard means for comparing the "volume of learning based on the defined learning outcomes and their associated workload" for higher education across the European Union and other collaborating European countries.

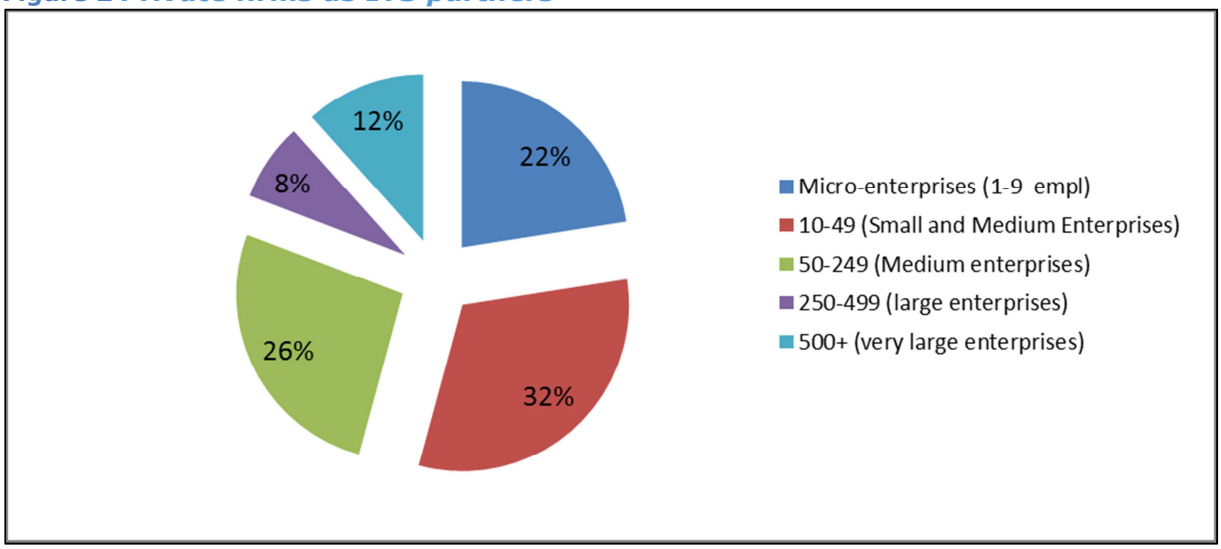
Table 5 - Distribution of ITSs by technological domain

Technological domains	Number if ITS in Italy
Sustainable mobility	17
Energy Efficiency	15
Innovative technologies for cultural heritage and tourism	12
Information and Communication Technologies	10
Life-science technologies	7
Technologies for *Made in Italy-Agro-food*	16
Technologies for *Made in Italy-Mechanics*	11
Technologies for *Made in Italy-Fashion*	7
Technologies for *Made in Italy- Business services*	3
Technologies for *Made in Italy-Home system*	2
Total	100

Source *INDIRE (2018).*

The ITS foundations included 2,223 partners, of which 848 were enterprises, distributed as shown in the graph below. (INDIRE ITS website)[13]. The size of companies participating ITSs' Foundations includes small and very large companies, with a predominance of small and medium enterprises (10-49 and 50-249 employees): this roughly reflects the characteristics of national economy, which is composed mainly by small and medium enterprises (ISTAT, 2018). However, there is still a remarkable representation of large and very large enterprises, accounting the 20% of the companies taking part of ITSs' Foundation (representing instead less than the 1% of the national economy, but employing the 20% of the Italian workforce).

Figure 2 ***Private firms as ITS partners***



Source *Banca Dati Nazionale ITS – Data Nov. 2017*

There is no formal evaluation of ITS programmes from the private sector perspective: informal sources, such as the financial newspaper Sole24ore[14] or policy papers of

[13] http://www.indire.it/progetto/its-istituti-tecnici-superiori/numeri-its/
[14] http://www.ilsole24ore.com/art/commenti-e-idee/2017-08-25/scuola-e-lavoro-its-sono-risorsa-fondamentale-230013.shtml?uuid=AEVRumHC and http://www.ilsole24ore.com/art/notizie/2018-01-22/si-rafforza-l-asse-istituti-tecnici-superiori-e-imprese-210419.shtml?uuid=AEx4KxmD

representatives of enterprises[15] indicate a positive experience with ITSs. Indeed, in November 2017 Confindustria, the main representative of the private sector, started a project to provide labels to those enterprises that participated in enhancing quality of high technical education though the "BITS - Bollino Impresa in ITS".[16]

The ITS educational attainment is of 73.6% in the period 2015-2017; 82.5% of graduates were employed in two years after achieving the diploma in 2016 (INDIRE, 2018).

An analysis of ITS graduates from 2014 (Almalaurea 2016) reveals that they are generally satisfied with their learning programmes: the majority would confirm their choice and suggest the course to a friend. Nevertheless, only 4 graduates out of 10 receive at the end of the traineeship a proposal from the hosting firms. Students declared that ITS Foundations should have a more relevant role in the transition from learning activities to job seeking and suggest providing a reliable placement system. The majority of stakeholders consider ITS as a positive innovation within Italy's skills system (OECD, 2017), however some challenges have been identified:

- The ITSs were initiated by three Ministries (Education, Labour, and Economic Development – Law December 27, 2006 n. 296, article 1, comma 663), and belong both to Education and VET systems, generating confusion on their role within the national education framework;
- As their legal form is that of a Foundations of diverse players, ITSs can encounter governance problems (as reported by INDIRE, 2013 and OECD, 2017), having a large board of directors;
- Regional management might lead to a fragmented system, where the quality and efficacy of the ITSs is not always ensured (OECD, 2017);
- Recruitment of ITS students among school-leavers is limited, as ITSs' visibility is low across the school system at the moment of transition for second to tertiary education. Indeed several enrolled students access ITSs after periods of unemployment or after the achievement of other tertiary degrees (OECD 2017);
- Female participation is low (OECD 2017), particularly in some regions (e.g., Sardinia and Puglia). This could be related to the "cultural and social stigma toward technical education" (OECD, 2017 page 109);
- Skills match are not guaranteed: according to Almalaurea (2016), 2 graduates out of 10 declare not to apply the knowledge attained during the technical training, and to have a job not coherent with the ITS degree.

