Knowledge exchange and collaboration between universities and society in Italy: The ITA.CON Project

Ministero dell'Università e della Ricerca

OECD

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The ITA.CON Project

In today's knowledge-driven societies, universities play a crucial role in fostering innovation and sustainable growth within their ecosystems. Improving knowledge exchange and collaboration (KEC) activities within the Italian university system is essential for societal progress, well-being, and enhancing the productivity of firms of different sizes and stages of development and generate value for society. This document offers a reform roadmap proposal for policies to enhance the knowledge exchange and collaboration system between universities and society in Italy. It builds on the outcomes of a project funded by the European Union via the Technical Support Instrument, and implemented by the OECD, in co-operation with the Directorate-General for Structural Reform Support of the European Commission (DG REFORM).

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Acronyms and Abbreviations

ANPAL - National Agency for Active Employment Policies (*Agenzia Nazionale Politiche Attive Lavoro*)

ANVUR – National Agency for Evaluation of the University System and Research (*Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca*)

APENET – Universities and Research Institutions for Public Engagement (*Atenei ed Enti di Ricerca per il Public Engagement*)

CDA – Administration Boards (*Consiglio di amministrazione*)

CRUI – Conference of Italian University Rectors (*Conferenza dei Rettori delle Università Italiane*)

CTN - National Technological Clusters (*Centri Nazionali di Tecnologia*)

DG Reform - EU Directorate-General for Structural Reform (*Direzione generale del Sostegno alle riforme strutturali*)

FFO - Ordinary Financing Fund (*Fondo di Finanziamento Ordinario*)

FIRST - The Fund for Investment in Scientific and Technological Research (*Fondo per gli Investimenti nella Ricerca Scientifica e Tecnologica*)

HE – Higher Education

HEIs – Higher Education Institutions

IPR - intellectual property rights

ITA.CON - "Italy Knowledge" ("*Italia Conoscenze*")

ITS - Istituti Tecnici Superiori

KEC – Knowledge Exchange and Collaboration

LCEI - The Low Carbon Eco-Innovatory

LEC - Large Engines Competence Centre

MiMIT – Ministry of Enterprises and Made in Italy (*Ministero delle Imprese e del made in Italy*, former MISE)

MISE – Ministry of Economic Development (*Ministero dello Sviluppo Economico*, current MiMIT)

MIM – Ministry of Education and Merit (*Ministero dell'Istruzione e del Merito*, Former Ministry of Education, University and Research)

MUR – Ministry of University and Research (*Ministero dell'Università e della Ricerca*, Former Ministry of Education, University and Research)

NETVAL – Network for the Valorisation of Research (*Network per la valorizzazione della Ricerca*)

NGEU - NextGenerationEU

NRRP - National Recovery and Resilience Plan (*Piano Nazionale di Ripresa e Resilienza*)

PA - Public Administration

PhD – Doctoral Programme

PNR - National Research Programme

REF – Research Excellence Framework

SDGs - Sustainable Development Goals

SMEs – Small Medium Enterprises

SRL - Societal Readiness Levels

TRL – Technology Readiness Levels

TSI – Technical Support Instrument

TTO – Technology Transfer Office

VQR – Evaluation of the Quality of Research (*Valutazione della Qualità della Ricerca*)

Executive Summary

In today's knowledge-driven societies, universities play a crucial role in fostering innovation and sustainable growth within their ecosystems. Improving knowledge exchange and collaboration (KEC) activities within the Italian university system is essential for societal progress, well-being, and enhancing the productivity of firms of different sizes and stages of development and generate value for society.

While many Italian state-owned universities have initiated KEC activities with external partners, including private firms, public administrations, and civil society, the prevailing trend reveals a structural and multidimensional weakness. The growing demand for universities to engage and collaborate with external partners is not paralleled by the necessary development of skills, organisational structure, governance arrangements, regulatory frameworks, and career incentives. Consequently, Italian universities may struggle to establish lasting relationships that have a sustainable impact on their communities and networks.

Various national efforts, such as Industry 4.0, which generated competence centres and technological hubs connected to universities, and the large inflow of resources by the National Recovery Plan (PNNR in Italian), have attempted to improve KEC between university and society. However, these efforts are characterised by a piecemeal approach to reforms. To overcome the KEC system's current weaknesses, universities can benefit from a well-structured internal organisation and more systematic collaboration mechanisms with external partners. Overall, a comprehensive reform framework is now required to encourage collaboration and enhance universities' role in generating value for society.

This document offers a reform roadmap proposal for policies to enhance the knowledge exchange and collaboration system between universities and society in Italy. It builds on the outcomes of a project funded by the European Union via the Technical Support Instrument, and implemented by the OECD, in co-operation with the Directorate-General for Structural Reform Support of the European Commission (DG REFORM). The project follows a request for technical support submitted by the Italian Ministry of University and Research (MUR) to DG REFORM.

The report suggests three priority areas for policy action, each accompanied by detailed recommendations:

1. Support the organisation and strategic management of universities.
2. Establish effective mechanisms to encourage collaboration between universities and other actors.
3. Provide universities with adequate human and financial resources for collaboration activities with external partners.

The roadmap outlines an action plan detailing recommendations to the MUR for enhancing KEC in Italy, assessing the degree of challenge associated with each option. The report also presents policy recommendations for collaborative implementation with other ministries. Finally, an example of an implementation pathway is provided for recommendations related to the organisational structure of universities.

In conclusion, by strategically addressing these priority areas and implementing the proposed recommendations, Italy has an opportunity to create a dynamic and robust framework for knowledge exchange and collaboration, which could unleash the potential of an extended network of universities and their ecosystems: an underutilised resource the country could mobilise to foster innovation, societal advancement, and sustainable economic development.

Rationale and Context

The importance of Knowledge Exchange and Collaboration in a knowledge-based society

Public research is an essential tool to foster a knowledge-based society. Higher education institutions (HEIs) are increasingly being called on to collaborate and contribute to social, economic, and environmental goals (Laino, 2019[1]). HEIs produce the world's most important resources: young minds and an educated workforce, which, in turn, can produce innovative ideas and products, thus contributing to societal development (Breznitz, 2014[2]; Fantino, Mori and Scalise, 2012[3]; Associazione Italiadecide, 2017[4]). Generating these resources is pivotal to enhancing the sustainable development of a country and its regions.

Knowledge exchange and collaboration (KEC) activities connect HEIs and the society, including businesses, public administrations, at central and local level, nongovernmental organisations (NGOs), and citizens (OECD/European Union, 2019[5]). These stakeholders collaborate with HEIs, generating a circular flow of information and knowledge. What was once called the "third mission" of HEIs has become a broader concept, according to which HEIs connect proactively with their societal stakeholders.

In Italy, the KEC activities between universities and their societal partners are spreading throughout the whole country. These activities started usually as knowledge transfer from universities to businesses, resulting in commercialisation of research, registration of patents and licenses, so that almost all Italian universities established technology transfer offices (TTOs) to provide support to these activities. Recently, many universities partner with civil society organisations and public administrations – on a regional and local level – to share knowledge and co-conduct projects in a wide range of policy areas aimed at promoting social progress. Examples include education and health policies, as well as programmes that address the challenges of the 'green transition' and the digital transformation of societies (the 'twin transitions').

The current research and innovation landscape in Italy

The context in which KEC takes place in Italy reflects the characteristics of the country, particularly in terms of research and innovation. According to the 2023 European Innovation Scoreboard, Italy ranks as a "moderate innovator" (European Union, 2023[6]). Its performance stands at 90.3% of the EU average, although the country's performance gap to the EU is becoming smaller (Figure .1) .

