

## Chapter 6. Organisational capacity: Funding, people and incentives

*This chapter expands on the findings presented in Chapter 2 with a focus on organisational capacity, funding, people and incentives. It discusses actions that steering actors and higher education institutions (HEIs) are undertaking in Italy to increase the efficiency and the effectiveness of the system, in order to reach their targets with respect to all missions and dimensions of higher education – in particular the ones discussed in the previous chapters. The chapter also presents several good practices at the national and international levels, focusing mainly on the funding system built in recent years.*

## Introduction

Improving the organisational capacity of Italian HEIs would positively affect their capacity to generate societal and economic value. Based on international evidence, this chapter presents the institutional arrangements in Italy's higher education system in connection with third mission, identifies specific challenges and discusses policy recommendations for the national higher education policy as well as for higher education institutions (HEIs).

This chapter highlights the multifunctional roles of HEIs beyond teaching and research, incorporating entrepreneurship and innovation, social outreach and contributions to their respective ecosystems. The potential of HEIs – including researchers, students, departments and other (administrative) entities – to engage in entrepreneurial activities and innovation processes depends on internal and external factors. These enabling factors include: the commitment of the rectorate and the quality of its strategy; the organisational structure and the degree of autonomy of actors; the availability of resources; the quality of research; the absorptive capacity of the business sector surrounding the HEI; and, of course, the features of HEI ecosystems. Italian universities show a great deal of heterogeneity regarding these enabling factors.

This chapter focuses on the organisational capacity of institutions to formulate strategies and related goals, and develop governance models and incentives schemes that can facilitate the implementation of the strategy and its goals. The chapter is based on the analytical framework of HEInnovate and in particular its five guiding principles – or “statements” – concerning the “organisational capacity” dimension.<sup>1</sup>

The organisational capacity of Italian HEIs has been affected by a series of recent reforms targeting the governance of the higher education sector and its funding mechanisms. These reforms are:

- the 2010 “autonomy reform”, providing institutions with a great degree of freedom in designing their institutional structures and strategic processes
- the three-year strategic planning exercise, which strongly connects funding schemes with the performance of research activities (ANVUR's evaluation scheme, VQR)
- competitive public funding schemes, such as Departments of Excellence being recently introduced
- ongoing developments in order to better monitor and reward third mission as another strand of universities activities.

## The national policy framework for HEIs' innovation activities

### *National reform processes as the basis for organisation capacity development: The 2010 reform*

The 2010 “Autonomy Reform” represented an important milestone to increase universities' degrees of freedom for structural and innovative processes, and entrepreneurial and innovation activities. The reform increased interdisciplinary and inner-institutional co-operation in research and teaching. Following the reform, departments became the main substructure in which university is organised. Departments ought to be composed by at least 40 professors and researchers, responsible for teaching and research and all the activities involving external stakeholders. Before this reform, the responsibilities for

research and teaching duties were split between departments and faculties (*facoltà*), causing inefficiencies to both strands of duties. Faculties or schools have become transversal structures co-ordinating teaching activities, offered under the responsibility of the department.

The quality of study programmes offered in departments or in their co-ordinating structures is assessed by a committee equally composed of teachers and students. The Ministry of Education, Universities and Research (MIUR) has to approve the new governance and related regulation. However, the Italian government did not allocate additional funding to universities to support the transition of the governance system.

Based on the reform, universities have adopted organisation systems based on their different needs and features. As mentioned before, large universities can use faculties or schools to co-ordinate departments in offering study programmes and promote interdisciplinarity. It is the case of the matrix structure, applied by the University Federico II in Naples, the second-largest university in the country. The Federico II is now organised in 26 departments, divided into 13 disciplinary areas that together provide interdisciplinary education programmes in 4 schools: the School of Agriculture and Veterinary Medicine, the School for Human and Social Science, the Polytechnic School of Basic Sciences, and the School of Medicine. This organisation offers students transversal knowledge and promotes the efficient use of the university's competencies.

In addition, the 2010 reform has allocated to departments the responsibilities for recruitment, technology transfer and third mission. Some universities have created new administrative positions within departments to ensure that the overarching institutional goals are conveyed throughout the organisation and affect individual activities. The organisational structure of the University of Bari provides a good example of this governance arrangement, which could be described as multidivisional-form (M-form).<sup>2</sup> The university has 7 central divisions – institutional affairs; procurement, construction and heritage; education and student services; co-ordination of departments; research, third mission and internationalisation; financial resources; human resources – and 23 research and teaching departments. All the departments have seven operational units mirroring the seven central divisions, allowing a continuous “core-periphery” communication in each process. A similar approach has been adopted at the University of Bologna. Each research department hosts a delegate (chosen among faculty staff) that has the responsibility to align activities in the areas of international relations, research and third mission activities to the university strategy. Delegates operate in co-ordination with vice-rectors heading thematic areas, and with relevant administrative divisions. A similar governance arrangement features the University of Rome “Tor Vergata”: all departments host a general manager for third mission.

### ***University autonomy enables HEIs to define their strategic goals, including vis-à-vis entrepreneurship and innovation***

University autonomy has provided HEIs with the possibility to develop their own tools to ensure that the academic community moves towards the strategic goals identified by the institution. As discussed in Chapter 1, every three years MIUR sets the priorities for the strategic planning of the university system, after consultation with the main academic stakeholders. HEIs develop their institutional strategies within the framework of the national strategy and discuss with the ministry a co-funding application for implementation.

For the period 2016-18, the resources allocated by MIUR to support institutional strategic planning amounted to EUR 150 million for public universities and EUR 400 000 for private, state-recognised universities. Universities matched these resources with their own funding. In particular, national strategic priorities encompasses three areas:

- access and completion in universities, student employability and internationalisation
- modernisation of infrastructures, the innovation of teaching methodologies
- young researchers and incentives for university teachers (state universities only).

Universities have adopted these priorities areas in their strategic documents and shared the national goals. For example, contributing to regional development through the provision of relevant skills tops the agenda of many of the case-study universities.

Based on the experience of the previous period, the resources allocated by MIUR to support institutional strategic planning in public universities have increased and total EUR 165 million in 2019-20. National strategic priorities include the following areas:

- teaching and learning
- research and technology transfer
- students' services
- internationalisation
- recruitment.

The relative scarcity of highly educated individuals in the workforce and the low level of literacy and numeracy skills, including among individuals holding a university degree, compared to other countries are amongst the main challenges of the Italian economy (OECD, 2017a). To respond to these challenges, Italy has introduced important innovation in the tertiary education system: the *Lauree professionalizzanti* or professional bachelor's programmes; the *Istituti Tecnici Superiori* (ITS), short-cycle professional/vocational tertiary education institutions;<sup>3</sup> competence centres, an important innovation in the national innovation system, especially regarding the capacity of HEIs to engage with the private sector.

Competence centres are embedded in the Industria 4.0 (I4.0) initiative, developed under the aegis of the Italian Ministry of Economic Development (MISE). I4.0 represents another important policy aiming to improve national skills and encourage and facilitate the transition to digital technologies of Italian firms, including small- and medium-sized enterprises (SMEs). Competence centres are private-public partnerships that provide firms with technology transfer services, guidance and training on technologies enabling the I4.0 paradigm. Since 2015, MISE has invested approximately EUR 73 million to promote 8 national competence centres. In 2019, these centres are in the process of being established and involve a network of more than 70 Italian universities and research centres, and about 500 companies. Italian competence centres take on the form of education labs promoting collaborative training. This is different to international experiences, such as competency centres in Sweden or Austria, which put emphasis on research (Box 6.1). All competency centres are physically hosted by universities in the centre/north of Italy, with the exception of the University of Napoli Federico II.

### Box 6.1. Austrian Competency Centres for Excellent Technologies (COMET)

Austrian Competency Centres for Excellent Technologies (COMET) – launched in 2006 – combine collaborative research with technology transfer and related training and development. The strategic focus of the COMET programme is the collaborative development of new competencies and the initiation and support of top-level long-term strategic research agendas for science and industry, as well as a desire to establish and secure technological leadership in Austrian companies. The programme aims to make Austria more attractive as a research location in the long run.

In terms of annual budgets, the COMET programme is the largest funding scheme for knowledge and technology transfer in Austria. COMET has funded two types of centre as well as individual projects. The programme is funded by the Federal Ministry for Transport, Innovation and Technology (BMVIT) and administered by the Austrian Research Promotion Agency (FFG). About half of the funding for COMET initiatives is provided by the business sector. The COMET programme includes three different schemes:

- K1 centres: focus on strategic science-industry research agendas, maximum EUR 1.7 million of national funding per year, for a maximum duration of 8 years.
- K2 centres: equal to K1, but with higher risk and international visibility; maximum EUR 5 million of national funding per year, for a duration of 10 years.
- K-projects: development of new science-industry initiatives or collaboration between K-centres, maximum EUR 0.675 million of national funding per year, for a duration of 3 to 5 years.

A recent impact assessment (Dinges et al., 2015) showed that the programme has been successful in creating new skills. The programme has proved effective in achieving high-impact publications, innovation outcomes, qualification of young researchers and the establishment of long-term (international) partnerships and mutual trust.