3.1.1 Istituti Tecnici Superiori in Puglia Region

Puglia hosts 6 ITSs, which are well aligned to the regional smart specialisation areas, as indicated in the table below:

[15] https://www.confartigianato.it/wp-content/uploads/2018/01/Confartigianato-Documento-ELEZIONI-2018.pdf
[16] http://www.confindustria.it/wps/portal/IT/newseventi/Iniziative%20e%20Progetti/Detail-Progetti/aa90d514-67cd-414e-82c4-80f7acae59ed/aa90d514-67cd-414e-82c4-80f7acae59ed/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOJ9PT1MDD0NjLwMDALdDBxNjEKcTYJcDU2MTfULsh0VAeldY_M!/

Table 6- Puglia's ITSs and corresponding smart specialisation areas

ITS	SNSI area	Year	Puglia Thematic/Specialization area	Province
ITS Antonio Cuccovillo - nuove tecnologie per il made in Italy - sistema meccanica	Made in Italy (mechanics)	2010	Sustainable manufacturing/Mechatronics	Bari
ITS nuove tecnologie per il made in Italy - sistema alimentare, settore produzioni agroalimentari	Made in Italy (Agri-food)	2010	Human and environmental health/Agri-food	Bari
ITS per la mobilità sostenibile - settore aerospazio Puglia	Sustainable mobility	2010	Sustainable manufacturing/Aerospace	Brindisi
ITS Apulia Digital Maker	Technologies for ICT	2015	Digital, creative, and inclusive communities/cultural and creative industries	Foggia
ITS per l'industria della ospitalità e del turismo allargato	Technologies for Cultural Heritage	2015	Human and environmental health/Tourism	Lecce
ITS per la mobilità sostenibile gestione infomobilità e infrastrutture logistiche	Sustainable mobility	2015	Sustainable manufacturing/Smart factory	Taranto

Source *Banca Dati Nazionale ITS (2018)*

In May 2018, there were 31 active programmes, for a total of 850 enrolled students, distributed as in table 8:

Table 7– Enrolled students by Technological Area

Technological area		**ITSs Puglia**
Energetic efficiency	Courses No.	-
	Enrolled	-
Sustainable mobility	Courses No.	8
	Enrolled	226
New technologies of life	Courses No.	-
	Enrolled	-
New technologies for made in Italy	Courses No.	13
	Enrolled	343
Information and communication technologies	Courses No.	4
	Enrolled	122
New technologies for cultural heritage, cultural activities and tourism	Courses No.	6
	Enrolled	160
Total	Courses No.	31
	Enrolled	850

Source *Banca Dati Nazionale ITS – May 2018, Region Puglia*

Data referred to students enrolled at courses started in 2016 show that more than a third of students (37%) deal with New technologies for Made in Italy and are based in province of Bari, Sustainable mobility students are the 29% out of the total and are concentrated in the two provinces of Brindisi and Taranto. Finally, the remaining 34% of students between Foggia (ICT) and Lecce (Tourism) are equally divided.

Foundations are composed by 229 partners in total, including 87 enterprises, 48 upper secondary schools, 19 training organisations, 17 university departments, 8 professional bodies, 5 organisations of the research system, 5 trade unions, 4 social partners, 3

chamber of commerce, 3 credit institutions, 3 associations of enterprises, and 17 organisations with other profiles, including 1 foreign partner (INDIRE, 2018). Firms' fields and sizes are described in table 8. The most represented field is the area New Technologies for Made in Italy (60 enterprises), and about half of the companies are micro and small enterprises (52%).

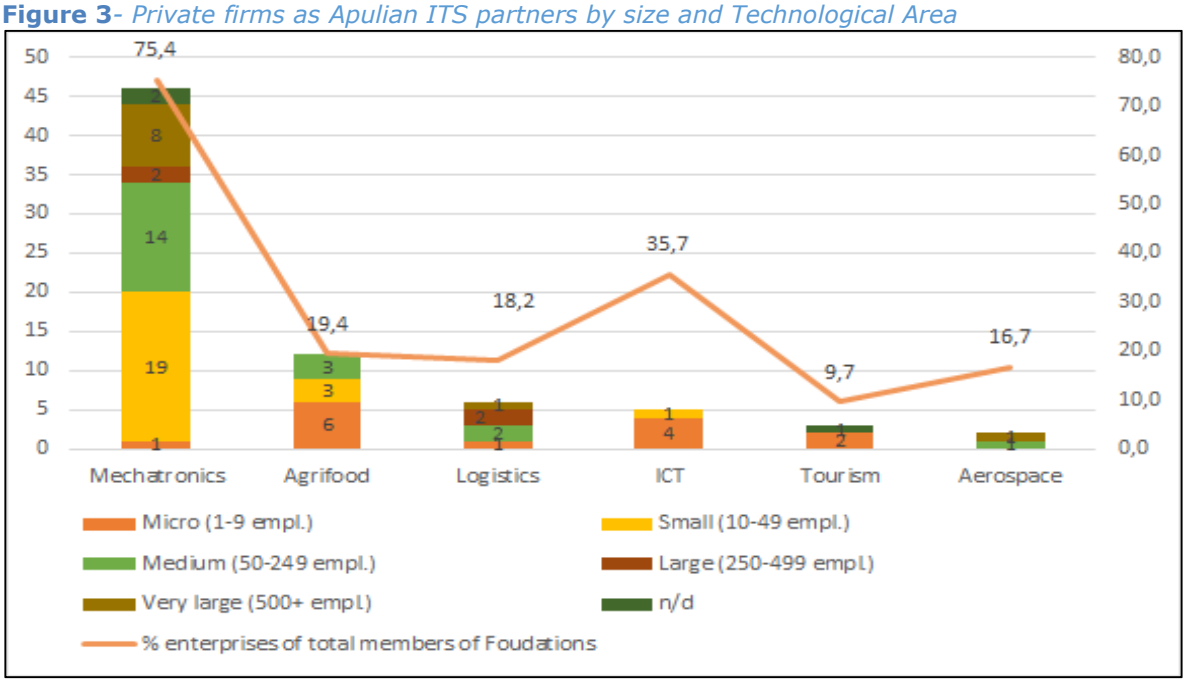
Table 8–ITS partner companies (or association thereof) by Technological Area

Technological areas	Company size					
	1-9	10-49	50-249	250-499	500+	Total
Energetic efficiency	-	-	-	-	-	-
Sustainable mobility	1	5	11	3	2	22
New technologies of life	-	-	-	-	-	-
New technologies for made in Italy	7	26	17	2	8	60
Information and communication technologies	4	1	-	-	-	5
New technologies for cultural heritage, cultural activities and tourism	2	1	-	-	-	3
Total	14	33	28	5	10	90

Source *Banca Dati Nazionale ITS – May 2018, Region Puglia*

The number and the size of enterprises as members of the 6 ITS Foundations clearly reflects the structure of the different economic sectors: large and very large enterprises are only part of Mechatronics, Logistics, and Aerospace ITSs. In ICT and Tourism ITSs only micro and small enterprises are present, whereas in Agrifood ITSs members are all SMEs. Mechatronics ITS also stands out for the largest number of enterprises present in the Foundation.