Figure .1. In 2023, Italy continues its performance as "moderate innovator"
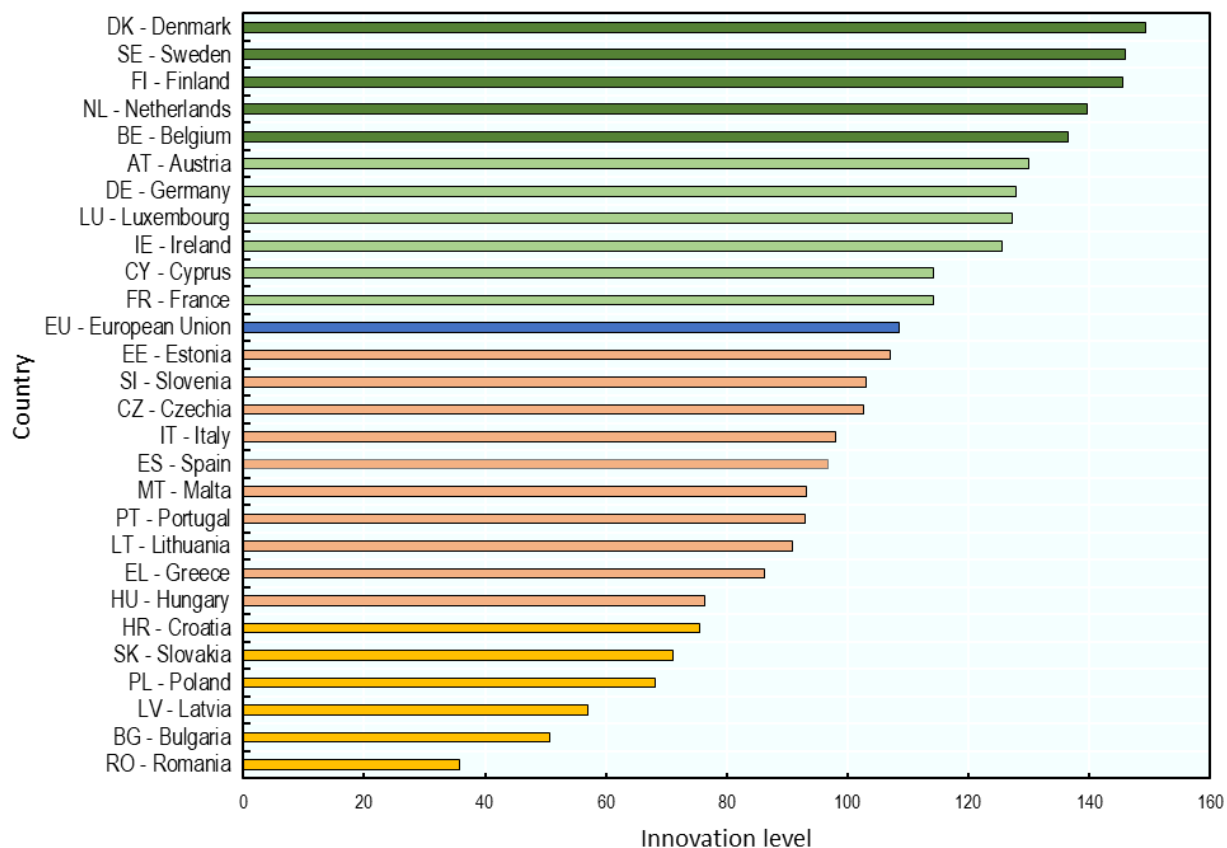
Note: The different colours of the bar graphs represent the different classification of innovators for each country. The bars in dark green represent innovation leaders; bars in light green represent strong innovators; light orange represents moderate innovators; dark orange represents emerging innovators. Blue represents the EU average.
Source: (European Union, 2023[6])

Despite this progress, the research and innovation landscapes continue to present some weaknesses. The productivity of labour (measured as GDP per hour worked) is stagnating, with a sluggish increase over the last 20 years, when compared with the EU27 and the OECD countries' average (OECD, 2024[7]) (Figure .2).

Figure .2. Italy's productivity of labour has been stagnating, and currently stands below OECD and EU average

GDP per hour worked – Total, 2015=100, 2022 or latest available
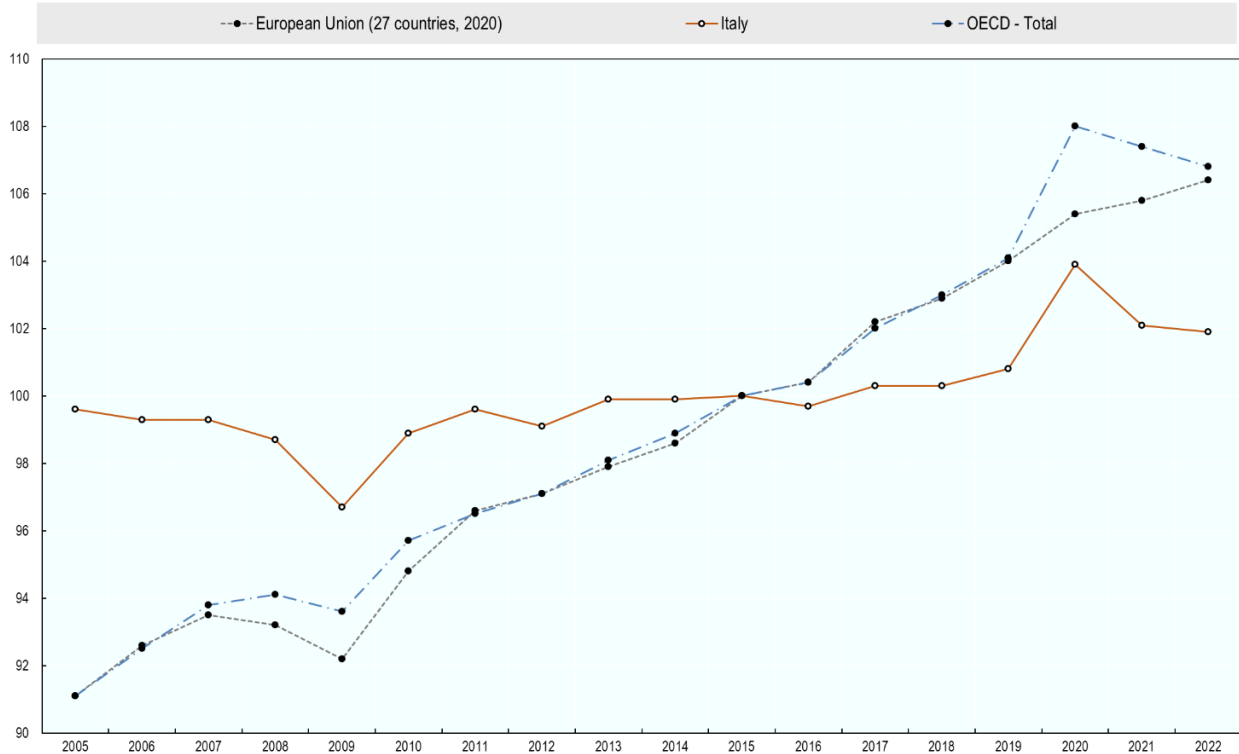
Note: GDP per hour worked is a measure of labour productivity. It measures how efficiently labour input is combined with other factors of production and used in the production process. Labour input is defined as total hours worked of all persons engaged in production. Labour productivity only partially reflects the productivity of labour in terms of the personal capacities of workers or the intensity of their effort. The ratio between the output measure and the labour input depends to a large degree on the presence and/or use of other inputs (e.g. capital, intermediate inputs, technical, organisational and efficiency change, economies of scale). This indicator is measured in USD (constant prices 2010 and PPPs) and indices.
Source: OECD (2024), GDP per hour worked (indicator). Doi: 10.1787/1439e590-en

Italy displays a lower level of gross domestic expenditure on R&D (1.45%) compared to OECD and EU27 average (2.7%, and 2.2%, respectively) expressed as % of GDP (OECD, 2024[7]). This may be attributed to the fact that Italy counts few large firms and a vast majority of small firms, who are often specialised in traditional sectors, with a small capital endowment. In fact, small medium enterprises (SMEs) contribute to 76% of employment and 64% of value added, compared to the OECD average of 68% and 59%, respectively (OECD, 2021[8]).

Furthermore, regional differences play a role influencing Italian universities' KEC activities (Figure .3). According to the 2023 European Regional Innovation Scoreboard, among the 21 mapped Italian regions there are three strong innovators, 16 moderate innovators and two emerging innovators (European Commission, 2023[9]).