*Sources:* Dinges, M. et al. (2015), “Wirkungsanalyse 2015 des österreichischen Kompetenzzentrenprogramms COMET Endbericht”, Austrian Institute of Technology and Joanneum Research; FFG (2018), *COMET Competence Centers for Excellent Technologies*, <https://www.ffg.at/comet>; OECD (2018), *OECD Reviews of Innovation Policy: Austria 2018*, <https://doi.org/10.1787/9789264309470-en>.

Within the framework of the 2010 reform, those universities that have identified entrepreneurship and innovation as goals of their institutional development strategy have to generate an entrepreneurial vision for the future of the institution. The institutional strategic plan connects with the performance plan of the organisation. The two plans are monitored on a yearly basis. The Polytechnic of Turin provides an example of an HEI that has defined knowledge exchange and technology transfer as a goal in its strategic plan (Box 6.2).

The reform of HEI autonomy has paralleled the introduction of scientific and pedagogic innovations in many universities, as well as the increasing demand for collaboration from the society and the economy. These forces have generated the need for more co-ordination among teaching activities, research, entrepreneurship, internationalisation and digitalisation actions and respective institutional bodies. Accordingly, the commitment of the rectorate is a necessary condition for efficient organisation arrangements. The results of these co-ordination efforts emerge in the Evaluation of Research Quality (VQR)

2011-14. According to this report, Italian universities have paid close attention to their governance arrangements. In particular, most universities have started monitoring their own activities. Half of the universities have put in place specific efforts to harmonise and integrate under a common strategic vision different functions that had been created independently, including patent offices, career services, industrial liaison offices, technology transfer offices and fundraising structures. Three universities out of four have established a top third mission figure, almost always a vice-rector or a delegate (ANVUR, 2018a).

**Box 6.2. Strategic targets regarding knowledge and technology transfer from the Polytechnic of Turin’s Strategic Plan 2016-18**

- Intellectual property creation: increase by 50%.
- Spin-off companies (companies for the commercialisation of technology resulting from the Politecnico Torino’s university): further strengthening and trebling of employment and resources for keeping venture capital.
- Focus on refining innovation processes to promote the area’s visibility and credibility for attracting new companies and investment.
- Share of students involved in innovation and entrepreneurship: increase by at least 25%.
- Reinforcement of competencies from the field of Humanities and Social Sciences for research and technology transfer.
- Development of new models of technology transfer in architecture, planning and design.
- Promote activities with regard to the UN’s 2030 Agenda for Sustainable Development.
- Realisation of a series of events to increase outreach for Politecnico’s activities.
- Realisation of a cultural centre in the “Cittadella Politecnica” on the campus: this should also be open on weekends and holidays and become a symbol of the city of Turin.

***University strategies and entrepreneurial activities reflect a broad understanding of innovation practices going beyond technology transfer only***

The organisational autonomy granted to Italian universities has generated many different governance arrangements supporting efforts to promote innovation and engagement with external actors. Governance diversity also reflects the heterogeneity of HEIs’ approaches to entrepreneurial and innovation activities. In particular, university approaches differ and take into account factors such as geographic location, endowment with resources or age of the institution. Bronstein and Reihlen (2014) developed an intuitive typology to account for different aspects of entrepreneurial universities according to various institutional and ecosystem characteristics. This typology could be used to classify all case-study HEIs discussed in this report (Box 6.3).

### Box 6.3. Typology of entrepreneurial universities

Bronstein and Reihlen (2014) – using the framework of the entrepreneurial university put in place by Etzkowitz et al. (2008) – developed four categories identifying four different types of entrepreneurial university. The typology takes into account different institutional features such as governance and organisation models, human resources, financial resources, infrastructures, missions and strategies, location and the characteristics of the ecosystem. The four types are discussed, in turn, below.

- The research-preneurial type puts emphasis on the advancement of knowledge and scientific excellence. It characterises traditional academic organisation structures (departments, faculties) with a high share of public funding (basic and competitive funds). Due to their nature as basic research providers, research-preneurial universities often host large research infrastructures. Outreach activities and industry-science relations take place through the commercialisation of basic research, resulting from specialisations and reputations in specific areas of excellence and take place on the level of projects or joint research centres with the help of industrial liaison offices (ILO) and technology transfer offices (TTO).
- Techni-preneurial institutions focus mostly on applied science and rely on strong linkages with surrounding firms. Relations with the business community can depend on institutional or individual (staff) initiatives. In this case, HEIs fulfil their role as local embedded knowledge providers for specific purposes. This setting allows for a high degree of mobility between the business sector and academia: tailor-made academic programmes in co-operation with business, entrepreneurship education and on-the-job training.
- The inno-preneurial model is characterised by flexible structures supporting HEIs in their relations with external (market) stakeholders. Inno-preneurial HEIs are able to provide innovative services and solutions to the business sector. Typically, the organisation of inno-preneurial HEIs incentivises staff to promote innovation and entrepreneurial attitudes and behaviours. Due to their proximity to business stakeholders, inno-preneurial HEIs often benefit from a high degree of private sponsoring (e.g. professional schools) and are typically located in metropolitan areas and industrial clusters.
- Finally, commerce-preneurial institutions support the commercialisation of innovations and marketable products. These institutions work closely with the private sector in specific high-tech sectors. These collaborations generate joint projects and joint ventures of entrepreneurial infrastructures, including business units, incubators and technology parks. As a result, commerce-preneurial institutions focus on market-oriented projects and develop specific capacities in public relations and marketing. The internal governance arrangements of this type of HEIs follow managerial principles.

Sources: Etzkowitz, H. et al. (2008), “Pathways to the entrepreneurial university: towards a global convergence”, *Science and Public Policy*, Vol. 35(9), pp. 681-695; Bronstein and Reihlen (2014).

In reality, it is quite difficult to find HEIs that are a perfect fit for one of the categories of Bronstein’s and Reihlen’s typology. In most cases, HEIs actually fall into more than one category, due to their multifunctional roles, stemming from path dependencies in their

development, governance structures, environment and culture (Unger and Polt, 2016). Yet, Bronstein's and Reihlen's typology is useful to classify Italian institutions, such as Rome Tor Vergata, which fulfils many characteristics of the research-preneurial model (acquisition of European Research Council [ERC] grants and Departments of Excellence) or the University of Bologna, which combines techni- and commerce-preneurial attributes (Box 6.4).

#### **Box 6.4. University of Bologna – Strategic governance model**

Since 2015, following the election of a new rector and some innovative governance arrangements, the University of Bologna has been focusing on academic entrepreneurship. The new leadership found a situation in which many interesting initiatives were in place; yet due to the lack of central co-ordination, the implementation of these different initiatives was not efficient and generated duplication of efforts.

To eliminate duplications and promote synergies among different initiatives, the university created a new organisational unit in charge of addressing university-industry engagement. In particular, the new unit had a threefold objective:

1. Increasing the number of institutional university-industry agreements.
2. Enhancing the capacity to generate value from research results by creating spin-off companies.
3. Strengthening student entrepreneurship and, generally, promoting the development of entrepreneurial mindsets.

The university created two separate subunits/divisions, each staffed with a director and three administrative units to work on the three objectives mentioned above. The new rector nominated the first Vice-Rector for Entrepreneurship in the history of the University of Bologna. The rector put in place a new plan to enhance linkages with the ecosystem and with global stakeholders, with the specific aim to create a network able to support university start-ups in their development.

As a result, the University's Strategic Plan for 2016-18 focuses on promoting cultural development, economic and social innovation and strengthening relations with external stakeholders at the regional, national and international levels, as well as enhancing services to support entrepreneurial students. Actions include:

- The AlmaEClub initiative, which aims to increase awareness of entrepreneurship and promotes networking related to entrepreneurship among its faculties. AlmaEClub involves more than 200 faculty members from all departments. AlmaEClub members get together periodically to discuss and contribute to specific projects concerning entrepreneurship carried out in the university.
- AlmaLaBOr, a co-working space and a digital manufacturing workshop (makerspace).
- The Alma Cube incubator, founded by the University of Bologna together with Confindustria Emilia-Area Centro (a regional branch of the Italian industrialist association), which assists aspirant entrepreneurs in starting up their initiative and creating conditions for their growth through relations with institutional investors at the national and the international levels.



Many Italian universities, however, have enlarged the scope of their engagement and go beyond the commercial activities that the Bronstein's and Reihlen's taxonomy takes into account. This is in line with the model that Goddard (2009) and Henke et al. (2015) have developed to discuss the "civic" (or engaged) university. This approach considering HEIs as public good providers has also been adopted in the Italian evaluation model of third mission where not only technology transfer activities – for which universities have a long tradition – are assessed, but also new forms of knowledge valorisation in the fields of health research, cultural activities and heritage and lifelong learning (see section "Evaluating the third mission"). Such a *broad* definition of third mission evaluation is deeply influencing universities' culture on engagement and societal impact, enhancing a better awareness of their cultural role and social mission. Besides being evaluated in terms of quantities and excellence, research and education outcomes also need to be assessed in terms of their relevance for society. This includes the ability to help solve societal challenges such as ageing, sustainable energy production, smart mobility solutions, etc. Many HEIs in Italy are developing activities to contribute to these missions. For example, several case-study universities have been organising their engagement/third mission activities on the basis of the 17 Sustainable Development Goals (SDG), as defined by the United Nations. SDGs provide universities with a co-ordination platform and facilitate interaction with external stakeholders that are also using sustainable development goals to inform their strategies. Social inclusion represents a core function of civic-oriented HEIs. Universities can promote social inclusion by providing access to higher education to all social groups. Universities can also promote greater employability of graduates by generating skills profiles that match the needs of (local) labour markets. Increasing student employability, for instance, is a core target of Italian education policies. Other measures to promote social inclusion target the ecosystems; HEIs can engage with social or cultural activities and open their campuses and facilities to their communities.