Figure 3- *Private firms as Apulian ITS partners by size and Technological Area*



Source *ARTI's elaboration on Banca Dati Nazionale ITS – Data extracted on February 2018, Region Puglia*

3.1.2 ITSs in Puglia: employment outcomes

Monitoring activities carried out by INDIRE (2018) on 15 programmes (368 enrolled students, 309 graduates, and 257 employed), highlight the following trends:

Although slightly below national average (70% vs 81%[17]), employment outcomes of ITSs graduates are well above regional figures. Youth unemployment rate in Puglia in ages 15-29 (which correspond to the expected cohort of the ITSs graduates), was above 40% in 2017 (ISTAT, 2017). It should be stressed however that monitoring activities are limited to 3 ITSs out of 6[18], and they neither consider the employment location (that can be outside the region of graduation), nor the type of job position (that can be consistent or not with the skills acquired through the learning pathway). This limits our ability to understand how ITSs directly impact on regional economy and contribute to smart specialisation strategy implementation.

3.2 The Innovative Industrial Doctorates

3.2.1 Doctoral studies in Italy

Doctoral Studies have been introduced in Italy in 1980, and implemented starting from 1983. Access to doctoral programmes happens through open national competitions, on yearly basis (called "cycles"). At present, Doctoral Studies are regulated by Article 4 of Law n. 210 of July, 3 1998, with modifications made by Law 240 of December 30, 2010 (Article 19). The main characteristics of Doctorates, which are the higher level of tertiary education, are:

- Minimum length of three years;
- Yearly progress-revision by an examination body (internal to universities);
- Production of original research, expressed by the Doctoral Thesis that is defended against a panel of external examiners.

Universities have autonomy in defining the number of doctoral students per cycle, as well as research topics. The provision of scholarships (whose amount is defined by Law) is compulsory for at least the 50% of students.

According to Tiraboschi (2014), over the last thirty years, the function of PhD courses in Italy has been downplayed, since they have been considered as self-referential mechanisms to train prospective academics, rather than as vibrant centres for innovation and technology transfer. PhDs have not been considered the new frontier of cooperation between university and industry for the advancement of knowledge and the economic, social and productive development of the country. Thus, the Italian government, during the last years, has promoted new policy measures to reduce the gap between university and business realms.

3.2.2 Innovative Industrial Doctoral Training

The National Operational Programme on Research and Innovation 2014-2020 funded by the Regional Development Fund (ERDF) and the European Social Fund (ESF), covering Italian less developed and transition regions outlines two main funding priorities: (1) investing in education, training and vocational training for skills and lifelong learning by

[17] http://www.indire.it/wp-content/uploads/2017/05/3.INFOGRAFICA_CONFRONTO_MONITORAGGIO-2015_2018_az.pdf

[18] The 3 ITS included are: Istituto Tecnico Superiore Antonio Cuccovillo - nuove tecnologie per il made in Italy - sistema meccanica, Bari; Istituto Tecnico Superiore nuove tecnologie per il made in Italy - sistema alimentare, settore produzioni agroalimentari, Bari; - Istituto Tecnico Superiore per la mobilità sostenibile - settore aerospazio Puglia, Brindisi (INDIRE, 2018)

developing education and training infrastructure and (2) research, technological development and innovation.

Within this programme, the new call on Industrial PhDs has been promoted for Southern regions[19]. The legislative basis was the Ministerial Decree of 8 February 2013, that outlines the rules for the accreditation of doctoral programmes as well as the criteria for the establishment of PhD courses by certified bodies. No mention is made about these courses in previous legal sources regulating Doctoral Studies. According to Tiraboschi (2014), the regulation of 8 February 2013 identifies three different PhD tracks: "PhDs in collaboration with enterprises"; "Industrial PhDs"; and "Higher Apprenticeships".

The National Operational Programme elaborated by MIUR introduces the so called "Innovative Industrial Doctorates" (IID) in Action 1.1, based on recommendations from different stakeholders involved in the definition of the programme. The aim of this action is to promote a new vision of PhDs, especially in the South of Italy and in line with Innovative Doctoral and Post-doctoral Programmes already implemented in other European countries.

The main characteristics of the IID, according to the first call for proposal in 2016 (Directorial Decree n. 1540 of July 26, 2016), were:

- alignment with the priority thematic areas of the National Smart Specialisation Strategy as well as with the regional labour market needs in terms of high skilled profiles;
- to last 3 years;
- to be included in existing PhD programmes offered by accredited universities;
- to cover a research period in a company (6-18 months);
- to cover a research period abroad (6-18 months);
- the provision of facilities and research infrastructures;
- the provision of learning activities to enhance language and ICT skills;
- the involvement of firms in the definition of learning paths;
- the acknowledgement of horizontal principles such as environmental sustainability and gender equality.

The bodies in charge of offering and activating PhD programmes must be universities, university consortia, or qualified research and higher education institutions through a preliminary check and endorsement to be received by MIUR on the basis of criteria and indicators provided by the National Agency of University and Research Assessment (ANVUR). Foreign universities and centres of research can take part only as members of consortia led by Italian universities.

Furthermore, innovative teaching methodologies are promoted, through online learning tools, blended learning and new approaches requiring a strict linkage with external stakeholders. As of March 2018, two cycles of IID have been running.

Table 9– Innovative Industrial Doctorates – 2016 & 2017 calls

	Submitted	Eligible	Granted
***2016* - Southern Italy**	***373***	***311***	***166***
2016 – Puglia	60	51	27[20]
2017- Southern Italy	***717***	***609***	***479***
2017 – Puglia	132	111	85

Source *Our elaboration on D.D. n. 353 figures*

Available budget, from the National Operational Programme, accounted for 13 million EUR in the first edition, which was intended as piloting initiative even in light of some delays in implementing the National Operational Programme (with a total of 166

[19] Namely Transition Regions (Abruzzo, Molise and Sardinia) and Less Developed Regions (Campania, Puglia, Basilicata, Calabria e Sicily), according to the definition of Cohesion Policy.
[20] 27 scholarship out of 30 approved were assigned, for a total of 27 enrolled students

scholarships granted), and 42 million in the second (with 479 scholarship granted). In 2018 the budget for the current call is set at 18 million EUR by the National Operational Programme Management Authority.

3.2.3 Innovative Industrial Doctorates in Puglia Region

In the first IID call (2016, cycle XXXII), 30 doctoral projects received a positive evaluation in Puglia. Of these 27 took part to the IID programme: the remaining 3 PhD candidates who won the the selection had found other job opportunities elsewhere. The proposed research projects, although approved, have therefore not being implemented.