Figure .3. Regional differences in Italy in terms of innovation, compared to other European countries

The classification of Italian regions according to the European Regional Innovation Scoreboard, 2023
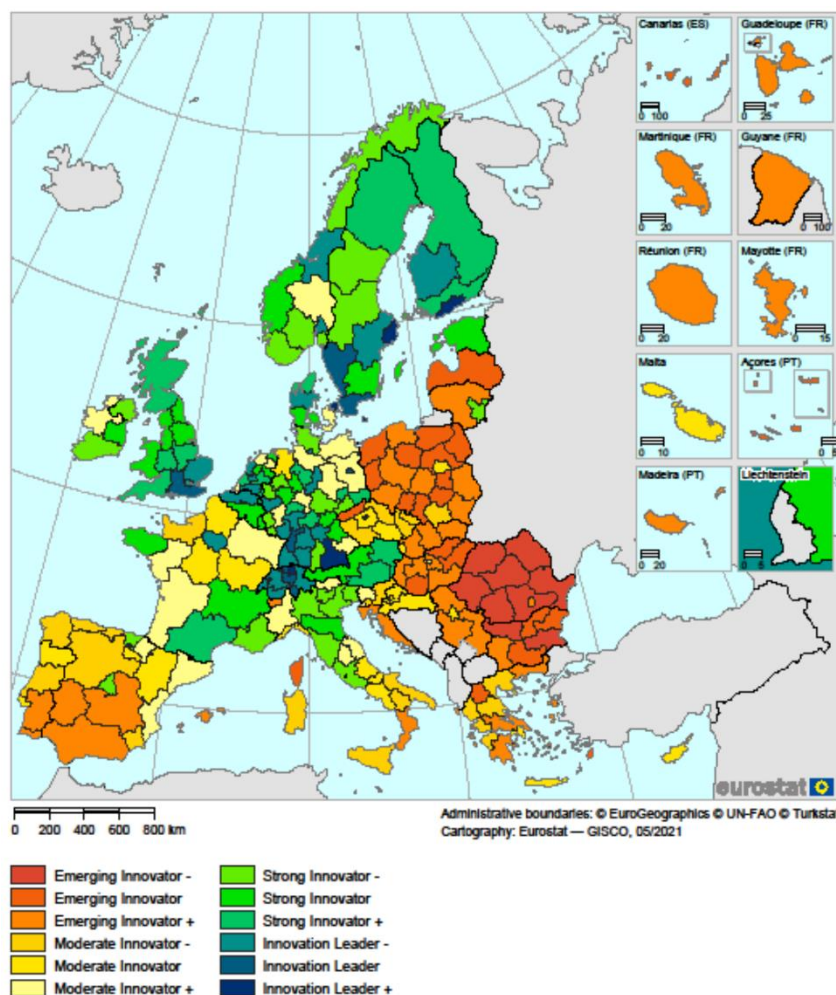
Source: (European Commission, 2023[9])

Universities located in regions with lower per capita income, lower private investment in research and development (R&D), and less internationalised industrial structure, may face difficulties connecting their research activities with local innovation needs. In Italy, this is particularly true in disadvantaged territories, which include "inner areas"[1] (or "remote areas"), that is, areas far from the centres of delivery of essential social services. These areas stretch over 60% of the national surface, and host 52% of Italian municipalities and 22% of its population. (Agency for Territorial Cohesion, 2013[10])

All these factors require a more explicit commitment of the public university system to improve the effectiveness of policy responses to big challenges, to address social, economic, and territorial inequalities, and thus mitigate the risks of ineffectiveness of policies aimed at improving societal well-being. To this end, a more effective system of knowledge exchange and collaboration (KEC) between universities and society at large, is needed.

Why the ITA.CON project and why now?

The ITA.CON project, (an abbreviation for "*Italia-conoscenze*" in Italian, "Italy-knowledge" in English), aims to formulate viable policy reform options that support state-owned universities in Italy in generating cultural and economic value with and for the society. These reforms should foster a more explicit and systematic collaboration between universities and their external partners.

Although designed before the outbreak of the pandemic, the project was initiated in 2021 amid the global COVID-19 pandemic and its far-reaching socio-economic impacts, when universities worldwide were forced to transition their daily operations in different ways. This transformation included the abrupt shift of classes, meetings, and events to a virtual format. Research activities were delayed, and access to physical campuses became difficult. Nonetheless, the pandemic catalysed the collaboration activities between universities and firms. In particular, the health crisis underscored the significance of partnerships between these entities, whose collaborative efforts were instrumental in expediting research on potential vaccines, curb the spread of the virus and increase the overall resilience of our economies and societies (Times Higher Education, 2020[11]). From this perspective, the COVID-19 pandemic demonstrated the positive impact that universities can have on innovation and development in their surrounding ecosystems.

Enhancing KEC activities in the Italian university system is a way to prompt societal progress and well-being and to improve the productivity of firms of all size and maturity in all regions. Therefore, there is scope to enhance the smooth-running of KEC activities in Italy and eliminate structural and organisational barriers that reduce the capacity of universities to collaborate with their partners.

At European level, growing attention is placed on the issues of open science and open innovation as determinants of the societal impact of research. The implementation strategy of the EU Framework Programme for Research and Innovation, Horizon Europe, is focused, inter alia, on "maximising impacts" (European Commission, 2020[12]). In the specific case of Italy, the significant amount of resources allocated by the Next Generation EU recovery plan represents a challenge for the country, but it also opens up an unprecedented field of opportunities for universities to better fulfil their mission in enabling the society to cope, in particular, with the 'twin transitions' (digital & green), without leaving anyone behind. (Ministry of Economy and Finance, 2021[13])

On these bases, the urgency of finding solutions to the problems limiting the effectiveness and efficiency of KEC activities ranks high for Italy and reflects the objectives of the Recovery and Resilience Plan.

The current policy context regulating the interplay between universities and society in Italy

Legal structures established during the last two decades are setting the base to support universities' KEC activities, historically known as 'third mission'. During the 2008-2010 period, reforms were enacted, influencing the Italian higher education system. Notably, the law n. 240/2010 gave leeway to the evaluation of universities' third mission activities, in their traditional view as technology transfer, and introduced competitive funding mechanisms aimed at improving the managerial structure of the universities. Among other things, that law made compulsory the participation of external, non-academic members in the administration boards (CDA) of the universities.

These changes paved the way for new interactions between the universities and the society, enhancing, in principle, its listening capacity to the needs of the surrounding ecosystem.

In the subsequent years, other national and regional policies have been established to further strengthen KEC activities. Measures include the reinforcement of universities' technology transfer offices (TTOs), an action put in place by the former Ministry of Economic Development (MiSE), and the Industrial PhD'

programmes, supported by the MUR, with contributions by individual enterprises and by regional governments, to promote the insertion of highly qualified human resources in the productive sector.

The National Plan Industry 4.0 represents another example of promoting stronger university-industry technological partnerships (OECD, 2017[14]). This Plan connects with initiatives such as the National Technology Clusters and Competence Centres, which, at least in some cases, have been appreciated by the industrial stakeholders for their capacity to promote entrepreneurial skills among the youth (OECD/European Union, 2019[5]). The National Research Programme (PNR) for 2021-2027 aligns with the European Framework Programme for Research, emphasising coordination of research and innovation policies, with a focus on health, culture, social systems, digital, climate and energy, and agri-food. The PNR emphasizes knowledge exchange and societal engagement, calling for a national strategy to enhance collaboration between universities, businesses, and society. In additional, regional administrations have also implemented programmes to strengthen knowledge exchange and promote regional development, by boosting the scale and relevance of teaching, research and collaboration opportunities (OECD/European Union, 2019[5]).

In summary, over the past 20 years, progress has been made. Italian universities, especially in the most industrialised territories, have consolidated their TTOs, and fostered a culture of collaboration with businesses and society at large. However, a comprehensive normative framework facilitating the KEC processes is still missing, and limited attention has been devoted to universities' societal impact in its wider meaning.

Updates on the policy landscape for KEC activities

From the ITA.CON project inception to the time of writing, some relevant updates to the research, higher education and innovation landscape in Italy were introduced, influencing the KEC system of Italian universities. At the European Union's level, the NextGenerationEU (NGEU) programme has provided a substantial inflow of financial resources. At the national level, the National Agency for the Evaluation of University and Research (*Agenzia Nazionale per la Valutazione dell'Università e della Ricerca* - ANVUR) has published, in July 2022, the results of its assessment (VQR – *Valutazione della Qualità della Ricerca*) for the period 2015-2019, and new regulations for intellectual property protection were introduced by the Government in August 2023.

The National Recovery and Resilience Plan (NRRP)

Italy is EU-wide the largest beneficiary of the Next Generation EU (NGEU) initiative, receiving almost 200 billion EUR, consisting of EUR 68.9 billion in grants and EUR 122.6 in loans (European Commission, 2021[15]). Within its NGEU-supported National Recovery and Resilience Plan (NRRP), approved by the European Commission in 2021, Italy has included a set of measures (Mission 4) focusing on education and research. Within Component 2 of Mission 4, named "From Research to Business" (*Dalla Ricerca all'Impresa*) and worth EUR 11.4 billion, an emphasis is placed on fostering basic and applied research conducted in synergy between consortia of universities and their socio-economic ecosystems, thus underscoring the need for a strengthening of KEC activities.