The civic engagement of universities has typically a strong place-based dimension. HEIs focus on their direct impacts with their regional ecosystems. This place-based approach to engagement characterises most case-study universities in Italy. The aim to contribute to the skills and the cultural development of local communities tops their engagement agenda and makes universities important actors (or even drivers) in local development dynamics.

The new campus of the University of Naples, in San Giovanni a Teduccio, represents a good example of this link between the university and its community. The campus is located in an impoverished neighbourhood of Naples and was built on the brownfield of an abandoned industrial site. This was a strategic choice aiming to support the development of the local environment of the campus by attracting companies and other actors to this location. The presence of the university has generated positive spillovers, i.e. university employees, students and national and international visitors have generated a new demand for goods and services. For instance, to favour the positive spillovers for the local community, there are no restaurants or cafes on campus.

The social responsibility programme "Polisocial" of the Polytechnic of Milan represents another example of civic engagement. Polisocial connects ethical and social challenges to research and teaching activities in the university. The aim is to create a linkage between the activities undertaken within the university, and social issues and needs arising in the ecosystem (the surrounding community) and at the global level. Polisocial promotes multidisciplinary approaches and projects for human and social development. It represents an umbrella for a variety of initiatives carried out under the aegis of Polytechnic of Milan, in collaboration with public and private foundations, non-governmental organisations (NGOs), companies and public authorities. These activities should contribute to the

development of capabilities and values for future generations to cope with societal and ecological challenges.

The University of Cagliari is another case in which the civic engagement tops the strategy of the institution. The university's core mission is to contribute to the social and economic development of Sardinia. The university has established close collaborations with the regional government and local private investors. The overarching goal inspires various activities, including: i) co-operating with local business – especially SMEs –; ii) tailoring teaching activities to local needs (for example, in the field of information and communication technology [ICT], which represents a key industry in the local ecosystem); iii) supporting spin-offs and start-ups in the CLab contamination lab; and, finally, iv) helping unemployed individuals get back on the labour market by developing their own entrepreneurial activity. In addition, the University of Cagliari has also organised information campaigns to raise awareness about violence against women.

The University of Bari, among others, has put in place a service to facilitate the integration of immigrants and refugees in the labour market. The university delivers this service through its Centre for Lifelong Learning (*Centro per l'Apprendimento Permanente, CAP*), which was created to promote lifelong learning and certify formal and informal skills of individuals. In its activity to support refugees, CAP helps with the accreditation process of foreign education certificates and supports inclusion into the respective study programmes at the University of Bari.

Italian universities are also important cultural actors, conducting research activities and protecting and promoting regional cultural and historical assets. There are several examples of such efforts (see Chapter 2), which are often supported by regional authorities (regional governments) that allocate financial resources to local universities to strengthen their capacity to promote cultural activities. This is the case of the University of Siena, particularly embedded in its local ecosystem, which acts as a provider of cultural and archaeological services for both the Tuscany Region and the municipality.

In general, entrepreneurial and civic HEIs contribute with all their missions – teaching, research and engagement – and innovation capabilities to the economic and societal development of their local, regional and national communities (Meissner, Polt and Vonortas, 2017). To function holistically and generate impact, however, HEIs requires new institutions and organisational changes. HEIs have to adopt innovative management models that allocate resources based on the performance of commercial, research and teaching activities. This also requires innovative and flexible structures, and entrepreneurial skills and mindsets in the administration and strategic choice of actions. At the same time, it is important to allow for new and innovative management solutions in public interest institutions (Klofsten, 2018) to promote innovation. In that respect, the way universities such as Bari, Cagliari and Federico II Napoli are challenging their structures and processes – as described above – could be assessed to fit attributes of the “inno-“ or “commerce-preneurial”, though not solely emphasising commercial activities.

### ***Mainstreaming gender diversity as facilitating factors for innovation***

Gender diversity, i.e. the participation of women in institutional leadership and research groups, has become a prominent factor in the assessment of higher education institutions. Evidence from the business sector points to a correlation between diverse leadership and better economic performance (see Hunt, Layout and Prince, 2015).

From a research and innovation perspective, mixed teams are keener to innovate, more creative in problem-solving activities and more competitive with regard to publication

performance, acquisition of competitive grants, etc. (see Powell, 2018; Campbell et al., 2013; Pollitzer and Schraudner, 2015). Gender equality and gender mainstreaming have become core dimensions in the European Research Area (ERA). The aim is to translate national gender legislation into effective actions to address gender imbalances in research institutions and decision-making bodies, and integrating the gender dimension better into research and development (R&D) policies, programmes and projects (ERAC, 2015). In a dedicated meeting held on 1 December 2015, the Council of the European Union recommended member states strengthen measures to strive for gender equality in this field, especially in leadership and decision-making positions, through the identification of specific targets and quantitative objectives for better gender balance in decision-making bodies including leading scientific and administrative boards, recruitment and promotion committees as well as evaluation panels and to encourage research funding and performing organisations to reach these targets by 2020 (Council of the European Union, 2015).

Within this context, universities are at the forefront to respond to the challenges related to gender diversity. This is due to several factors. For example, universities promote societal development. In addition, universities are confronted with growing needs with regard to changing student population, internationalisation of student flows, research and migration. Several European countries have developed policies and tools, e.g. agreements and indicators, on gender-specific targets for universities. These include specific criteria in competitive funding programmes, as well as specific programmes to promote the participation of women in the top levels of science and research hierarchies (see Evaluation Framework for Promoting Gender Equality in Research and Innovation, EFFORTI, 2017).

In Italy, however, there is the impression that national policy does not consider the promotion of gender diversity in the higher education sector as a national priority. In fact, even though female presence among professors is growing (from 2.6 out of 10 in 1988 to 3.8 in 2017), persistent inequality is reported in the opportunities to climb the ladder as well as persistence in the leaking pipeline phenomenon in women's academic careers from graduation to apical stages of professorships. Moreover, insufficient integration is still observed in the horizontal dimension, by the scarcity of women in some specific disciplines (ANVUR, 2018b). This national trend is sometimes contradicted by successful practices, at the local level. For example, the University of Cagliari aims to promote innovative start-ups within their local contamination lab, CLab, by emphasising the heterogeneity of student teams during their participation in the programme. The University of Cagliari is one out of two Italian universities where the rector is a woman. The Politecnico Milano has defined strategic targets with respect to gender equality in its current strategic plan for 2017-19. Planned activities comprise the development of a programme to foster equal opportunities by putting in place measures that increase the number of women enrolling and completing STEM (science, technology, engineering and mathematics) courses.

National policies for students are also facing the challenge of raising the share of female students in STEM disciplines. The PLS (Plan for Scientific Degrees) is intended to help students in developing their own academic path within scientific disciplines, encouraging enrolment in such programmes. As female participation in these disciplines is often low, project promoters are also asked to implement targeted measures to encourage young female students to enrol in science.

A stronger and structured approach to gender issues should become a core principle guiding the design of measures, programmes and goals in future national science, research and innovation policy planning. Italy could inspire its policies following tools and best practice examples provided, among others, by the EFFORTI project (Evaluation Framework for

Promoting Gender Equality in Research and Innovation, <https://www.efforti.eu/>), which is financed by Horizon 2020 and aims to model the impact of different actions to promote gender equality in research and innovation activities undertaken in European countries.

***Mechanisms of selection of the university leadership: An international comparison***

The recruitment processes for leading managerial and academic positions can be a key way to promote diversity and the development of new ideas. This is reflected by the fact that the performance indicators for Italian universities include the percentage of external professors hired per year.

Italy has remained one of the few OECD countries in which the appointment of the rectorate is still based on an internal election process. Although there are several examples of vital and strategically oriented university leaderships, international comparisons have provided evidence that collegial models like the one adopted in Italy tend to negatively affect institutional leadership (OECD, 2008). In particular, being elected by internal bodies and deans, it proves generally difficult for new rectors to overcome institutional path dependencies. In addition, in Italy, the share of external stakeholders seating in the board of governors is limited, when compared with international practices. There are several examples, among OECD countries, illustrating other ways to elect university leadership (OECD, 2008). Box 6.5, below, illustrates the example of Austria.

**Box 6.5. The appointment process for rectors in Austria**

In Austria, the rector is elected by internal and external stakeholders. The appointment of a new rector in Austria follows the decision of the university board based on a proposal of three candidates by the university senate and the university's collegial body. The university board is the institution's supervisory body. It encompasses, in equal shares, members appointed by the university senate and members selected by the ministry – who are typically external stakeholders. There is also an external stakeholder elected consensually by both parties (for a maximum total of nine members).

The rector is appointed for a four-year term. The recruitment process has to be initiated by a public announcement of the vacancy of a rector's position at least eight months before the incumbent rectorate finalises its term.

A special commission, gathering the heads of the board and the senate, is responsible for the selection of candidates among applicants. This commission can also actively search for candidates who have not applied spontaneously. Basic selection criteria include international experience, and organisational and economic management capabilities. Four months after the publication of the call for applications, the commission selects three candidates and presents them to the senate. The senate may either approve the proposal or ask for adjustments. After this stage, the board receives a final shortlist of three candidates for the final decision. The appointed rector has to propose a team of vice-rectors to be approved by the senate.