With reference to the three priority-areas of the Apulian S3, projects on "Human and environmental health" represent the 53% (16) of the total proposed, "Sustainable Manufacturing" the 30% (9), and "Digital, creative, and inclusive communities" the 17% (5). Data from 2017 are not yet available.

Out of 27 enrolled PhD students, 14 were at the University of Bari, the largest in the region. Total regional funding for all 4 universities was 2.047.143,96 EUR.

Table 10 – Data summary for Innovative Doctorates first call (2016/2017)

HEI	2016	2017
Università degli Studi di Bari "Aldo Moro"	14	44
Politecnico di Bari	4	15
Università degli Studi di Foggia	1	7
Università del Salento	8	19
LUM "Jean Monnet" (private)	-	2
Total	27	87

Source *Presentation from V. Sperati (2017) PON Italy – Innovative Doctorates in Puglia Region and our elaboration on Decree. n. 3749 figures*

Although data from the second call are not yet available, those collected from the first call show that delays in the publication of the call and results may lead to organizational bottlenecks and reduced opportunities for potential candidates. There has been an attempt of overcoming the problem in the following round.

4.Field Research

4.1 Methodology

The HESS fieldwork in Puglia was articulated in three main steps:

1. An exploratory workshop;
2. Primary data collection through semi-structured interviews and focus groups:
3. A validation workshop.

In parallel, the HESS project opened-up a continuous dialogue with MIUR, which supported the project by providing information and data on ITS and Industrial PhDs and taking part to the events.

4.2 Exploratory workshop

The exploratory kick-off workshop was organised by the JRC, ARTI and the regional government to present and discuss the project with stakeholders. The meeting was held on the October 31st 2017, in Bari. Overall, more than 30 participants attended on behalf of Apulia Region, ARTI, MIUR, local Universities, all the regional ITS Foundations, managers of Confindustria and technological poles.

Local stakeholders attending the meeting included:

- professors from Universities responsible for Industrial PhD;
- directors and officers from ITSs ;
- representatives of the private sector involved in either Industrial PhDs or ITSs.

MIUR was also present to the meeting through Ms. Vanessa Sperati, responsible for industrial PhDs. The meeting was opened by high-level civil servants from Regione Puglia (Director of the Department of Economic Development, Innovation, Education, Training and Labour; Manager of the Section Education and Universities; Manager of the Section Innovation and Institutional Capacity) and the president of ARTI.

The meeting aimed both at showing the main purposes and methods of the project to local and national stakeholders, and at co-refining the research questions and methodology. During the event, 3 focus groups were held focussing on Industrial Phd (1) and ITS (2), led by the national expert and 2 JRC representatives. These allowed stakeholders to reflect on the alignment of tertiary education activities and regional policies, whilst they enabled the research team to narrow-down the focus of the project. Tables 11 reports the key aspects emerged in the discussions, to be further explored in the remaining of the case study.[21]

[21] The focus-group protocol is reported in Annex 2.

Table 11– Explored topics in ITSs and Innovative Industrial PhDs

ITS	Innovative Industrial PhD
General perception about the instrument Pros and cons of ITSs **Pedagogical and didactical approaches** • ITS distinctive pedagogical approaches and their linkages with the needs of the region • Level of involvement of the private sector in the definition of ITS learning pathways **Recruiting process (of the students)** Level of ITS awareness and reputation among young people **Employability of graduates** Skills/capacities of ITS graduates that are most valued by employers in Apulia **Monitoring and updating of the learning process** • Administrative bottlenecks • Level of involvement of ITS Foundations in S3 • Level of involvement of the private sector **Awareness of EU policies** • Awareness of EU funds, programmes and tools • Awareness of EU Cohesion Policy and Smart Specialisation. **ITS governance** • Main administrative bottlenecks to ITSs functioning • Level of involvement of ITS Foundations in S3 in order to contribute and to explore related opportunities	**General perception about the instrument** Challenges and opportunities of Industrial PhD adoption in the regional system **Pedagogical and didactic approaches** • Differences between "traditional" and "industrial" PhD and novelty perception from different stakeholders • Collaboration between universities, public administration and private sector in planning Industrial PhDs learning pathways • The main features of PhDs distinctive pedagogical approaches and their linkages with the needs of the region **Selection of PhD students** • PhDs and entrepreneurial culture in Puglia • Administrative bottlenecks to Industrial PhDs implementation **Universities' strategies for the inter-sectorial collaboration** • Multi-level governance – relationship between universities, regional and national administration **Intra-regional collaboration and S3** • PhD alignment with regional priorities and S3 - Industrial vs Traditionals programmes

Participants to the focus groups were subsequently asked to fill an online survey, where they were asked to further explain their point of view about on the topics raised during the kick off meeting, and to suggest key informants for field research (see Annex 3) . The results of such survey, completed by 8 key informants (6 ITS, 1 regional government representative and 1 university professor) supported the development of the interview guidelines and the identification of the interviewees for the second part of the fieldwork.

4.3 Interviews and focus groups

In the second step of the fieldwork, qualitative data were collected through in-depth semi-structured interviews with key informants, and focus groups with ITSs students.

Overall, 41 stakeholders involved in ITS and Industrial PhDs were interviewed in the period between January and April 2018, as summarised in the table below. Interviewees represented the following stakeholders' groups: Apulia Region representatives in charge of Research, Higher Education and Regional Policy, Vice Rectors and HEIs managers of Research/Didactic/Third Mission, University professors, Director/Professor/Staff of ITS,

Students currently attending ITS, Students graduated in ITS, PhD Students, Managers/owners of companies hosting students.

Table 12 - Summary of fieldwork

	ITS and Industrial PhDs	
Apulia Region representatives in charge of Research, Higher Education and Regional Policy	At least 2 Regional Policy makers	
Rectors, Vice Rectors and HEIs managers of Research/Didactic/Third Mission	1 Rector or Vice Rector or Delegate per each University (overall 4)	
	ITS	**Industrial PhD**
University professors	6 professors involved in the ITS Foundations (1 x ITS)	4 Directors of PhD Curriculum (1 per University)
Director/Professor Staff of ITS	1 member x ITS (overall 6)	
Students currently attending ITS	Focus Group	
Students graduated in ITS	4	
PhD Students		4
Managers/owners of companies hosting students	4	4

4.3.1 General findings

Both ITSs and PhDs received appreciation from all the interviewed stakeholders, including current (ITS and PhD) and former (ITS) students.
Transversal consensus emerged in ITSs and IID over several aspects:

- Active teaching methods (such as problem based learning, experiential learning, etc.) are considered valuable by all consulted stakeholders. They have proved efficient and highly motivating for students.
- The development of soft skills is seen as crucial for employability: this issue was particularly underlined by companies, either consulted by ITSs/IIDs in the frame of preliminary contacts for programme design, or directly interviewed for this study;
- The novelty of the instruments implies a significant organisational challenge, which was stressed by all interviewees involved in running IID and ITS and was also clearly perceived by students.
- Whilst there is general awareness of the activities of the regional government for territorial development, there was limited knowledge of Smart Specialisation.