Innovative PhDs

The Italian higher education system has been promoting the use of high-level skills in the productive sector. As a result of implementation of the NRRP, the Ministerial Decree n. 352, issued in 2022, allocated 5,000 grants for innovative doctorates that meet the innovation needs of enterprises and promote the recruitment of researchers from enterprises (Italian Ministry of University and Research, 2022[16]).

The evaluation of universities' KEC activities

The evaluation of universities' KEC activities – commonly referred to as "third mission" - was further enhanced with the 2015-2019 edition of the VQR exercise by the ANVUR. Universities partake in this evaluation by submitting to the Agency "case studies" conducted with external partners, categorized in 10 'fields of action' defined by ANVUR: enhancement of intellectual or industrial property, academic entrepreneurship, intermediary and technology transfer facilities, artistic and cultural heritage, health protection, lifelong learning, public engagement, public goods and inclusion policies, open science, and activities related to the Sustainable Development Goals (SDGs).

The aim of ANVUR was to assess the impact of these case studies on their beneficiaries. In the 2015-2019 evaluation cycle, the appraisal of these case studies went beyond a narrow definition of impact, solely tied to marketable research outcomes, to embrace a broader interpretation, empowering institutions to highlight the aspects deemed most impactful in their portfolio of KEC ("third mission") activities (ANVUR, 2021[17]).

The new Code of intellectual property

Other recent interventions have also supported the momentum of knowledge exchange. Notably, as of August 2023, the Italian government has approved a new decree concerning the Italian Intellectual Property Code. The key change to the IPR law regards inventions by university researchers. The old law granted patent rights to researchers employed in universities. The new version specifies that, generally, these rights belong to the university or research institution when the invention occurs during employment. Thanks to this amendment, Italy has aligned its intellectual property rights to that of other European countries and abandoned the contested "professor's privilege".

KEC and co-creation projects: the international perspective

In Italy, the growing momentum of KEC reflects an international trend. Across OECD countries, there are various examples of universities conducting KEC activities with their partners (OECD, 2023[18]; OECD, 2023[19]). These activities strengthen universities' public commitment to improve the effectiveness of policy responses. Many of these examples showcase factors that can influence collaboration activities, and policy interventions similar to the Italian case.

While there is no "one-size-fits-all" approach to collaboration projects, some notable examples can showcase the successful role that universities can play in their communities (OECD, 2021[20]). Universities' role includes: i) providing multidisciplinary knowledge and expertise; ii) building the skills needed for the development and deployment of innovations, for instance through university-industry joint training programmes; iii) offering access to key infrastructures (e.g. laboratories, specialised equipment) and networks; iv) acting as trusted mediators between citizens, government and businesses; and v) anchoring innovation activities in regional ecosystems by leveraging close ties with local companies and communities. (OECD, 2023[21]).

Recently, the pursuit of advancing the green transition and achieving the goals of the 2015 Paris Climate Agreement catalyses collaboration between universities and society on the international stage (Sabel and Victor, 2022[22]). Against this backdrop, universities have started to contribute through joint green innovation projects with industry, public authorities, and citizens (Box .1). As hubs of diverse knowledge, universities are uniquely placed to build interdisciplinary teams. They are entrusted by citizens, often serving as bridges between society and industry, and their regional ties enable them to engage with local ecosystems – a useful asset to develop tailored green solutions (OECD, 2023[21]).

Box .1. Collaboration initiatives for the green transition from 9 OECD countries and an international consortium

No.	Initiative name	Country	Short description
Green mobility			
1	**aspern.mobil LAB**	Austria	Initiated by Vienna University of Technology, aspern.mobil LAB offers a space for universities, companies, citizens, and the government to participate in joint innovation for a green and inclusive local mobility system in Vienna.
2	**HyMethShip**	International	This international consortium of 13 partners involving universities, research centres and industry partners aimed at jointly developing a hydrogen-fueled combustion solution to reduce emissions of ships.
Green energy			
3	**Centre TERRE**	Canada	Created by the Jonquière College and his automation Center (CPA), the Centre TERRE co-creates renewables and automated energy solutions jointly with SMEs, universities and other partners to respond to the needs of businesses and citizens located in remote areas that are not served by the national electricity grid.
4	**GreenLab**	Denmark	Green industrial park and a national research and development facility aimed at accelerating innovation in the field of green energy generation, storage and sharing. It provides testing the ground for green energy solutions co-created by industry, academia and government.
5	**NEWRAIL project**	Netherlands	Initiated by ProRail, this co-creation project involves TNO, the Hague University of Applied Sciences and local authorities to develop a new solution to install solar panels on existing noise barriers along railway lines.
6	**MIT Plasma Science and Fusion Center (PSFC) and Commonwealth Fusion Systems (CFS) Fusion Technology project***	United States	This partnership between the MIT Plasma Science and Fusion Center (PSFC) and the spin-out Commonwealth Fusion Systems (CFS) aims at developing advanced superconducting magnets for fusion technology devices aimed at generating carbon-free electricity.
Green products, services and processes			
7	**SUSBINCO**	Finland	Co-creation project involving 18 partners (incl. businesses and public research institutions) to develop innovations to substitute fossil-based binders and coatings (i.e. materials used in various industries and applications to provide adhesion, protection and desired properties to surfaces) with bio-based solutions to use in packaging, paints, adhesives, sealants, and abrasives.
8	**Lorraine Smart Cities Living Lab**	France	Located in the Université de Lorraine, the living lab collaborates with local authorities/municipalities, companies, citizens and incubators to co-create user-centered solutions related to the green transition. For example, the lab has co-created new objects based on plastic waste.
9	**GreenCoLab**	Portugal	Initiated by the Centre of Marine Sciences and other five founding partners with the objective of bringing together researchers and businesses to drive innovation in the field of algae biotechnology (i.e. the application of biotechnological techniques to use algae for the production of valuable products or for environmental purposes).
10	**Low Carbon Eco-Innovatory (LCEI)**	United Kingdom	Initiated by Liverpool John Moores University, University of Liverpool and Lancaster University to co-create jointly with regional SMEs for the development of a wide variety of goods, processes and services that are environmentally-friendly (e.g. alternative packaging from naturally degradable materials such as starch, vegetable oil and seaweed).

Source: (OECD, 2023[23])

The international stage may offer useful benchmarks and offer best practices for the Italian case, providing policy interventions to maximise the impact of collaboration activities.

Data originated from the ITA.CON Project

The methodology of the ITA.CON Project is described in Annex A (page 34). The initial phase, which consisted of a questionnaire-based KEC survey administered to all 67 Italian state-owned universities (respondents n=56), followed by online interviews with university representatives and their partners, showed that Italian state-owned universities actively engage in KEC activities. In recent years, universities have increasingly conducted different types of collaboration activities that have an impact on society and aim to improve the policy responses to societal challenges. Most universities are adopting various methods and approaches to connect with their surrounding 'ecosystems'[2]. However, the Italian case is two-faceted: while there is an increasing demand for universities to engage with external partners, KEC activities face obstacles that can limit the propensity of all actors to efficiently connect and build structural relationships to provide a sustainable impact on their own communities and networks. From these observations stems the need for designing policy reform options encouraging and supporting the universities towards actions aimed at generating cultural and economic value with and for the society.

Territorial and structural obstacles to KEC activities persist

The questionnaires and the interviews revealed that the challenges hampering a smooth flow of the KEC process in Italy are of concern for both the universities and their external stakeholders, including businesses, public administrations, civil society. These challenges stem from the local contexts in which the universities are located, and from the organisation and processes within the universities. In particular, both university representatives and external partners mentioned three main obstacles:

1. the characteristics of the surrounding productive/industrial ecosystem;
2. the lack of recognition and career incentives for university personnel involved in KEC activities;
3. the unnecessary bureaucratic burden.

While the first element is mainly perceived in the southern part of the country, the remaining two do not show geographical specificity (Figure 4).