Rectorates can be re-appointed with a qualified majority of two-thirds of votes in the senate and on the board. In this case, no appointment process is initiated. There is no limitation to the number of times a rectorate can be re-appointed.

*Source:* BMBWF (2002) University Act of 2002; Section 2, Vienna.

### *Competitive funding mechanisms for Italian HEIs*

Italy put in place a new funding system of higher education institutions in parallel with the reform of universities' autonomy. The Italian higher innovation system encompasses 67 public universities. The public funds allocated by the central level, however, seems to be undersized compared with the relatively large dimensions of the system. In 2015, Italy allocated public funding equal to 0.9% of gross domestic product (GDP) to tertiary education. This level is well below the EU average of 1.3% (OECD, 2018). Research expenditures of Italian higher education institutions (higher education investment in R&D, HERD) represent 0.35% of GDP, a level in line with Korea (0.39%), Spain (0.35%), Greece and Ireland (0.31% each), but below the OECD average of 0.43% (OECD, 2016). In more general terms, although the downturn in public funding allocated to the higher education sector in the aftermath of the crisis has been brought to an end in 2016, recovery has not yet brought it back up to 2009 levels (EUR 7.36 billion in 2018 compared with EUR 7.83 billion in 2009).

The funding system encompasses three components, following different allocation criteria to state universities. These components are: i) a mixed allocation based on the historic cost faced by HEIs and the standard cost per student; ii) an allocation based on the performance of research; and iii) a smaller share to help HEIs deliver better services to students. These three dimensions are listed and discussed in turn below.

- The first and largest share represents 55% of the total fund allocation (as of 2018). To allocate resource, the funding mechanism takes into account the structural features of HEIs. First of all, the historic allocation of funds – about 55% of funds in this component are allocated following this path dependence principle. Second, the average standard cost per student (CSTD) is calculated based on: programmes offered; number and qualifications of academic staff; number of non-academic staff and services offered; socio-economic conditions of the students (i.e. average income of the region and potential fees to be collected); and finally, the availability of public transportation. The aim of the reform in the near future is to phase off path dependence and allocate funds to HEIs only on the basis of the CSTD. This should improve the provision of tertiary education and highly skilled graduates entering the Italian job market. In addition, this would help the country increase the number of workers holding diplomas from universities, as Italy ranks on the lower end of the OECD country ranking regarding share of tertiary educated people in the 24-34 age group (OECD, 2017a).
- The second funding stream is the so-called *Quota premiale* (performance-based funding) and represented about 24% of overall public funding to HEIs in 2018. The largest share (about three-fifths) of *Quota premiale* is allocated on the basis of the periodical Evaluation of Research Quality (*Valutazione della Qualità della Ricerca*, VQR), undertaken by the National Agency for the Evaluation of University and Research (ANVUR). The remaining two-fifths of funding allocated by the *Quota premiale* are equally distributed for the quality of recruitment (one-fifth) and for self-defined targets concerning the quality of research environment, quality of teaching and internationalisation (one-fifth). Compared to international standards, the share of public funding allocated on the basis of *ex post* performance indicators to Italian HEIs is very high (OECD, 2017a). For example, similar systems, in place in Denmark, Finland, the Netherlands or Sweden allocate a total of about 2% of public funding or even less, based on performance evaluation.

- The third component of the funding system is the so-called *Quota interventi specifici* (funding for ad hoc initiatives). This component allocates additional funding to compensate for “shocks” (i.e. volatility) in state transfers (21% of total public funding in 2018) and to support targeted measures. These measures include funding of institutional strategic plans, resources for students’ welfare and services, grants for doctoral students and incentives for the recruitment of academics and young researchers. The *Quota interventi specifici* allocated EUR 900 million to these measures in 2017.

Aside from being a central pillar for public university funding, VQR results are also the basis for the allocation of additional competitive funding for the implementation of Departments of Excellence (*Dipartimenti di Eccellenza*). Departments of Excellence receive targeted financial support from the Ministry of Education for a period of five years. The selection system ranked the best 350 departments according to their VQR performance between 2011 and 2014. Departments of excellence can use these extra funds to recruit academic and non-academic staff, build infrastructures for research, and provide financial incentives to the personnel to develop 2<sup>nd</sup> and 3<sup>rd</sup>-cycle study programmes.

Italian universities have become acquainted with evaluation processes. Several case-study universities – while not being enthusiastic about the funding framework – pointed out that mechanisms such as the system of performance indicators and the VQR evaluation procedure, implemented by ANVUR, have become important vehicles to increase the acceptance of performance monitoring and then the efficiency of tertiary education institutions. It also allows each university in Italy to be able to benchmark its positioning in the system. Additional competitive funding streams exist but they are limited in scale and fragmented

A specific feature of the Italian research system is the absence of large (public) intermediaries or funding institutions. In many OECD countries, these entities serve as vehicles for the steering of the academic system by the provision of financial incentives, allocated through competitive bottom-up or thematic programmes. The Italian Fund for Investments in Scientific and Technological Research (FIRST), which operates under the aegis of MIUR, can provide HEIs with financial incentives for industrial research and pilot projects. However, FIRST’s budget is small compared with the size of higher education in Italy: about EUR 84 million in 2018. For example, the Austrian Fund for Scientific Research (FWF) – an independent body that finances excellent research activities – has an annual budget of about EUR 220 million. Likewise, the Swiss National Science Foundation (SNF) – another entity supporting mainly basic research – supported HEIs’ R&D projects with about EUR 880 million in 2017.<sup>4</sup> Agencies such as the Swedish VINNOVA, the Austrian Research Promotion Agency (FFG) or the Research Council Norway (RCN) would be examples for independent intermediaries with a broader set of missions, including applied research and development, innovation support as well as strategic task and knowledge creation.

Italian universities partly compensate the relative scarcity of public funding allocated by the centre with alternative sources. HEIs receive funds from students, the private sector, regional governments, funding agencies and from the European Union’s Framework Programmes for R&D. These sources of funds are particularly important for activities in the areas of entrepreneurship and innovation. As an example, in some case-study universities, funding from these sources nearly equals the amount of funds allocated to them by the *Quota premiale* system. While the diversification of funding sources is generally a positive feature of national systems, the fact that Italy displays large variations

in the economic performance of regions penalises universities localised in the south of the country. In addition, some structural features of the Italian economy, such as the large quantity of SMEs, cause the R&D expenditure of business to be generally low compared to the European average (1.33% of GDP in 2016), with the sole exceptions of Piedmont (1.78% in 2016) and Emilia-Romagna (1.49% in 2016).<sup>5</sup> Consequently, many universities find it difficult to attract funds from local businesses in their ecosystems.

Italian HEIs' capacity to engage is negatively affected by the vast regulatory framework they are subjected to as public bodies. Based on evidence collected in case studies, there may be a disconnect between the formal institutional autonomy of universities and the cumbersome regulations and specific (sometimes conflicting) incentives offered by the government (cf. European Commission/EACEA/Eurydice, 2015; Claeys-Kulik and Estermann, 2015).

An example of this disconnect is that the evaluation system takes only into account the research performance of HEIs. It provides an adverse incentive for diversifying institutional strategies, *de facto* limiting the internal steering autonomy of universities. Bibliometric indicators are quite common in performance-based allocation mechanisms in use in other European countries. However, in Denmark or Finland, for instance, the performance-based mechanism that assesses research outcomes allocates about 2% of the total public funds to HEIs. Conversely, in Italy, the funding scheme emphasises research at the expense of other HEI missions. The current emphasis on scientific excellence at the level of individual entities and researchers is widely perceived to have a crowding-out effect on entrepreneurial and third mission activities.

In addition, the system rewards HEI performance at a given point in time, taking into account only, to a limited extent, positive trends. Gaps between HEIs, in terms of their financial endowments, crystallise and the divide between northern and southern universities may risk getting bigger and bigger. In the same vein, the Department of Excellence scheme – with the majority of these departments located in northern universities – generates conflicting incentives, especially with regard to the promotion of interdisciplinarily and transversal competencies. In order to maximise the number of citations, researchers may adopt a risk-averse attitude and prefer to continue publishing in “safer” scientific domains rather than initiate new (interdisciplinary) areas of research that may not guarantee the same number of citations in the short run.

Not only do funding schemes provide limited resources to HEIs, they are also fragmented. One example – particularly important for the entrepreneurial and innovation agenda – is represented by the lack of co-ordination between the Research Projects of National Interest Scheme (PRIN), and the cluster initiatives connected with Italy's Industry 4.0 strategy. PRIN is a MIUR initiative and totals EUR 3 billion (as of 2017). National technological clusters depend on the Ministry of Economic Development and have a total endowment of EUR 7.3 billion, which funds 8 competence centres. Co-ordination between these two policy actions would help technological progress in Italy's productive sector.

There is also duplication of efforts to promote vocational educational training at the tertiary level. For instance, some Italian universities have started implementing the *Lauree professionalizzanti*. These programmes may overlap with those provided by *Istituti Tecnici Superiori*, since their basic orientation towards market-oriented tertiary education is similar (OECD, 2017a). To manage the development of vocational educational training at the tertiary level, Italy could take into account the example provided by the Netherlands' Top Sector Approach, launched in 2011 (Box 6.6).