4.3.2 ITSs specific findings

In line with OECD (2017) all interviewees agreed that a strength of ITSs is undoubtedly the flexible design of their curricula, which is characterised by an active participation of firms. This method allows employers to continuously monitor their needs and adjust education programmes accordingly. Furthermore, all interviewees agreed on the quality of the teaching and administrative personnel and on the efficacy/efficiency of the procedures, particularly during the work-based learning periods. The only weak point of the education experience, highlighted by several participants, was related to career guidance and placement services, which need to be strengthened.

Despite these remarkable strengths, the ITSs suffer first and foremost for their financial unsustainability. As ITSs are funded (with a yearly time-horizon) under programmes that will probably change in a few years, it is impossible for managers to plan in the long-

term, all the more as the private funds they receive cannot be guaranteed. Part of the problem lies in the legal setting of these institutes: ITSs are formally institutions of Tertiary Education but are treated as "training organisations". This has, in Italy, significant implications for financial treatment. Whilst education is fully publicly funded, training is considered private. ITSs are in a hybrid situation: they have the needs of an educational organization and access funding as private organisations. In particular, they are funded, through the European Social Fund, by regional operational programmes. This means, for instance, that they are excluded from some type of expenses, which are allowed in educational institutions (e.g. hardware), and other sources of funding available for schools.

Furthermore, information and awareness about ITSs is still limited, especially for the newest ones (for those Foundations and learning programmes established in 2010 a powerful channel is still the word of mouth). Companies, and students themselves, do not fully perceive the added value of ITS, partly because of the limited formal recognition of non-academic training. In turn this makes recruitment of graduates difficult. Indeed, the fieldwork suggests that many ITS' students do not proceed from high-school, but rather reach an ITS following a period of unemployment.

Variability among different ITSs depend mostly on the sector of operation and the age and experience of the institutes themselves. The most relevant aspect is represented by the size of the companies involved: some sectors are composed by large industries (e.g. mechatronics), which have medium-term plans of research and development and can better identify prospective learning needs; some other sectors, instead, are represented by micro and small companies, like in the case of tourism, which base their needs on estimated touristic flows, which are less predictable than product design and development. Learning-design approaches are obviously different: if in the first case the sector can express a more structured development plan, and manage related risks; in the second case, the development plan involves the territory in a wider sense[22] and risk management is consequently more challenging.

As ITSs need to respond to territorial demands, the ability of forecasting such demands is crucial. In this respect, unexpected changes in industrial policies may undermine ITSs' planning. Interviewees reported the case of Grottaglie airport (province of Taranto). The airport was supposed to become centre of excellence for research and development of remote control of airplanes: on this basis, the Aerospace ITS designed a course aimed at training professionals able to work in specific settings of remote control. The implementation of the regional project, however, suffered some delays and re-design of the original plan, which has impacted directly both in the companies involved in the training programme and in the career opportunities of the graduates, undermining social trust.

Last but not least the fieldwork highlighted a good understanding of the EU Cohesion framework and a proactive attitude towards fund-raising in EU programmes (i.e. Erasmus+). Specific awareness of S3, however, was limited and the case-study served, *de facto*, at filling this communication gap.

[22] Tourism includes "tourism industries" or "tourism characteristic activities" (EUROSTAT), which includes a range of activities and services offered by a territory (see UN (2010). International Recommendations for Tourism Statistics 2008)

4.3.3 Innovative Industrial Doctorates specific results

Innovative Industrial Doctorates have been a new experience for Puglia and the fieldwork highlighted mixed experience from students and academics interviewed. One of the most interesting and novel features of this educational instrument is its inherent multidisciplinarity, which has generated significant challenges in the implementation of the IID as well as extremely positive experiences.

Universities highlighted the slow-pace of the required organisational adjustments to fit the new processes, procedures as well as the significant change in culture that IIDs demand both to universities and firms. In line with the literature on U-I links, the fieldwork revealed that communication and information flows on these innovative instruments are not smooth, with weak connections among the various IIDs, lack of information in schools and across undergraduate degree programmes.

In particular, HEIs, in which research is mostly disciplinary-based, find difficulties both in adjusting to the shift from basic to applied research, and to deal with research needs of enterprises and regional development. Applied research is in fact often and mostly transdisciplinary: this requires joint design, reciprocal understanding of needs and objectives, as well as awareness of the territorial needs for economic development. Implementation of IIDs also requires a shift from 'traditional' to 'active' learning methods, which represent very different pedagogical perspectives. In fact, one of the main criticisms to traditional methods of teaching, reported by managers and owners of firms hosting IID students, is related to the deeply-rooted assumption that soft and transversal skills are marginal during learning programmes in HEIs and that these attributes have to be learnt only later at work.

Administratively, in the first year of the programme, several obstacles emerged when attempting to fulfil the requirements of the call. In particular, the selection process of PhD students/projects adopted by universities (which follow public regulations) did not prove satisfactory to the firms (which are used to more flexible approaches). It also appeared difficult to meet the formal requirements of the work-based visiting period that candidates need to spend abroad. However, for the second call those issues were already overcome.

The most relevant obstacle to formalize joint research-projects, however, has been identified by the Universities as a lack of "learning culture", which is particularly evident in SMEs. This is in line with the literature which has shown that SMEs are in general less informed and networked (unless located in strong industrial agglomerations); they have a much lower propensity to engage in R&D (which is an obvious pre-requisite to participate in industrial PhDs) and they rarely are in the position to predict skills and competencies of the future. Forecasting is, on average, a prerogative of large firms.

Lastly, the existence of previous relationships with enterprises by HEIs has played a major role particularly in the project design phase: most of the applications are in fact based on direct contacts of professors with business players. This is a very tangible indicator of the structural and cultural barriers to be overcome to open-up the participation IIDs to a broader set of firms.

4.4 Validation workshop

The validation workshop was organised in March 2018 in Bari with the aim of corroborating the findings from the fieldwork and debating possible steps to address the

emerged challenges. The working day was organised in two sessions:

- sharing the results of the fieldwork for discussion and validation (morning session);
- debating and planning forward (afternoon session).