Figure 4. Problems identified by universities and their partners, by three geographical areas

Percentage share
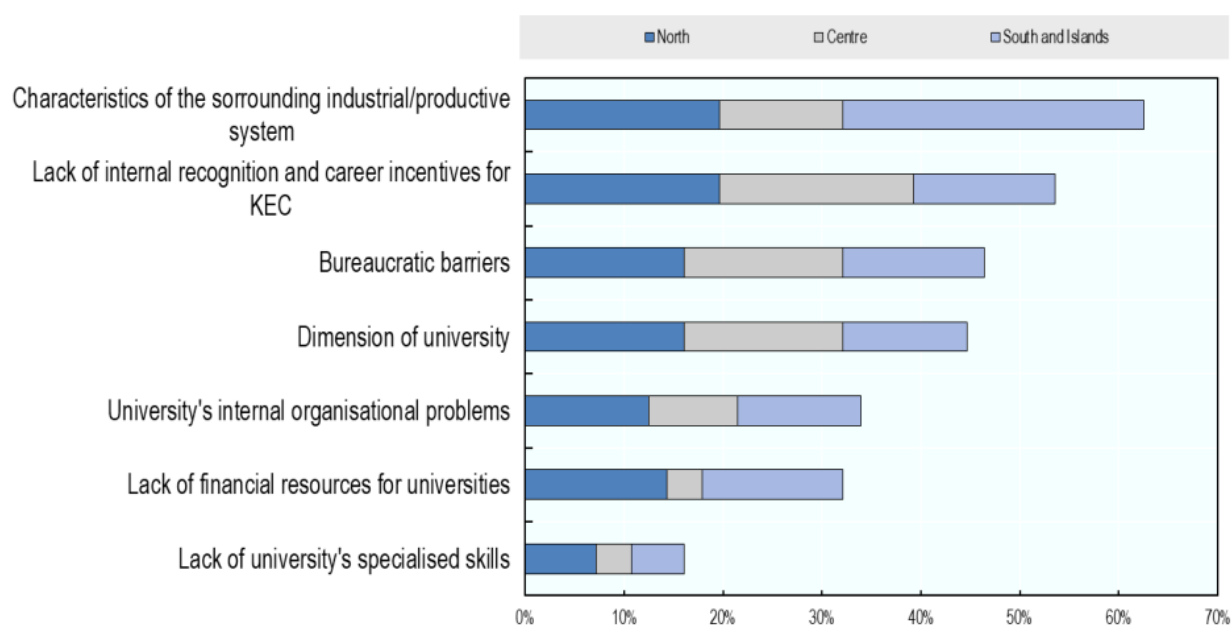
Note: The totals in each bar graph represent the share of universities and their respective external partners, of the full sample (56), that identified a specific obstacle for KEC activities. Each bar graph shows also the distribution of this share by geographical areas. The obstacles mentioned by universities and their partners through questionnaires and interviews were aggregated for each university, meaning that if an obstacle was cited by either a university or partner, it was considered as expressed by the university. In questionnaires and interviews the university and its partners could mention more than one obstacle.
Source: ITA.CON Survey and Interviews, 2022

The element "Characteristics of the surrounding industrial/productive system" reflects the diverse performance of Italian regions (see Figure 4) and refers to the uneven distribution of innovation actors. Both universities' representatives and their external partners recognised the importance of the ecosystem in generating opportunities for collaboration. As expected, in high-income regions (or sub-regional areas), universities encounter more favorable conditions to conduct KEC activities with their partners.

The "Lack of internal recognition and career incentives for KEC activities" derives, according to university representatives, from the low-level priority attributed to KEC activities by the academy and, consequently, from the lack of adequate career incentives. Nevertheless, it was recognised that the external evaluation procedures run by ANVUR has partly counteracted these barriers in recent years. According to external stakeholders, this hindrance stems from a persisting "stalled cultural paradigm". There is a widespread understanding that KEC activities are currently suffering from the lack of dedicated funding streams.

The third most cited obstacle were "Bureaucratic barriers". Both university representatives and external partners underlined the need for an increased flexibility, as the universities are currently tied down by a too rigid regulatory armamentarium, which discourages the willingness to boost knowledge exchange and collaboration with external partners.

As shown in Figure 4, other obstacles were mentioned, mostly without an obvious or interpretable geographic specificity. Some of these obstacles are not independent from each other, e.g. lack of financial resources may entail the lack of career incentives for professors and researchers to run such activities. Against this background, reforms aimed at improving the current landscape of KEC activities need to be

multifaceted and consider the interplay among the problems identified, to implement multidimensional policy solutions.

Italian universities partner mainly with firms and public administrations

While engaging with their communities, the most common external partners for universities in Italy are private firms, including SMEs and start-ups, with almost half of the universities having at least one collaboration with these actors (Figure .5). The strong collaboration with SMEs is no surprise: the Italian productive sector is vastly dominated by small firms. Collaboration with larger firms, however, can also prove to be difficult. Universities reported a series of obstacles featuring these collaborations, with mismatches in administrative procedures and difficulties in finding the right skills for specific tasks.

Figure .5. The types of partners with which universities co-conduct KEC activities

Percentage share
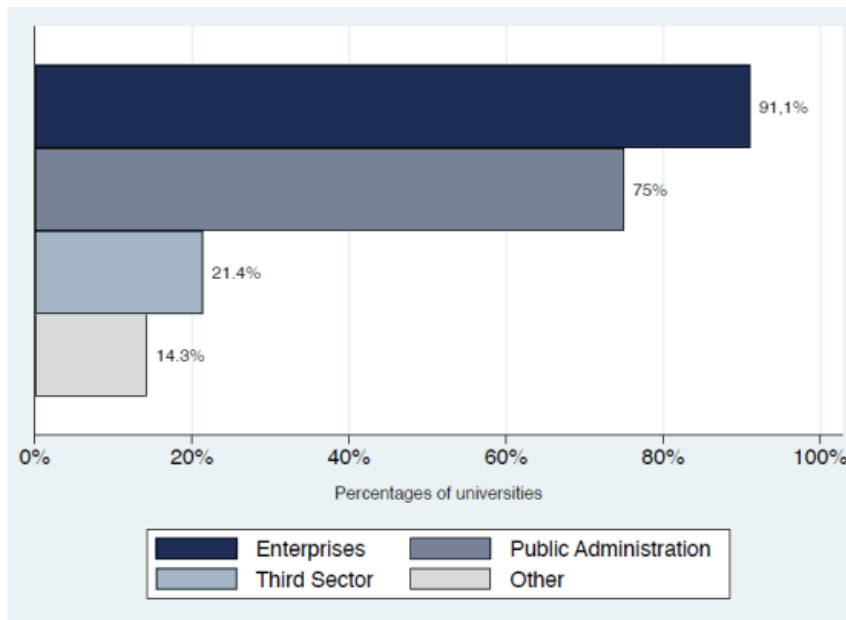
Note: The totals of the bar graphs illustrate the share of universities, out of the full sample (n=56), that identified a specific partner.
Source: ITA.CON Survey and Interviews, 2022

The second most common partner for collaborations is the public administration (PA), especially local and regional governments. Regional governments, in particular, represent an important partner for many universities, regardless of their size and location, and generate procurement processes. In addition, several universities have specific partnerships with the municipalities in which they are located. Universities engage in social and technology domains, and in some cases contribute to the rehabilitation of cities' most impoverished areas.

The partnership with regional governments is becoming even more important in view of the funds that Italy is receiving from the European Commission within the National Recovery and Resilience Plan. In fact, the resources of the Italian NRRP are funneled, for an important portion, through the regional governments. Therefore, the NRRP has further boosted collaboration between universities and regional governments. Several universities have stipulated legal frameworks for cooperation with the regional administrations to be involved in the implementation of the PNRR, the most notable example being the "Innovation Ecosystems", funded with a total of 1.30 billion EUR for the period 2023-2026 (Italian Council of Ministers,

2021[24]). Nevertheless, the interviews disclosed challenges faced by some universities in managing processes and initiating projects for securing funds. Notably, a few universities acknowledged their non-participation in tender calls, attributing this to a deficiency in necessary skills and administrative capabilities.