**Box 6.6. The Netherlands' Top Sector Approach: Adopting a market-oriented approach to tertiary vocational education and training (VET)**

The Dutch government launched the Top Sector Approach in 2011 to align public resources for R&D and innovation strategically, along with nine “top sectors”. This policy marks a significant evolution in the Netherlands’ innovation policy, which adopts a “demand-driven” perspective. Stakeholders in the business sector, tertiary education and research sector are encouraged to join forces, explore new markets, technologies and products.

The nine strategic sectors, considered as a priority by the policy include agri-food, horticulture, high-tech systems and materials, energy, logistics, creative industry, life sciences, chemicals and water. These sectors together account for over 80% of the Netherlands’ business sector R&D expenditures, 55% of exports, but only 30% of value added and employment share. The policy promotes collaborative research of science-based entities and business, including SMEs. The policy has adopted a sectoral approach for two major reasons: i) to overcome existing barriers between several government departments and ministries involved; and ii) to leverage private investments through close co-operation between public and private actors in the respective fields. The annual estimated budget has been about EUR 1.1 billion per year between 2013 and 2016.

“Top teams” encompassing high-level representatives from industry, public research and the government, identified the top sectors to become the target of the policy. These top teams formulated strategic agendas for each of the top sectors. The implementation of the strategic agendas was handed to “top consortia for knowledge and innovation” (TKI), based on public-private partnership of businesses and higher education and research institutions. The government has reimbursed private partners in the TKIs for their engagement, allocating EUR 83 million in 2013.

The innovation contract signed in 2013, allocated a total investment of EUR 2 billion for the 9 top sectors over a 2-year period, of which EUR 970 million from the private sector. EUR 36 million are invested to harmonise top-sector activities with the societal challenges formulated in Horizon 2020 and to promote parallel implementation.

The top-sector initiative includes the so-called Technology Pact. These are a cluster of targeted measures and funding along all stages of education cycles, to increase skills and human resources in areas related to the top sectors.

*Sources: Polt, W. et al. (2015), *The Leverage Potential of the European Research Area for Austria's Ambition to Become One of the Innovation Leaders in Europe – A Comparative Study of Austria, Sweden and Denmark*, Studie im Auftrag des ERA Council Forum Austria; OECD (2014), *OECD Reviews of Innovation Policy: Netherlands 2014*, <https://doi.org/10.1787/9789264213159-en>.*

***The lack of long-term planning is an obstacle in the development of partnerships with external stakeholders***

The funding system is also challenged by the lack of long-term planning, which negatively affects the sustainability of the initiatives and policies put in place by HEIs. Uncertainty about the availability of resources generates pressure on HEIs which have to fundraise to sustain their innovative activities. Contamination labs represent a good example of the negative effect of the lack of strategic funding and provide students with entrepreneurial education programmes. These programmes are often pre-incubation support for the creation of business start-ups. Contamination labs promote interdisciplinary exchange



among students, organised in small teams generating and implementing innovative ideas. Experts from the private sector support students in developing business ideas and, eventually, their start-ups. To participate in the contamination lab programme, students have to go through a competitive process. The programme lasts six months. In some cases, as in the University of Cagliari, the contamination lab has gone beyond its original scope and has generated linkages with the local community supporting lifelong learning and entrepreneurship programmes for unemployed individuals.

There are 19 contamination labs in Italy and these entities have created the CLab Network (<http://clabitalia.it/contamination-lab>). National programmes support start-up creation. For example, the national award for innovation, PNI Cube (*Premio Nazionale Innovazione*), selects academic start-ups among the winners of the regional business plan competitions (Start-Cups). Pre-incubation activities of contamination labs rely on institutional and regional funding, including the European Union's structural funds, and private investors. Contamination labs can be considered a successful practice in terms of entrepreneurial education, which would benefit from strategic funding. Italy could take inspiration for its policies to support academic entrepreneurship from the Austrian "AplusB" (Academia plus Business) initiative.

#### **Box 6.7. Promoting academic entrepreneurship: The Austrian AplusB programme**

Austria created the Academia plus Business – AplusB – Programme in 2001, with the aim of promoting academic start-ups. In particular, the policy promotes the creation of academic start-ups that mirror the local requirements in terms of innovation and skills. The AplusB programme receive funds from regional/state governments and the private sector. The federal government generates around one-third of the overall funding for the centres: approximately EUR 32 million over the decade 2002-12. The Austrian Research Promotion Agency (FFG) created seven AplusB centres in the 2012-17 funding period.

AplusB centres are incubators and function in close collaboration with universities. The centres offer a wide range of support services, which include individual advice and coaching, provision of office premises, raising public awareness and support with funding and internationalisation. The incubators have a different thematic direction against the background of the relevant priorities and directions of the universities and Universities of Applied Sciences (UAS).

AplusB centres focus on academic spin-offs by scientists, students and graduates, although the target group was expanded in the second funding period from 2007 to include academics with professional experience, coming from the business sector. Since 2016, the updated programme "aws AplusB scale-up" has generated incubators specialised in supporting start-ups with high-growth potential.

*Sources:* BMWF/BMVIT (2016), *Austrian Research and Technology Report 2016. Report under Section 8(1) of the Research Organisation Act on Federally Subsidised Research, Technology and Innovation in Austria*, <http://www.bmfwf.gv.at/ftb>.

### ***HEIs and the regional dimension***

In Italy, the regional dimension is particularly important for HEIs. Regional governments, agencies and local businesses represent sources of financial support. Regional stakeholders finance activities related to: i) knowledge transfer, entrepreneurship and innovation; ii) the

protection of local cultural heritage; and iii) the provision of tailored education programmes, matching the skills needs of local ecosystems. Knowledge dissemination, on the model of the “European Researchers’ Night”, is another activity HEIs carry out at the regional level, by opening their facilities to the public.<sup>6</sup> The very presence of university buildings and campuses may represent a driver for development in regional ecosystems, as illustrated by the examples of the University Federico II in Naples (San Giovanni a Teduccio neighbourhood) or the Cesena campus of the University of Bologna. Due to an increasing understanding of their role as agents of socio-economic development in regional ecosystems, several Italian universities have adopted a “*bilancio sociale*”, an annual report discussing the results achieved in terms of local impact.

HEIs have embraced the smart specialisation paradigm and, especially in the south of the country, they have become acquainted with the use of European Structural Funds and in particular, the European Fund for Regional Development (ERDF). This represents an important evolution compared with the past when the local “engagement” agenda of HEIs was limited to the inclusion of representatives from regional communities in governing bodies such as the administrative board. As mentioned in several interviews with stakeholders met on study visits, the new approach – inspired by the smart specialisation agenda and financed by European Structural Funds – generates a new framework for regional engagement, which involves HEIs in ambitious and structured policy actions promoting development (triple/quadruple-helix). Box 6.8, below, illustrates the case of Cagliari in this perspective of local engagement.

#### **Box 6.8. Example for regional engagement: The University of Cagliari**

The University of Cagliari’s mission statement aims to create knowledge and innovation capabilities for the regional ecosystem. The university is at the centre of a dense regional network that generates strong ties with main Sardinian stakeholders including from the regional government, the business community, venture capitals and social agents.

The regional ecosystem formalised this network in 2018, by creating a centralised stakeholder committee, which is based on a “triple helix” model involving university leaders, the regional government, the business community and other stakeholders. The committee, which should function for at least a year, sets development targets to improve Sardinia’s economic and social performance.

The committee, however, is not the sole example of the University of Cagliari’s regional engagement agenda. For instance, another important institution is represented by the university’s Centre for Innovation and Entrepreneurship Activities (CREA). CREA operates in direct collaboration with regional businesses and is co-funded by European Structural Development Funds. CREA supports the following activities:

- “Unica&Imprese” ([www.unicaimpresa.it](http://www.unicaimpresa.it)), an annual event involving more than 100 researchers and more than 200 companies, with the aim of establishing new collaborations. Unica&Imprese displays the research activities of the University of Cagliari giving companies the possibility to familiarise with recent technological progress.
- “Emerging organisations” (EOS) offers university know-how and intellectual property management via training, consulting and technical assistance. EOS aims to advance the creation of businesses in the ICT sector. With the support of

European Structural Funds, the project targets unemployed individuals and residents in Sardinia with high-school diplomas. Half of the positions in the training programme are reserved for women.

- “Imprinting” is another initiative, funded by the Sardinian regional government, targeting unemployed individuals and, in particular, the long-term unemployed to support them in starting their own business or engage in small- and medium-sized enterprises.
- “Nemo”, also funded by the structural funds, aims to activate new economic dynamics in rural Sardinia, by creating a platform for the creation of businesses and self-employment projects in information and communications technology, agri-food, tourism and cultural heritage.