Forty stakeholders participated to the workshop, representing the Puglia Region, the ITSs foundations, the Apulian Universities (with both academics and IID candidates). The participation of the private sector was limited to three representatives.

Parallel sessions were organised in the morning, while in the afternoon the debate took place in plenary. Given the strong consensus on the findings presented from the fieldwork, it was easy to open-up the discussions to new topics. In particular representatives from both ITS and IID programmes were keen on discussing the regional governance arrangements.

Participants expressed the need for a coordinated collaboration between the various stakeholders – the Region, the Ministry, ITSs, PhDs, Universities, Schools, business firms, industry associations and other regional actors – to overcome the obstacles highlighted above on communication, information, and management. ITSs were particular clear about their needs: they stressed that such new coordination mechanism should exploit synergies between ITSs and universities, should improve the coordination within the 6 ITSs as well as with the other institutional actors; should support ITSs in defining their objectives in line with the broader development goals. Despite the proposal being favourably seen by the majority in the debate, connected risks were pointed out: the addition of another layer/stakeholder might create confusion and generate unnecessary layers of bureaucracy.

5. Conclusions and policy implications

The report has explored two specific educational instruments In Puglia, namely ITSs and IIDs, as a first step to understand their potential contribution to Smart Specialisation. By exploring how they are organised, the challenges they face, their employment outcomes, their organisational and pedagogical novelty, we are able to reflect on their role for S3 and regional development, as well as to draw broader implications for policy and ideas for future research.

The analysis has highlighted that ITSs and IIDs are powerful tools that are generating positive experiences. Whilst being a novelty in the higher education landscape, they both have gathered commitment from those involved, who have shown a proactive and constructive attitude towards their development. Those running IIDs and ITSs have also shown significant awareness of regional development policies and funding opportunities at the EU, national, and regional level (though not specifically of S3 and S3 priorities). Despite these very positive traits, the evolution of ITSs and IIDs is not without hurdles. The main obstacle faced in the implementation of both ITSs and IIDs is the different culture between business and the research and higher education sectors. Such difficulty is compounded by a governance structure that provides limited opportunities for peer-exchange at the regional level and is perceived as inadequate especially by ITSs. As relatively new entities, ITSs need a space to come together and get to know each other to formulate clearly their common needs and interact with the public administration in a coordinated manner. For IIDs and (even more) ITSs, it also seems essential to increase visibility and awareness to potential students and partners. Communication about available learning opportunities, and their value for employment and economic development, is weak, particularly for ITSs, but also for companies that can be interested to joint research with universities. The fieldwork has also revealed that ITSs have a more flexible structure and greater ability to interface with businesses than universities: they are therefore critical actors in building and upgrading local (and not only) value chains (all the more in moderately developed innovation systems such as the Apulian one). In line with ARTI (2018), our analysis suggests that the ITS model, provided its weaknesses

are address, can support upgrading the current low-skill equilibrium identified by OECD (2017b).

Whilst the study has focussed largely on the supply of skills, for both IIDs and ITSs it appears paramount to have a clearer understanding of the regional demand for skills. This is especially relevant in light of the literature on market structure and inter-firm relations, which suggests that, on average, Italian Southern firms internalise more functions, have more limited external networks and are less likely to be located in specialised agglomerations. The literature also describes an environment in which inter-firm job mobility is likely to be lower, and thus one in which education is more directed at needs and opportunities with the present employer (specific skills), and has less of an effect of fostering a localized pool of skilled labour (Iammarino and Marinelli, 2015; Filippetti et al., 2018). Future research should address this gap to maximise the impact of these new learning tools.

To conclude, the case study allows two further reflections on knowledge-based regional development and, more specifically Smart Specialisation. Building on the Apulian tradition of stakeholders' engagement, the project, which combined solid evidence with participatory method, enhanced transparency and accountability, by opening up the policy process to all the actors involved. This bottom-up element, which is crucial to the S3 process, strengthens policy-capabilities which are also crucial for territorial growth (Iammarino et al., 2018). Secondly, and most importantly, the study has clearly shown the importance of coordinating education and regional development policies. In regions with moderately developed innovation systems, investments on the quality of universities and higher education must be accompanied by the reinforcement of technological capabilities of private firms, as a pre-condition to foster those linkages and networks for innovation (D'Este and Iammarino, 2010; D'Este et al., 2013) that underpin a successful implementation of Smart Specialisaton. The instruments analysed here, and especially the ITSs, provide precisely the opportunity to build, in a synergistic manner, human capital and technological capabilities.

Coordination human capital and innovation policy, within the S3 framework is critical for the future of S3 itself. Whilst ITSs and IID have been taken directly into account in the design process of the Apulian Strategy, our work suggests that they would contribute meaningfully to S3. As such, addressing the challenges identified in this report appears as a useful investment for territorial development in Puglia.

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Annexes

Annex 1. European Funding and participation to EU programmes in Puglia

During the current programming period, the Operational Programme of Puglia Region allocated the following funds in the most relevant Thematic Objectives (for the sake of this research): T.O 1 - Research, Technological Development and Innovation, and T.O 10 – Education, Training and Lifelong Learning.

T.O.	Allocated funds (€)	% of the OP	Actions
1	336.183.406,00	9.44%	1.1 Support to R&D activities to develop new sustainable technologies, new products and services 1.2 Support to the economic exploitation of innovation and industrialization of research results 1.3 Interventions to support innovation and technological advancement of enterprises 1.4 Promotion of new markets for innovation 1.5 Creation and consolidation of innovative start-ups 1.6 Interventions to reinforce national and regional systems of innovation, and to reinforce and increase cooperation between enterprises and research centres 1.7 Support to research infrastructures of the regional system *Source: http://por.regione.puglia.it/asse-1*
10	301.500.000,00	8.47%	ESF 10.1 Interventions against early school leaving 10.2 Interventions to reinforce basic competences 10.3 Interventions to favour transition from education to work 10.4 Intervention to promote research and higher education 10.5 Interventions for lifelong learning 10.6 Interventions for continuing education/training and/or specialized/professional training 10.7 System actions ESIF 10.8 Intervention for rehabilitation of scholastic buildings 10.9 Interventions for labs and technological infrastructures *Source: http://por.regione.puglia.it/asse-10*

Source: Operational Plan Puglia 2014-2020

There are no databases available that regroup calls and results, and single calls need to be screened to check the possibility for the HEIs to participate, and in which role. Some calls however have been published for HEIs only, as i.e.:

Call	Objective	Notes/Results
8/2016	To develop a European and international network to support student mobility (incoming and	Supporting the Erasmus+ programme/mobility 9 projects funded (€2.247.864,60)

	outgoing)	
9/2016	To reinforce educational and career guidance (ex ante, ongoing, ex post) in the Apulian Universities	11 projects funded (€ 2.741.649,50)
12/2016	To reinforce knowledge management of the Apulian Universities by hiring Didactic Managers (internal to the universities	2 projects funded (€ 840.915,00)
2/PAC/2017	To realise Summer Schools promoted by Apulian Universities	17 projects funded (€ 295.937,27)
3/PAC/2017	To reinforce innovative degree courses offered by Apulian Universities	10 projects funded (€ 2.694.257,50)
Research for innovation programme	To fund new positions for researchers in the Apulian Universities	Deadline 13.01.2018, it follows the Programme Future in Research of the previous programming period

Source: Official Journal Region Puglia

A particular relevance for the region are the Interreg programmes, that are almost directly contributing to the relevant areas of the smart specialization and have a strong regional dimension

Interreg Programme	**Results so far**	**Axis of the programme**	**Contribution to RIS3 area**
GREECE-ITALY	41 projects 191 Apulian partners (private and public)	PRIORITY AXIS 1 Innovation & Competitiveness	All areas, depending on the field of the projects
		PRIORITY AXIS 2 Integrated Environmental Management	Green and blue economy Agri-food
		PRIORITY AXIS 3 Multimodal Sustainable Transport System	Sustainable mobility Smart factory
ITALY-CROATIA	1 project selected with Apulian coordinator Statistics on partners not available	PRIORITY AXIS 1 BLUE INNOVATION	Green and blue economy
		PRIORITY AXIS 2 SAFETY AND RESILIENCE	--
		PRIORITY AXIS 3 ENVIRONMENT AND CULTURAL HERITAGE	Cultural and creative industry Tourism
		PRIORITY AXIS 4 MARITIME TRANSPORT	Sustainable mobility Green and blue economy Smart factory

Source: our elaboration on information provided in the websites of the two Interreg programs

As regards direct programmes:

Horizon 2020: according to the H2020 statistics database, in June 2018 the Apulia partners present 8 participations to projects for a total of 837,3k of funding. Participants

are: INNOVAPUGLIA SPA, Unione Regionale delle Camere di Commercio della Puglia, Ente per lo sviluppo dell'irrigazione della Puglia Basilicata Irpina, Regione Puglia, Aeroporti di Puglia SPA.

Further information have been found in CORDIS database.

Participant	Project	Topic	RIS3 reference
INNOVAPUGLIA SPA (P)	CITADEL Empowering Citizens to Transform European Public Administration	H2020-EU.3.6.3. - Reflective societies - cultural heritage and European identity CULT-COOP-11-2016-2017 - Understanding the transformation of European public administrations	N/A Transversal
Unione Regionale delle Camere di Commercio della Puglia	INCAME INnovation CApacity of Mediterranean Enterpises	1. H2020-EU.2.3. (INDUSTRIAL LEADERSHIP - Innovation In SMEs)	Transversal on competitiveness
Unione Regionale delle Camere di Commercio della Puglia	INCAME_2 INnovation CApacity of Mediterranean Enterpises	H2020-EU.2.3. - INDUSTRIAL LEADERSHIP - Innovation In SMEs H2020-SGA2-EEN - H2020 2D CONSULTATION EEN	Transversal on SME competitiveness
Ente per lo sviluppo dell'irrigazione della Puglia Basilicata Irpina	SERECA Secure Enclaves for REactive Cloud Applications	H2020-EU.2.1.1.3. - Future Internet: Software, hardware, Infrastructures, technologies and services ICT-07-2014 - Advanced Cloud Infrastructures and Services	Transversal – see Digital Agenda Puglia 2020
Regione Puglia	NETIM New Tools for Innovation Monitoring	H2020-EU.2.3.2. - Specific support	Transversal: monitoring of the RIS3
Regione Puglia	ERA-NET ON ADVANCED MANUFACTURING TECHNOLOGIES	H2020-EU.2.1.5.1. - Technologies for Factories of the Future NMBP-21-2016 - ERA-NET on manufacturing technologies supporting industry	Smart factory Mechatronics

		and particularly SMEs in the global competition	
Regione Puglia	GIDDB New practices of Grassroots Innovation for Demand Driven Businesses	H2020-EU.2.3.2. - Specific support	Transversal
Aeroporti di Puglia SPA	e-Airport Increase airport capacity, safety and security using European GNSS	H2020-EU.2.1.6. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies – Space GALILEO-1-2014 - EGNSS applications	Aerospace

Sources: CORDIS database; H2020 statistics database; our elaboration on information

ERASMUS+

According to the Platform E+ Project Results the partners from the Apulia Region participate to 63 projects, of which 49 are mobility projects, 8 are Strategic Partnership projects, and 5 are support to policy reform.

Most of actions are addressed to Youth (policy, support for employability, social dialogue, mobility). It is instead particularly interesting a Knowledge Alliance project proposed by the Polytechnic of Bari, which directly contribute to economic regional development, by topic: "Gienhas (Grasping Innovation in Europe through a closer iNterAction between HEIs and SMEs)". Even if transversal as topic and not focused on a specific sector, the results have a great potential for smart specialization areas of the region, whose economy is mostly based on SMEs for some sectors (e.g. Agri-food; Tourism; etc.)

COSME

According to the database of the programme, in addition to one project under Erasmus Youth Entrepreneurs, the following projects have received funding:

Participant	Project	Topic	RIS3 reference
DISTRETTO AGROALIMENTARE REGIONALE SCRL (C)	TRAns-national Collaboration Empowering Key European Industries	Competitiveness of SMEs through networking	Transversal to sectors
Comune di Brindisi (C)	Wellness and wellbeing experience across the European Routes of the Olive Tree	Transnational thematic tourism	Agri-food Tourism Cultural and Creative Industries
DISTRETTO TECNOLOGICO	Clusters waving the flag to the internationalisation of	Competitiveness in aerospace	Aerospace

AEROSPAZIALE S.C. A R.L. (P)	European SMEs taking advantage of the cross-sectoral dimension of Earth observation for Blue Growth market		
DESTINATION MAKERS SRLS (P)	Film festivals And MOvie tourism across Unesco Sites	Cultural and Creative Industries (film festival)	Cultural and Creative Industries
Region Puglia (P)	EuroVelo 5 – Via Romea Francigena: an innovative transnational cycling tourism product	Tourism based on ancient routes	Tourism
UNIONE REGIONALE DELLE CAMERE DI COMMERCIO DELLA PUGLIA (P)	BRIDGE-UP	Services scaling-up	Services

Source: COSME database, our elaboration

To gain some historical perspective, the tables below report some information in Italy's and Puglia's participation in FP7.