KEC activities have reached beyond traditional tech transfer and are increasingly moving to the "core" of the missions of universities in Italy

Evidence illustrates that Italian universities conduct various types of KEC activities. From the questionnaires and interviews, a total of 337 KEC activities run by universities in collaboration with their partners were mentioned. Based on the ANVUR ten fields of action, these activities are counted and categorised as follows:

- 142 socio-cultural KEC activities, making it the largest group of KEC activity of Italian universities. These activities can span from production of public goods and instruments for inclusion, such as projects to support the integration of migrants, to public engagement activities, such as the launch of an interactive museum activity for citizens;

- 120 activities within the technology transfer domain. These activities represent the second biggest group. They include projects of support for intermediation structures, and valorisation of research, such as filing new patents and licenses;

- 34 activities of academic entrepreneurship. This category includes projects related to spin-off and start-ups creation and support, such as programmes support of new start-ups during the COVID-19 pandemic;

- 21 activities related to the 2030 Agenda and the Sustainable Development Goals (SDGs);

- 16 lifelong learning and open education, which included projects such as designing summer schools, and upskilling and reskilling courses for adults in particular domains;

- 4 residual KEC activities as other, including projects for awards and crowdfunding activities.

In conducting KEC activities, most institutions maintain the "third mission" terminology, sometimes making implicit or explicit reference to ANVUR's definition (Figure .6). However, different interpretations of it are emerging as the role of the university evolves.[3] For instance, the model of the "civic" university is gaining traction in the public debate in Italy. It reflects an innovative model of the university's engagement, which considers the three missions of the university as interconnected and introduces the university as an "anchor institution" that has its surrounding territory at the core of its activities (Goddard, 2016[25]). Other universities are trying to go beyond the third mission definition and are developing other concepts, such as "public engagement" or "societal impact". In other cases, universities have considered social justice as an objective for KEC activities.

Figure .6. A representation of definitions used by universities in defining KEC
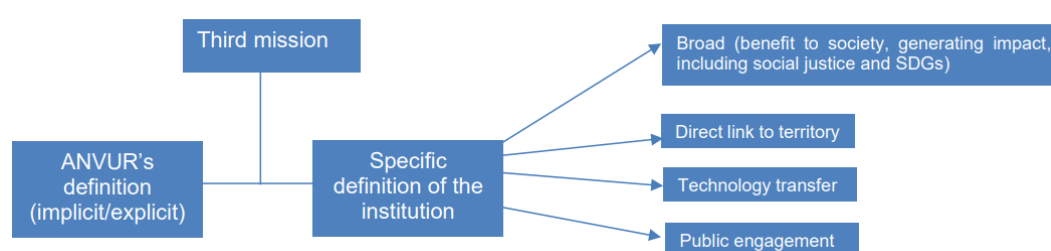
Source: Author's elaboration

The way forward: three priority areas of action to enhance KEC in Italy

This report recommends a series of reforms aimed at improving knowledge exchange and collaboration (KEC) between universities and society, with the goal of reinforcing the public commitment of the university system. Based on the data presented above, the proposed reforms concern three main priority areas: i) support the organisation and strategic management of universities; ii) establish effective mechanisms to encourage collaboration between universities and other actors; and iii) equip universities with adequate human and financial resources to facilitate collaboration activities with external partners. This classification is only indicative as many of the issues categorised in the aforementioned groups are intertwined.

The policy recommendations presented hereinafter are solely in the responsibility of the Ministry of University and Research (MUR). However, the last part of section 3 presents other useful policy reforms that would require the cooperation between the Ministry of University and Research and other Ministries, such as the Ministry of Economy and Finance, and the Ministry of Enterprises and Made in Italy.

1. Support the organisation and strategic management of universities

The organisational capacity of universities plays a pivotal role in facilitating and sustaining KEC activities, and thus reinforcing the role of universities in their ecosystems. How a university is structured can provide the essential foundation for fostering meaningful partnerships with external stakeholders. The establishment and/or strengthening of dedicated offices focused on KEC demonstrates commitment to adapting and preparing the university's internal organisation for KEC activities. These offices can streamline communication, coordinate efforts, and provide the necessary support structures for both academic and external partners.

Furthermore, the internal organisation within universities significantly influences the culture of KEC activities. A culture that values and incentivises collaboration, innovation, and engagement can create an environment conducive to fruitful partnerships. Leadership commitment and support are crucial in setting the tone for the entire institution, emphasising the importance of KEC as a strategic priority. Additionally, flexible administrative structures that facilitate interdisciplinary collaboration and reduce bureaucratic hurdles contribute to the agility required for successful engagement with diverse external partners.

Many Italian universities have made changes to their internal structure to foster KEC. The change first started with traditional technology transfer activities. Most universities operate a technology transfer office (TTO) that manages the commercialisation of research, patents and licenses. Recently, some have also established a KEC office, whose mission goes beyond the role of the TTO, including a wider range of collaboration activities with diverse societal partners.

In addition, in Italy, different universities have published strategic plans outlining the different KEC activities undertaken by each department and the budget devoted to them. Most universities have also appointed senior-level leaders to take charge of this portfolio, including vice-rectors or delegates for the third mission, sustainable development, or public engagement.

However, the questionnaires and interviews conducted for this report show that these efforts are not homogenous across all state-owned universities. Many academics continue to regard KEC activities as a residual or marginal component, prioritised only after teaching and research. While some professors manage balance all "three missions" (teaching, research and KEC) within their schedule, many find themselves prioritising the first two.

To effectively connect to their external partners, universities can make use of a "KEC manager", that is a full-time staff/profile, recognised within the institution, and purposely trained and dedicated to KEC activities. This could help facilitate interactions between the universities and their ecosystem. Previous efforts in Italy have already gone in this direction. In recent years, the former Ministry of Economic Development (MISE) has supported the introduction in the universities of a new professional, referred to

as the "Knowledge Transfer Manager", to support the Technology Transfer Offices (TTOs) in accomplishing their mission.[4] However, such a profile would need to be supported through the right structures to effectively enhance collaboration.

Although KEC is clearly gaining more and more ground within universities, it has not yet been recognised as a fundamental driver of all their activities, including teaching and research. Box .2 proposes a set of policy recommendations that can support the organisation of universities to facilitate KEC.

Box .2. Recommended Ministerial Regulatory Strategies for Streamlining university organisation to boost the efficiency and societal impact of Knowledge Exchange and Collaboration (KEC).

In the context of Law n. 43, 31 March 2005, the Ministry should confirm the strategic goals and indicators related to KEC in the definition of the Ministerial Decree concerning "general guidelines for university planning and indicators for the periodic assessment of results" for the period 2024 - 2026, issued every three years, and ensure support for the university who wish to establish or expand KEC activities. KEC activities should be further monitored in the processes of self-evaluation and accreditation (AVA) and the assessment of research quality (VQR).

These guidelines, while fully respecting the autonomy of each institution, should merely specify the essential elements that strategic plans may include and related objectives. The above-mentioned Ministerial Decree will underline that the strategic plans should achieve targeted goals measured through indicators proposed by its technical evaluation body (ANVUR), concerning training activities, research activities, and their relevance to society within a comprehensive and coherent program, and by balancing the three components (missions).

The central question that each university seeks to address with its strategic plan concerns how it conceives its role in society. A good strategic plan, ambitious and realistic, is a key element to boost the Efficiency and Societal Impact of Knowledge Exchange and Collaboration (KEC) Activities.

The universities' strategic plans may include the following possible components:

- 1.2 Establish or enhance the structures dedicated to KEC activities (traditionally known as the 'technology transfer office'). These structures should be staffed with professionals possessing appropriate expertise, including technological and socio/cultural skills. As part of their role, KEC professionals should be able to identify collaboration opportunities, communicate the different ways in which universities can engage with societal partners, and collaborate with diverse stakeholders.

- 1.3 Develop a digital dashboard for monitoring KEC activities in each university, classified by project and partner. The dashboard should feature a range of datasets and indicators to evaluate the impact of KEC activities.

- 1.4 Integrate students' placement initiatives within the university's KEC strategy, to strengthen the connection between the university and its ecosystem, based on insights into its specialisation(s) and skills needs.

- 1.5 Improve, in coherence with the ongoing reform concerning degree classes, Ministerial decrees n. 1648 and n. 1649, adopted in 2023, the flexibility in the architecture of undergraduate and graduate courses, to encourage interdisciplinary learning and teaching. This approach will better tailor student curricula to meet contemporary and future skill demands.

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2. Establish effective mechanisms to encourage collaboration between universities and other actors

The project illustrated that several universities in Italy, especially smaller ones located in non-central ecosystems, may lack the resources, functions, and skills needed to sustainably perform KEC activities. Some universities, for instance, are unable to benefit from the substantial resources provided by the National Recovery and Resilience Plan (NRRP) due to a shortage of skills and administrative capacity.

It is crucial to note that, owing to the intricacy of bureaucratic processes, the diverse and sometimes ad-hoc collaboration opportunities with public or private entities, a high level of skills is essential to support and facilitate KEC activities. Consequently, smaller universities may find it challenging to retain advanced skills and functions that are not regularly utilised.