Ecosystems, while local, are not confined to a given territory; they can use local linkages to develop broader networks of stakeholders and provide specialised services to different communities. An example of this kind of “ecosystem” is represented by the federation of the *Scuola Superiore Sant’Anna*, the *Scuola Normale Superiore* in Pisa and the *Istituto Universitario di Studi Superiori*, IUSS, in Pavia. These “schools” have been characterised by the excellence of their research, but also by their small size (a result of their highly selective recruitment process). The aim of the federation is to maintain “excellence” while at the same time gaining critical mass by sharing some services/activities in order to generate a common culture, including for engagement, which capitalises on the features of the three institutions. In other words, the federation should bring about sustainable innovation in these institutions. In particular, by joining forces, these three schools aim to become more visible and competitive at the international level, a dimension in which their size has increasingly represented a handicap. This new organisational solution, based on “institutional innovation”, is a result of the 2010 autonomy reform and is a good illustration of the possibility to generate “critical masses” in research and teaching without the need to merge institutions. The federation between the Pisa-based schools and the IUSS is the result of a three-year programme (2016-18), approved and supported by MIUR.

### ***Individual incentives and recruitment mechanisms supporting engagement***

Reforms introduced in 2010 have created new institutions and practices that are positively affecting the performance of the Italian HEIs in their three main missions. So, for instance, while the VQR and the tri-annual strategic planning exercise have contributed to increasing awareness of the academic staff for performance and research quality, the creation of the position of “general manager” has spurred business-oriented processes and structures within institutions.

In the same vein, the autonomy reform has provided HEIs with the possibility of rewarding staff for their support of the overall development of the institution (e.g. the third mission results, the amount of third-party funding, etc.). In other words, HEIs can set the criteria for salary progression of academic staff by taking into account factors that go beyond performance in research and teaching. In particular, Law 240/2010 put in place a new financial tool that provides salary incentives to academic and administrative staff contributing to the development of the institution – the so-called *Fondo per la Premialità* (Fund for incentives). HEIs can decide on the criteria to assign rewards to staff but the law requires that HEIs define these criteria in their tri-year strategic development plan. The *Fondo per la Premialità* depends on institutional funding and matching funds provided by

the Ministry of Education. The *Fondo* can also be supported by resources allocated to Departments of Excellence.

However, despite the possibility of rewarding staff for their engagement activities, only 9 out of 67 public universities applied for additional funds for the “Fondo Premiale” in the 2016-18 planning period. Based on study visits and interviews with stakeholders, it seems that HEIs share a common practice to provide financial incentives only to administrative staff, who are hired on private law basis and, differently from academic staff, do not have to fulfil the same regulations as civil servants.

To incentivise staff undertaking activities related to third mission, there is a need for new indicators in the evaluation system. In interviews with university stakeholders, it was unanimously stated that the national funding system, including incentives for individual researchers, is very much biased towards research in terms of publication and citation indicators. This situation provides little incentives to HEIs to connect scarce resources with many different priorities. The same holds true for the recruitment process. According to stakeholders, when hiring, universities cannot take into account social skills and experiences with respect to entrepreneurship. Based on the information collected in the field, a crucial factor hampering the implementation of a reward system as prescribed by Law 240/2010 was also often reported to be the lack of a standardised, transparent and effortless monitoring system to allow a fair assessment of the results reached by universities in the area of third mission.

Stakeholders look with great interest at ANVUR’s efforts to develop a new model supporting the evaluation of third mission activities and of the impact of academic research (see subsequent section) and are requesting performance-based incentives.<sup>7</sup> Universities themselves are also very proactive in contributing bottom-up to the construction of the evaluation model proposing as standards their promising experiments (such as some promising experiments in the reward systems) and good practices (for example, the inclusion of music activities for the local community and institutional sustainability initiatives). Nonetheless, there is the impression that formal institutional autonomy is jeopardised by constraints set by rules and bureaucracy: universities have to balance a variety of objectives at the same time. Despite this background in which there are scarce resources supporting engagement and impact, Italy is home to some good practices. For instance, creative non-monetary incentives for academic staff include the provision of sabbatical years, to put in practice innovative ideas, or a different computation of working hours, when the academic staff works in a spin-off. Some universities such as the University of Bari consider that the work undertaken by academic staff in a spin-off company does not conflict with research and teaching duties, this to circumvent the regulation that allows academics to carry out professional activities and consultancies in part-time positions only with the authorisation of the rector.

Other incentives include rewards for inventors of intellectual property rights (IPRs) owned by the university. By law, universities have to give inventors a minimum of 50% of the revenues generated by university-owned patents. The inventor has to use these revenues for research or other academic activities. In some institutions, the share of revenues allocated to the inventor is higher. For instance, the University of Cagliari gives inventors 65% of the revenues generated by patents owned by the institution. In other cases, the additional revenue is allocated to departments that can use it to incentivise patenting activities of the university or to increase the share of the university in the ownership of a given patent. Due to the so-called professor’s privilege, patents owned by universities represent only 36% of all academic patents (ANVUR figures for 2011-14 period). The

patenting activity, however, is highly concentrated in a few institutions, about 50% of patents in 12 universities, while in the case of university-owned patents the same share is concentrated in 9 institutions (ANVUR, 2018a).

University stakeholders met by the OECD delegation have been particularly vocal about the new regulation (*Legge sulle partecipate*) that prohibits universities holding shares in new spin-offs. According to stakeholders, this regulation may challenge academic entrepreneurship, due to the fact that the performance evaluation carried out by ANVUR consider patents and spin-offs on the same level. In addition, by reducing their participation in spin-offs, the university may lose an important source of income that finances other activities. Finally, another argument put forward by stakeholders to criticise the new regulation is that the university's participation in a spin-off is a sign of credibility and stability for potential investors interested in the business. So, the regulation, which aims to avoid university participation crowding out private investments, would actually have the opposite result (Netval, 2017).

HEIs propensity to the entrepreneurship and innovation agenda depends also on students' attitudes and demands. In particular, academic staff seems to be characterised by an age gap. "Older" researchers tend to have a lesser drive towards innovation and market exploitation of research. Vice versa, younger researcher and students are generally more open-minded towards innovation and entrepreneurship. Another key factor driving entrepreneurial attitudes is the increased internationalisation of academia. This includes student exchange programmes and international research collaboration, which challenge traditional practices and promote innovation (see also Chapter 4 on internationalisation).

A good example is that of the University Tor Vergata, which has created mixed teams of academic researchers. Individuals of different age groups and level of hierarchy work together to promote cross-fertilisation of mindsets. To create these mixed teams, the university undertook an activity to map the "professional" skills of academic and administrative staff (about 800 people surveyed). The initiative took place as a basis for further career development plans and training programmes. Information about skills needs within the university informed a large hiring programme for non-academic staff and, in particular for professional skills in areas such as business and technology transfer management.

The University of Bologna has created its incubator – AlmaCube – to promote open innovation and create opportunities for collaboration and professional development. The university and incubator launched an open innovation programme to promote the development of entrepreneurial careers among students and young researchers. The open innovation programme puts in place actions that bring together multidisciplinary students from different universities and challenge them to solve real industry problems. Several international good practices engage students in innovation processes, as in the approach of the University of Bologna. For instance, a well-known example is that of DEMOLA in Tempere (Box 6.9).

**Box 6.9. DEMOLA Tampere – An open innovation platform of co-creation and agile experiments for students, businesses and universities**

The Finnish 6City programme, with the support of European Structural Funds, launched the New Factory DEMOLA in 2008. DEMOLA aims to facilitate joint business-academia creation processes. DEMOLA adopts the paradigm of open innovation to support the process that turns an idea or a need into a working demonstration, prototype or business concept.

At its start, DEMOLA benefitted from the support of the three universities in the region of Tampere: the University of Tampere (UTA), the Technical University Tampere (TUT) and the Tampere University of Applied Sciences (TUAS). The primary focus of DEMOLA was on local business requirements and collaborations. Since then the initiative has grown into a global innovation ecosystem that works in 15 countries and that involves approximately 60 universities worldwide.

The basic principle of DEMOLA is engaging students in development processes for companies. Companies and universities start co-development projects. The former get the opportunity to involve university students in their problem-solving activities. The latter can offer students real-life training experiences.

DEMOLA co-creation projects typically last three to four month and include:

- A challenge defined by the partner company or other organisations.
- A call for a team of multidisciplinary and multicultural students. The company can also identify participants in the project.
- An eight-week facilitated development process and a set of milestone outcomes such as a value creation workshop, pitching workshops and a testing afternoon.
- Value/demo created by the team. IPR owned by the team.

Today DEMOLA is funded by universities in Tampere and the City of Tampere and project fees by companies. About 100 DEMOLA projects with 450 students are carried out every year.

*Sources: OECD (2017b), Knowledge Triangle Synthesis Report – Enhancing the Contributions of Higher Education and Research to Innovation, OECD, Paris; DEMOS Helsinki (n.d.), Demola Tampere: An Open Innovation Platform of Co-Creation and Agile Experiments for Students, Businesses and Universities, <https://www.demoshelsinki.fi/wp-content/uploads/2018/06/demola.pdf>.*

***Evaluating third mission (TM)***

The performance evaluation of TM activities is a challenging task across OECD countries, especially when it should inform the allocation of funds. The Italian agency, ANVUR, has developed an evaluation model for TM activities and the impact of academic research, where “third mission” is defined as the openness of the university towards the socio-economic context through the valorisation and transfer of knowledge.