Italy most active FP7 thematic areas

FP7 priority areas	Nr. of applicants	Requested EC contribution by applicants (M EUR)	Nr. of mainlisted applicant	Success rate (applicants)	Requested EC contribution by mainlisted applicants (M EUR)	Success rate (requested EC contribution)
ICT	15,381	5,641.95	2,214	14.39%	818.82	14.51%
Marie Curie (People)	7,448	n/a	1,355	18.19%	n/a	n/a
ERC	5,335	6,901.38	282	5.29%	410,39	5,95%
Research for the benefit of SMEs	4,892	722.09	760	15.54%	112.12	15.53%
Health	3,971	1,825.41	834	21.00%	350.15	19.18%
Transport (incl. Aeronautics)	3,548	988.35	916	25.82%	265.80	26.89%

Source: Seventh FP7 Monitoring Report - MONITORING REPORT 2013 (2015)

Puglia's participation to FP7 programme compared to Italian participation is described in Tables 10-12.

Puglia participation to FP7 compared with national data

Rank	Country/region	EC funding (ML EUR)	%	Number participations	Average EC funding/participation	Number coordination
0	Italy	3,592.7	100%	11,789	304,749	1923
11	Puglia	56.0	1.56%	207	270,497	30

Source: Conte A. (2016) Stairway to Excellence Puglia

Annex 2. Exploratory workshop: focus groups protocol

1. ITS

- Presentation and Introduction of participants
- Description of ITS experience: all the participants
    - Pros and Cons
    - Quality of relationship between Institutions/Universities/Firms
- Pedagogical and didactic approaches
    - Innovative elements, implementations (criticalities)
    - Level of involvement of firms in the definition of learning pathways
- Recruting processes
    - How do they work? Which profiles are you looking for?
    - Level of graduates' satisfaction
    - Expectation of graduates before and during the attendance
- Level of employability of graduates
    - The process of tutoring and placement: how is it structured? Pros and Cons
    - How do you assess the matching between ITS profiles demand and offer?
    - Data and statistics on level of employability (geographic distribution – in Italy and abroad-, socio-demografic, etc…)
- Evolution and updating of learning process
    - How programmes are updated?
    - Which tools you have to reflect on supply/demand of ITS graduates?
- Discussion on overlapping between ITS and the new professional degrees
- Consciousness of European Funds, Programmes and Tools
    - Use of Structural Funds, Horizon, Cosme, etc…
    - Examples of best practices, pros and cons
- Level of awareness on S3
    - Are you informed? Is it something you feel important for you?
    - How to work on the alignment between ITS and S3 regional priorities?
- In light of this discussion, how do you imagine to contribute to the S3 – or more generally, to the development and innovation process with regional actors?
- Which relationships do you have with Puglia Region? Which relationship would you like to have?
- Are you aware, do you know cases of collaboration between High Schools, Higher Education Institutions, Firms and Public bodies (both at local and international level that you feel useful and potentially replicable?
- Discussion on next steps:
    - Which outputs do you expect from HESS project?
    - Availability to be interviewed and to give contact of key informants:
        - Scholars and teachers
        - Involved firms
        - Firms that hired ITS graduates
        - Current students and graduates
    - Availability to take part to the final event and suggestions of key informants.

2. Industrial PhDs

- Presentation and introduction of participants
- Description of PhDs experience: all the participants
    - Pros and Cons
    - Quality of relationship between Institutions/Universities/Firms

    - How the novelty of Industrial PhDs has been perceived by Universities in Puglia (and awareness of other implementation procedures at national level)
- Pedagogical and didactic approaches
    - Innovative elements, implementations (criticalities)
    - Level of involvement of firms in the definition of learning pathways
    - Main elements of novelty in relation to traditional PhDs
    - Comments on implementations (what works, what is critical)
    - Industrial PhDs are useful to obtain a positioning at international level?
- PhD Students
    - Recruting process
    - Students' Expectations at the beginnning of the learning experience
    - Level of satisfaction
    - Professional perspectives
- Universities' strategies for the inter-sectorial collaboration
    - Is there a strategy for partnering with private and public setctor at University level
    - Which role and relevance Industrial PhDs have within this strategy?
    - Do you know cases of collaboration between universities, firms and public administration bodies (at both local and international level) that you feel important and replicable at regional level?
    - Awareness of European Funds, Programmes and Tools
    - Use of Structural Funds, Horizon, Cosme, etc…
    - EU Funds > Examples of best practices, pros and cons
- Intra-regional collaboration and S3
    - What is the level of Universities participation within the S3?
    - Which role do you feel PhDs can have within the S3?
    - Are they aligned to the S3 priorities?
    - Which relationships do you have with Puglia regional government?
- Discussion on next steps:
    - Which outputs do you expect from HESS project?
    - Availability to be interviewed and to give contact of key informants:
        - Scholars and teachers
        - Involved firms
        - Firms that hired PhD
        - Current PhD students and graduates
    - Availability to take part to the final event and suggestions of key informants.

Annex 3 Interviewees-identification survey

During the event on 31 October in Bari, a number of critical issues emerged. Which of these do you consider to be the most important? (indicate 2 preferences) *

- ☐ Not recognised role / not adequately promoted in the education system
- ☐ Legal form not suitable to the needs
- ☐ Inefficient administrative governance
- ☐ Different timing between the Ministry and regional requirements (for a regular beginning of the study year)
- ☐ Problems of financial self-sustainability
- ☐ Problems in relations with public and private sectors
- ☐ Lack of medium to long-term strategy
- ☐ Other

Reason for preference(s) (if 'other' is indicated, please specify)

_____
_____
_____
_____

Can you suggest one or more professionals, with adequate knowledge of ITS, to be interviewed for in-depth information on the phenomenon (indicate name, surname, reason for the choice and, if possible, main contact details) *

_____
_____
_____
_____

Availability for personal interview / visit to the ITS Foundation / organisation of focus groups with students/entrepreneurs

The aim of the HESS project is to understand in depth the role of ITS in regional development. That is why we are organising a data collection exercise in the field. Are you willing to give a more in-depth interview on these topics? Are you willing to organise a meeting with stakeholders and students?

- ☐ Interview via skype or telephone
- ☐ Personal interview in presence
- ☐ Willingness to organize a focus group with students and/or companies
- ☐ Study visit to the courses premises or the ITS Foundation premises

Period of availability

- ☐ 18-20 January
- ☐ 25-27 January
- ☐ 8-10 February

Further comments, observations or suggestions for meetings to be organized on the territory.

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