In this context, there is an opportunity to systematise collaboration mechanisms to better leverage the diverse specializations of universities and optimize their services. Collaboration among universities could be facilitated within administrative regions. While the project identified several Italian regions promoting collaboration among universities within their jurisdiction, it is important to strike a balance to ensure that systematic collaboration does not compromise the autonomy of the involved institutions.

Additionally, the rapid pace of collaboration opportunities may necessitate the establishment of a centralised intelligence entity to support universities in designing and implementing their collaboration strategy. This entity could organize and collect best practices identified by ANVUR's evaluation of third mission activities and generate evidence about emerging dynamics. The centralized intelligence service might create benchmarks and promote intra-university cooperation in KEC activities by connecting entities involved in similar processes or facing similar challenges.

Furthermore, with the growing importance of Open Innovation and Open Science, universities are urged to take a more proactive role within innovation ecosystems and be transparent about their research activities. Sharing knowledge with external partners becomes a high priority for universities. However, as open innovation and open science prompt a paradigm shift, considerations about data and intellectual property (IP) protection must be carefully addressed. Striking a balance between different forces is essential to generate a sustainable innovation ecosystem where all actors have incentives to stay connected and collaborate.

An additional aspect to enhancing collaborative efficacy, finding a balance between collaboration and data/IP protection, involves engaging innovation intermediaries. These entities, often possessing specialised expertise in navigating innovation ecosystems, play a pivotal role in connecting universities with external partners. By facilitating connections, offering guidance on funding opportunities, and providing insights on market needs, innovation intermediaries streamline the collaborative process. This intermediary role is especially critical in translating academic research into tangible innovations with real-world applications, establishing a seamless pathway for knowledge exchange and technology transfer.

Box .3 presents policy recommendations to facilitate collaboration between universities and external actors.

Box .3. Suggested Recommendations to Establish effective mechanisms to encourage collaboration between universities and other actors

In a view to improve the governance of innovation policies and their societal impact, while taking into account their different institutional levels and the need to encourage collaboration between universities and other social actors, the suggestion is to:

- 2.1 Incentivise "federative activities" among universities, to increase the efficiency and effectiveness of KEC activities at the regional and/or local level. Universities located in close proximity hold specialisations and skills within different domains including in the realm of patents, procurement and technology transfer, which could be shared among different universities to optimise collaboration opportunities with outside partners.
- 2.2 Establish a central working group/helpdesk, at the level of the Ministry of University and Research (MUR), to specifically assist universities and their partners in generating collaboration strategies and meeting the demand of KEC activities stemming from the different territories;
- 2.3 Insert the principle 'As open as possible – as closed as necessary', within collaboration frameworks, to make it more explicit and operational, by specifying when and why closure is necessary. This principle represents a policy priority for the European Commission and the standard rule under its research and innovation funding programmes as it improves the quality, efficiency and responsiveness of research;

3. Equip universities with adequate human and financial resources to facilitate collaboration activities with external partners

Ensuring that universities are well-equipped with both human and financial resources is crucial for facilitating effective collaborations with external partners.

Human resources, including skilled personnel and specialised expertise, are the backbone of successful partnerships. Establishing specialised teams or units dedicated to collaboration, innovation, and partnership development is essential. These teams should consist of individuals capable of manging the complexities of external engagements, skilled in relationship-building, partnerships negotiation, and in communicating the university's strengths to potential collaborators.

Equally important are financial resources, which provide the necessary infrastructure and support for the collaborative partnerships. Allocating budgets for research and development, joint projects, and outreach activities enables universities to establish and sustain meaningful partnerships. Currently, many academics, being primarily evaluated on teaching and research, are often sidelining KEC. Adequate funding would also allow for investments in state-of-the-art technology, research facilities, and other resources enriching the collaborative experience for all involved parties.

In Italy, to effectively accomplish its mission to guide and coordinate the higher education and research system, MUR allocates annual funding to state-owned universities, primarily through the Ordinary Financing Fund (*Fondo di Fianziamento Ordinario* – FFO).

This allocation is based on several criteria, including, e.g., the standard cost per student, as well as a premium share (*quota premiale*) linked to teaching and research performance. Consequently, Italy's funding model for state-owned universities is the result of 'activity cost based funding' and 'performance-based funding.'This hybrid system merges two competive results-oriented approaches. Additionally, it is important to note that, within this framework, only 5% of the performance-related funding, which itself constitutes 30% of the total funding, is allocated to knowledge exchange and collaboration activities. Italy's percentage of 1.5% (5% of 30%) appears low and shows a potential improvement.

Italian Ministerial authorities may take the opportunity to reassess the funding mechanisms for higher education institutions, emphasizing knowledge exchange and collaboration (KEC) activities more significantly. Such a recalibration would incentivise universities to proactively pursue and develop stronger partnerships. **Error! Reference source not found.** proposes a set of policy recommendations that can support the human and financial resources of universities to facilitate KEC.

Box 4 Increase the funding available for Knowledge Exchange and Collaboration (KEC) Activities

The Ministry should consider the possibility of increasing the financial reward for KEC activities. The increase in the performance-based fund, allocated on the basis of the strategic plans, will allow the universities, inter alia, to

- 3.1 Boost financial support for KEC activities;
- 3.2 Implement a mechanism to transition fixed-term employees in KEC roles (e.g., those hired through NRRP funds) to permanent positions, thereby stabilising their careers;
- 3.3 Encourage collaborative 'federation-style' initiatives among universities, to improve the efficiency and effectiveness of KEC activities at regional and/or local levels; universities located in proximity, each with its specific competencies could share resources to minimise costs and maximise collaboration opportunities with external entities;
- 3.4 Introduce an annual award for exemplary KEC activities, with the prize being shared equally between the university (or universities) and their respective partners, in recognition of their collaborative achievements;
- 3.5 Promote citizen science activities through Universities via competitive means.

Possible reforms to implement by the MUR in cooperation with other Ministries

Furthermore, there are some actions/reform options that do not fall solely under the jurisdiction of the MUR, but would require action from other Ministries, such as the Ministry of Economy and Finance and the Ministry of Enterprises and Made in Italy. These possible reforms include:

- establish – at regional or supra-regional level – mechanisms aimed at promoting inter-university agreements to carry out KEC activities together.
- introduce (jointly with ANVUR and other relevant governmental agencies and institutions) a mechanism of evaluation of the various forms of 'innovation intermediaries' (notably the ones financed by the NRRP), aimed at evaluating their impact and selecting those worthy of consistent funding. The mechanism would be based on a set of indicators of the societal impact of KEC activities, building on the previous experiences of universities and their partners;
- make data sharing and transparency compulsory for companies receiving public funds in the framework of KEC activities, imposing a more appropriate interpretation of data privacy rules;
- establish a coordination board among pertinent ministries and other public agencies involved in KEC activities at different institutional levels. This would entail reforming the rules governing collaboration between public institutions (e.g., between Regions and universities), favouring agreements aimed at carrying out societal collaboration activities together, which also provide for the possibility of sharing financial resources without the need for tenders;
- facilitate access to finance for SMEs and NGOs to stimulate their demand for innovation, reducing the costs of R&D activities and supporting the recruitment of qualified personnel.

Action plan to enhance KEC in Italy

The following section proposes an action plan for the implementation of the reform proposals presented in the previous section. The main objective of the action plan is to provide a long-term framework for universities to conduct KEC activities with their external partners. Reform proposals have been ranked based on ease of implementation and degree of challenges, considering obstacles such as financial investment, timing and urgency (see table below). This classification illustrates the pertaining challenges that competent authorities may face in implementing each reform.

1. Support the organization and strategic management of universities		
Priority area and recommendations	**Ease of implementation/degree of challenge**	**Remarks**
1.1. Generate a set of guidelines for the development of a 'KEC strategic plan' for each university, making it a mandatory fulfilment for universities, and support it with dedicated financial resources allocated according to *an ex-ante* evaluation, an *in-itinere* monitoring, and an *ex-post* impact assessment. This set of guidelines should replace and/or complement the measures that currently govern the processes of self-assessment and accreditation (AVA), the three-year planning of universities' activities (PRO3), the research quality assessment (VQR), the recruitment plans etc.	Easy implementation/low challenge	Avoid adopting a "one-size-fits-all" approach, to let each university frame the strategic plan as they would like. Certain universities have already adopted a similar approach.
1.2 Establish/reinforce in each university the KEC office (commonly known as TTO), composed of professionals with adequate skills, including in the technological domain	Medium ease of implementation/medium challenge	Requires significant financial investment to each KEC and/or TTO office. Systematic challenge in finding adequate candidates to fill the position.
1.3 Create a (digital) dashboard for monitoring KEC activities in each university.	Easy implementation/low challenge	Well on track, some universities already have it in place.