The model divides TM activities into two main areas and identifies associated standardised indicators. First, the capacity to generate value from research results, which is by definition the transformation of goods supported by public funding (public research) into private goods. Second, the production of public and social goods, i.e. other forms of knowledge

transfer and exchange producing impacts on the social, cultural and economic context. Concerning the first area, the evaluation takes into account indicators concerning intellectual property management (patents and plant variety registrations), academic entrepreneurship (spin-offs), third-party research activities and intermediaries' activities. Regarding the production of public and social goods, ANVUR uses indicators measuring the creation and management of cultural heritage (museums, archaeological excavations and cultural heritage), clinical research and training (registered clinical experimentation, biobanks), lifelong learning activities and public engagement intended as the production of advice, expertise, informed opinion, contributions to controversies, communication of science. Evaluation methods are based on informed peer review. ANVUR has collected data on all third mission activities run by Italian universities in 2011-14 within the framework of the Italian research assessment exercise called VQR 2011-14 (Evaluation of Research Quality 2011-14). Some universities have developed their own methodologies to measure and finance TM activities; Box 6.10, below, illustrates the example of the University of Bologna.

#### **Box 6.10. The Third Mission Observatory and incentives to personnel**

In 2017, the University of Bologna Alma Mater launched its Third Mission Observatory. The aim of the observatory is to collect and analyse the activities related to the third mission of the university community, with particular attention to relations between the university and the social environment, both locally and internationally.

The observatory looks at all initiatives intended to apply the results of research in each of the contexts addressed by the knowledge areas of the university and the skills developed in working environments, including the transfer of technology and the production of goods and services, via which the university contributes directly or indirectly to the well-being and evolution of society.

The Third Mission Observatory, therefore, encourages the teaching and administrative staff of the university to think and develop scientific and social projects that create ever-stronger links between the university and society at all levels. The observatory also enhances the staff capable of making their knowledge available to the society, including through dissemination initiatives for the new generations.

The main challenge to implement an evaluation system for TM activities is to identify good standardised indicators. There are several international practices illustrating different solutions to this problem. The Swedish Developmental Pilot, undertaken between 2013 and 2016, is an example of a process to develop and test national indicators based on qualitative as well as “tailored” approaches to measurement (Box 6.11).

**Box 6.11. Experimenting methodologies to evaluate the third mission, the Swedish Development Pilot**

Referring to a long tradition of societal and economic outreach activities of Swedish HEIs, the ecosystems between institutions and socio-economic has been part of an official “third task” in the national Higher Law since 1997. This policy has generated a series of activities, support structures and funding instruments, to promote the third mission at the national, institutional and agency levels to actively support development according to this mission.

Despite this support framework, the social engagement of HEIs was still an add-on to research and teaching, representing HEIs’ prevailing core missions. The level of engagement of individual HEIs was affected by path dependence and organisational features.

As a result, the government introduced new regulations in 2012 to promote the development of evaluation mechanisms assessing the efforts and initiatives put in place by HEIs to improve their interaction with society. The new regulation included new incentive mechanisms.

In 2013, VINNOVA and the Swedish Research Council were assigned to implement a programme, running until 2016, to develop and test an evaluation model for HEI’s societal interaction. The government allocated a total of EUR 21.3 million over 3 years. The process included three major building blocks:

1. Two pilot calls for dedicated strategic projects to be implemented by single HEIs or consortia of HEIs, in 2013 and 2014. The budget allocated to these pilot projects was approximately EUR 16 million (government funds and VINNOVA co-funding). All Swedish HEIs were asked to participate and 27 received funding.
2. A stakeholder dialogue – including HEIs, national and regional authorities, agencies, industrialist associations – aiming to identify common characteristics of HEI’s societal engagement (to inform indicators in the evaluation process).
3. Two additional pilot calls to test the developed evaluation process and assessment mechanisms, focusing on the HEI’s strategies and implementation plans as well as on the quality and results of interactive activities. The pilot evaluation process received funds totalling EUR 12.8 million.

This process sheds light on the status of the way in which Swedish HEIs engage with society and on the quality of these interactions. Some key lessons from the process might provide learnings for other countries, in particular:

- HEIs should involve several levels (leadership, departments and faculties, staff and researchers) in engagement activities. This to generate a better understanding of the subject and higher consensus about the outcomes.
- Funding is a basic requirement but the Swedish experience illustrates that even small amounts of funding can leverage resources and mobilise people, activities and organisational learning.
- Evaluation tools can stimulate the organisational development of HEIs but they should take into account differences existing among different types of HEIs.

*Source: Wise et al. (2016) in OECD (2017b), Knowledge Triangle Synthesis Report – Enhancing the Contributions of Higher Education and Research to Innovation, OECD, Paris.*



## Conclusions and policy recommendations

Heterogeneity is a key feature of the Italian university system. Differences among regional ecosystems affect HEI strategies and approaches to entrepreneurship and innovation. These differences are exacerbated by the lack of a national policy perspective on engagement/third mission. Central authorities have focused on teaching and research missions. However, especially after the 2010 autonomy reform, several institutions have developed a range of innovative practices to fulfil their third mission.

Institutional initiatives are quite diverse, though they share the characteristic of being closely related to the conditions and demands of their regional ecosystem. University engagement mirrors the local firm structure, the availability of other higher education or research institutions and funding, specific regional needs regarding knowledge and skills, and the presence of social or cultural issues.

Within this framework, there is a need for a broad definition of entrepreneurship and innovation activities, which goes beyond business development and commercialisation of academic knowledge. Academic entrepreneurship should also refer to universities' contribution to societal development, i.e. exploiting the idea of a third mission. In addition, academic entrepreneurship should fertilise teaching and research activities. For instance, it could inspire new pedagogic systems promoting interdisciplinary learning, transversal capabilities, new organisational models and respective incentive schemes. Likewise, institutional marketing and brand development should be mentioned in this vein.

The experimental work of ANVUR to develop an evaluation model for third mission and an associated scheme of standardised indicators is based on a broad definition of academic entrepreneurship and should be considered positively. However, this effort is not paralleled by a discussion about the financial incentives and support scheme to be provided to third mission activities.

Funding for HEI engagement is scarce and fragmented. This causes the Italian system to lag behind vis-à-vis international OECD and EU good practices. A relevant share of funding for third mission activities stems from regional governments – which often mobilise the European Union's structural funds – or in some cases from the private sector. At the same time, national authorities define performance measurement, quality assurance schemes and relevant regulations with regard to recruitment, IPRs and economic activities of universities among other things. Besides generating fragmentation, this complex governance may generate incoherence in targets and incentives provided to HEIs.

Summing up, the lack of alignment between national policies concerning entrepreneurship and innovation, scarce and fragmented resources and tight (and sometimes limiting) regulation challenges HEIs and researchers to balance their activities between multilayer incentives and sometimes conflicting targets. As adjustment processes in universities usually take time, there is a need for developing a long-term vision to allocate resources capitalising on the strengths of Italian universities. This strategic approach should go beyond the current three-year planning horizons of the national and institutional strategic programmes.

In particular, concerning the developed of a long-term vision, Italian authorities could consider the following recommendations:

- Creating a long-term national vision/policy conducive to university entrepreneurship and innovation activities. One of the key limits of the Italian system is the lack of a coherent long-term vision that orient the decisions and

behaviours of stakeholders. In particular, the long-term vision should serve as a sustainable mid-term planning horizon for ministerial and institutional strategy development, allocation of funding and implementation of activities in line with the overall strategic targets.

- Adopting a broad definition of “engagement” or “third mission” incorporating entrepreneurship and innovation from multiple perspectives. As discussed extensively in this report, university “engagement” is a very broad concept that encompasses a range of activities higher education institutions can put in place to generate value for their own networks. Promoting the engagement agenda requires adjusting the performance-based funding scheme to take into account all these new activities and actions HEIs can put in place. This could be done by applying both standardised indicators and selected individual qualitative targets, to be negotiated at the individual level with each HEI.
- Consider broadening the emphasis on bibliometric indicators with other indicators capturing different activities. Based on a broader definition of “engagement” and “third mission”, the Italian government could define new indicators and a framework of incentives and funding on the national level conducive to higher education innovation. Italy (ANVUR) has done some interesting experiments in this field and could capitalise on these experiences to develop a broad evaluation framework in the future.
- Reducing the current fragmentation of the national incentive structure for entrepreneurial and innovative activities by better aligning initiatives co-ordinated by different ministries (in particular MISE and MIUR but also the Ministry for Foreign Affairs and others). As flagged by other OECD reports (see for instance OECD, 2017a), Italy’s government framework suffers from governance fragmentation both at the national level and between the centre and regional levels. There is great potential for improvement in the way policies are co-ordinated between ministries. Italy should capitalise on the experience done in the field of Industry 4.0 to improve its capacity to co-ordinate policy agendas in the future.
- Establishing a funding entity that could serve as an intermediary managing national competitive programmes, provided that funding is allocated in a stable and long-term manner to this entity. This should be done to: i) increase stability and duration of programmes vis-à-vis the three-year planning cycles; and ii) provide transparent and sound selection criteria matching international standards (peer review processes, etc.). Such an entity could be formed as a truly independent body with its own purpose (e.g. as a fund or trust) or with a closer connection to the enforcement of government strategic targets (e.g. as an agency administering public programmes or provision of strategic intelligence in terms of data analysis or evaluations). In both cases, the provision of sufficient and sustainable resources is crucial.

Concerning the governance of higher education institutions, there is a need for the following improvements:

- Introducing innovations in the selection of university leadership. For instance, concerning the collegial selection, the country could take into account international practices for the appointment process of the rectorate such as incorporating multi-level applications processes. In addition, stakeholders could consider gender

aspects as criteria for appointment processes and working conditions at all levels of university hierarchy.

- Evaluating the new legislation regarding subsidiary companies to avoid adverse incentives negatively affecting the creation of universities' spin-offs. There is a need for "proofing" the regulatory framework and avoiding it can negatively affect academic entrepreneurship, and university engagement. Italian authorities may need some form of co-ordination, within the centre of government to capitalise on the many successful experiences and allow them to generate more value for their own ecosystems and the country as a whole.
- Assessing the impact of the professor's privilege on incentives. Based on international good practices that handle this issue, Italy could start an evaluation of the professor's privilege to assess the need to modify this policy.

## Notes

<sup>1</sup> See [www.heinnovate.eu](http://www.heinnovate.eu) for an overview of principles and statements.

<sup>2</sup> "M-form", or "M-firm", defines the model of a multidivisional organisation, with strong leadership and semi-autonomous units controlled by (financial) incentives and targets (Palmer et al., 1993) [https://www.jstor.org/stable/2393256?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/2393256?seq=1#metadata_info_tab_contents).

<sup>3</sup> For a discussion of the *Instituti Tecnici Superiori*, see Chapter 2, and OECD, 2017a.

<sup>4</sup> [http://www.snf.ch/en/theSNSF/profile/facts\\_figures/statistics/pages/default.aspx](http://www.snf.ch/en/theSNSF/profile/facts_figures/statistics/pages/default.aspx).

<sup>5</sup> Eurostat (2019), "Intramural R&D expenditure (GERD) by sectors of performance and NUTS 2 regions [rd\_e\_gerdreg]".

<sup>6</sup> [http://ec.europa.eu/research/mariecurieactions/actions/european-researchers-night\\_en](http://ec.europa.eu/research/mariecurieactions/actions/european-researchers-night_en) (accessed on 28 February 2019).

<sup>7</sup> This element was reported and commented by several panellists ("there is an appetite for third mission evaluation incentives") at the HEInnovate meeting with the steering group of the project, MIUR, Rome, 10 December 2018.

## References

ANVUR (2018a), "Le attività di Terza Missione: strategie, risorse ed impatto (Third Mission activities: strategies, resources and impact)", Biennial Report, Section 9,

[http://www.anvur.it/download/rapporto-2018/ANVUR\\_Rapporto\\_Biennale\\_2018\\_Sezione\\_9.pdf](http://www.anvur.it/download/rapporto-2018/ANVUR_Rapporto_Biennale_2018_Sezione_9.pdf).

ANVUR (2018b), "I docenti" (The professors), Biennial Report, Chapter I.3.4,

[http://www.anvur.it/download/rapporto-2018/ANVUR\\_Rapporto\\_Biennale\\_2018\\_Sezione\\_3.pdf](http://www.anvur.it/download/rapporto-2018/ANVUR_Rapporto_Biennale_2018_Sezione_3.pdf).

ANVUR (2016), *Comunicato stampa. L'università italiana ha accettato (e vinto) la sfida della qualità della ricerca*, Rome,

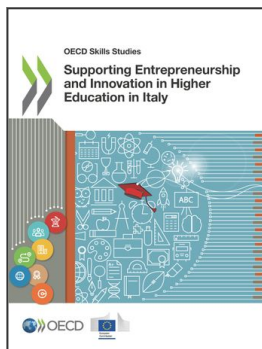
[http://www.anvur.it/old/attachments/article/799/CS\\_VQR\\_Anvur\\_dicembre2016~.pdf](http://www.anvur.it/old/attachments/article/799/CS_VQR_Anvur_dicembre2016~.pdf).

BMBWF (2002) University Act of 2002; Section 2, Vienna.

BMWF/BMVI (2016), *Austrian Research and Technology Report 2016. Report under Section 8(1) of the Research Organisation Act on Federally Subsidised Research, Technology and Innovation in Austria*, <http://www.bmwf.gv.at/ftb>.

- Bronstein, J., Reihlen, M. (2014), “Entrepreneurial University Archetypes: A Meta-Synthesis of Case Study Literature”, *Industry and Higher Education*, Vol. 28. <https://doi.org/10.5367/ihe.2014.0210>
- Campbell, L.G. et al. (2013), “Gender-heterogeneous working groups produce higher quality science”, *PloS one*, Vol. 8(10), e79147.
- Claeys-Kulik, A.-L. and T. Estermann (2015), *DEFINE Thematic Report: Performance-based Funding of Universities in Europe*, European University Association.
- Council of the European Union (2015), “Advancing gender equality in the European Research Area”, <http://data.consilium.europa.eu/doc/document/ST-14846-2015-INIT/en/pdf>.
- DEMOS Helisinki (n.d.), *Demola Tampere: An Open Innovation Platform of Co-Creation and Agile Experiments for Students, Businesses and Universities*, <https://www.demoshelsinki.fi/wp-content/uploads/2018/06/demola.pdf>.
- Dinges, M. et al. (2015), “Wirkungsanalyse 2015 des österreichischen Kompetenzzentrenprogramms COMET Endbericht”, Austrian Institute of Technology and Joanneum Research.
- Etzkowitz, H. et al. (2008), “Pathways to the entrepreneurial university: towards a global convergence”, *Science and Public Policy*, Vol. 35(9), pp. 681-695.
- ERAC (2015), “Opinion on the European Research Area Roadmap 2015-2020”, *ERAC Document 1208/15*.
- European Commission/EACEA/Eurydice (2015), *The European Higher Education Area in 2015: Bologna Process Implementation Report*, Publications Office of the European Union, Luxembourg, <https://doi.org/10.2797/128576>.
- FFG (2018), *COMET Competence Centers for Excellent Technologies*, <https://www.ffg.at/comet>.
- Goddard, John (2009), *Reinventing the Civic University*, London: NESTA
- Henke J., Pasternack P., Schmid S. (2015) “Viele Stimmen, kein Kanon – Konzept und Kommunikation der Third Mission von Hochschulen”, Halle: Institut für Hochschulforschung (HoF) an der Martin-Luther-Universität, Halle-Wittenberg.
- Hunt, V., D. Layton and S. Prince (2015), *Diversity Matters*, McKinsey & Company.
- Klofsten, M. (2018), *Technological Forecasting and Social Change*, <https://doi.org/10.1016/j.techfore.2018.12.004>.
- Meissner, D., W. Polt and N.S. Vonortas (2017), “Towards a broad understanding of innovation and its importance for innovation policy”, *The Journal of Technology Transfer*, Vol. 42(5), pp. 1184-1211.
- NETVAL (2017), *Dieci proposte per il Sistema del trasferimento tecnologico in Italia*, Giugno, Roma.
- OECD (2018), *OECD Reviews of Innovation Policy: Austria 2018*, OECD Reviews of Innovation Policy, OECD Publishing, Paris, <https://doi.org/10.1787/9789264309470-en>.
- OECD (2017a), *OECD Skills Strategy Diagnostic Report: Italy 2017*, OECD Skills Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9789264298644-en>.
- OECD (2017b), *Knowledge Triangle Synthesis Report – Enhancing the Contributions of Higher Education and Research to Innovation*, OECD, Paris.
- OECD (2016), *OECD Science, Technology and Innovation Outlook 2016*, OECD Publishing, Paris, [https://doi.org/10.1787/sti\\_in\\_outlook-2016-en](https://doi.org/10.1787/sti_in_outlook-2016-en).
- OECD (2014), *OECD Reviews of Innovation Policy: Netherlands 2014*, OECD Reviews of Innovation Policy, OECD Publishing, Paris, <https://doi.org/10.1787/9789264213159-en>.

- OECD (2008), *Tertiary Education for the Knowledge Society: Volume 1 and Volume 2*, OECD Reviews of Tertiary Education, OECD Publishing, Paris, <https://doi.org/10.1787/9789264046535-en>.
- Palmer, D.A., Jennings, P.D., Zhou, X. (1993), “Late Adoption of the Multidivisional Form by Large U.S. Corporations: Institutional, Political, and Economic Accounts”, *Administrative Science Quarterly*, Vol. 38, pp. 100-131.
- Pollitzer, E. and M. Schraudner (2015), “Integrating gender dynamics into innovation ecosystems”, *Sociology and Anthropology*, Vol. 3(11), pp. 617-626.
- Polt, W. et al. (2015), *The Leverage Potential of the European Research Area for Austria’s Ambition to Become One of the Innovation Leaders in Europe – A Comparative Study of Austria, Sweden and Denmark*, Studie im Auftrag des ERA Council Forum Austria.
- Powell, K. (2018), “These labs are remarkably diverse – Here’s why they’re winning at science”, *Nature*, Vol. 558(7708), pp. 19-22.
- Unger M. and W. Polt (2017), “The knowledge triangle between research, education and innovation – A conceptual discussion”, *Foresight and STI Governance*, Vol. 11, No. 2, pp. 10-26, <https://doi.org/10.17323/2500-2597.2017.2.10.26>.



**From:**  
**Supporting Entrepreneurship and Innovation in  
Higher Education in Italy**

**Access the complete publication at:**  
<https://doi.org/10.1787/43e88f48-en>

**Please cite this chapter as:**

OECD/European Union (2019), “Organisational capacity: Funding, people and incentives”, in *Supporting Entrepreneurship and Innovation in Higher Education in Italy*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/8ecb2b1f-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.