1.4 Link the activities related to student placement with the university's KEC strategy, to foster a stronger connection between the university and its ecosystem, based on information about its specialisation(s) and skills needs	Easy implementation/low challenge	Can be done by placing a requirement through the KEC strategic plan.
1.5. Improve flexibility in the architecture of undergraduate and graduate courses	Easy implementation/low challenge	Can be completed at the university level, according to the structure of each university (i.e. different disciplines and departments etc.).

2. Establish effective mechanisms to encourage collaboration between universities and other actors

Priority area and recommendations	Ease of implementation/degree of challenge	Remarks
2.1. incentivise 'federative activities' among universities, to increase the efficiency and effectiveness of KEC activities on the regional and/or local level. Universities located in close proximity have different competencies including in the realm of patents, procurement and technology transfer, which could be shared among different universities to reduce costs and optimise collaboration opportunities with outside partners.	Medium ease of implementation/medium challenge	Must address/clarify the role of regions that should not overpass the autonomy of universities.
2.2. establish a central working group/ helpdesk, at the level of the Ministry of University and Research (MUR), to specifically assist universities and their partners for the demand of the KEC activities stemming from the different territories.	Easy implementation/low challenge	Easy to undertake – must address potential requirement of additional human and financial resources within the Ministry, also to maintain system updated overtime
2.3. insert the principle 'As open as possible – as closed as necessary', within collaboration frameworks, to make it more explicit and operational, by specifying when and why closure is necessary.	Medium ease of implementation/medium challenge	Must address ad-hoc cases for each project

3. Equip universities with adequate human and financial resources to facilitate collaboration activities with external partners

Priority area and recommendations	Ease of implementation/degree of challenge	Remarks
3.1. Consider the possibility to provide additional financial resources to KEC activities. For example, this could be done by creating an additional and specific budget line, or by increasing the performance-based reward for KEC activities within the Ordinary Financing Fund (*Fondo di finanziamento ordinario*, FFO).	Hard implementation/high challenge	Must address complexity of the performance-based funding of the FFO, and general funding mechanisms for state-owned universities (block-funding).
3.2. establish a mechanism that allows to convert fixed-term contracts of KEC personnel (e.g., those hired through the funds of the NRRP) into permanent positions, to generate sustainable linkages with their ecosystems.	Hard implementation/high challenge	Lack of clear mechanism in view of timing of funds received through the NRRP
3.3 Encourage collaborative 'federation-style' initiatives among universities, to improve the efficiency and effectiveness of KEC activities at regional and/or local levels, to share costs	Medium ease of implementation/medium challenge	Must address mechanisms to share resources
3.4. introduce an annual award for exemplary KEC activities, with an equally shared prize between universities	Easy implementation/low challenge	Easy to implement, must address coordination between different institutional actors and additional funding
3.5 Incentivise citizen science activities, through university, via competitive means.	Easy implementation/low challenge	Easy to implement, must address coordination between different institutional actors and additional funding

- 1.1 encourage collaborative 'federation-style' initiatives among universities, to improve the efficiency and effectiveness of KEC activities at regional and/or local levels; universities located in proximity, each with its specific competencies could share resources to minimise costs and maximise collaboration opportunities with external entities;
- 1.2 introduce an annual award for exemplary KEC activities, with the prize being shared equally between the university (or universities) and their respective partners, in recognition of their collaborative achievements; promote citizen science activities through Universities via competitive means.
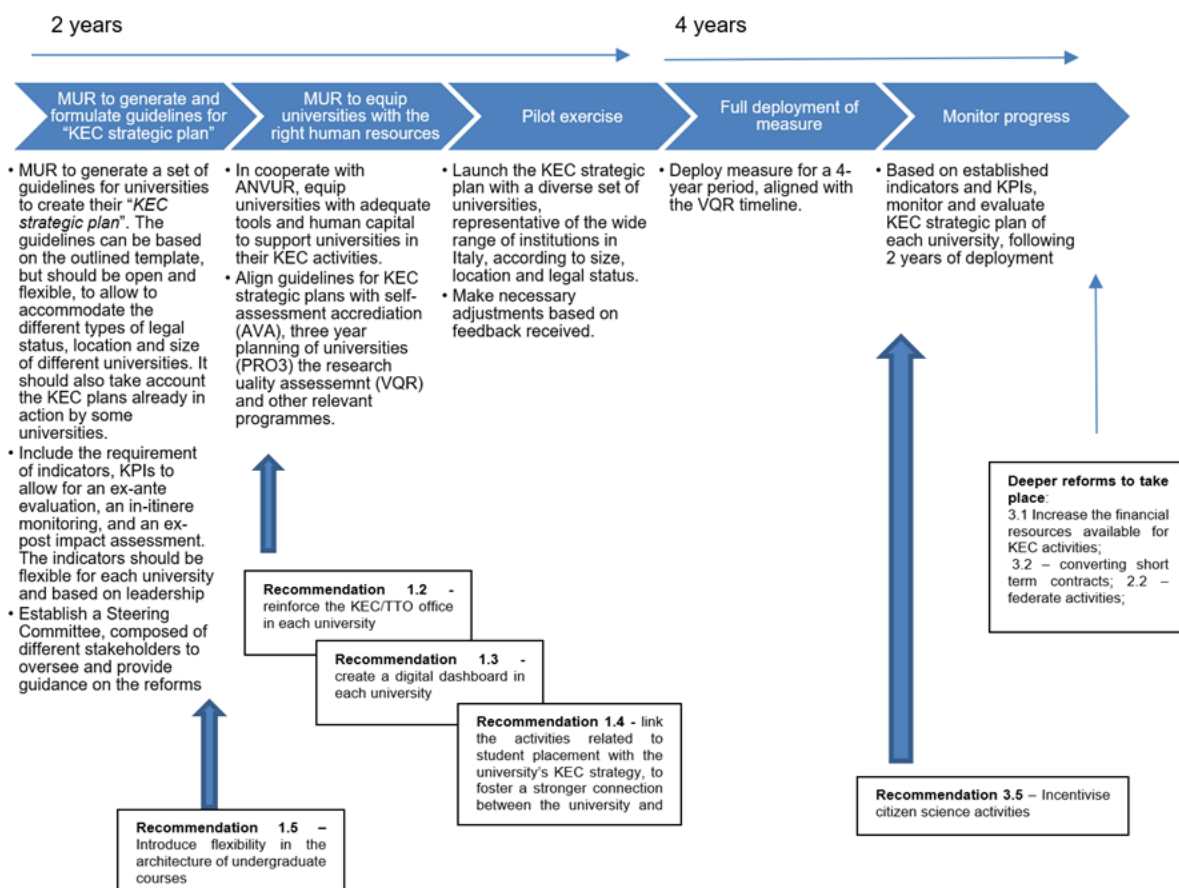
Roadmap

This last section of the paper aims to provide a step-by-step roadmap of the implementation of the reforms proposed (listed above). The aim of the reforms is to help strengthen the commitment of the university system to improve the effectiveness of policy responses to address social, economic, and territorial inequalities. The list of recommendations presented above are not mutually exclusive but closely intertwined. To this end, we propose the roadmap for a main reform that can be implemented by Italian authorities, that is, recommendation 1.1. In its implementation, other reforms can come into play.

Timeline

Recommendation 1.1:

"*Generate a set of guidelines for the development of a 'KEC strategic plan', making it a mandatory fulfilment for universities*" deals with the organisation of the university as an institution. It aims to formally place KEC at the core of the institutions' activities. The timeline of its implementation can be aligned to the cycle of Evaluation of Research Quality (VQR), while the pilot exercise can be run on an ad-hoc basis.

Figure 7. Roadmap

Source: Author's elaboration

Actors involved

Within the implementation of the roadmap, various institutional and societal actors can be involved. On the institutional side, ANVUR, the national agency for the evaluation of research is a key actor in this process. The timeline of the VQR exercise, managed by ANVUR, can prove to be an essential tool to integrate the reforms into the policy cycle.

Other societal actors can also prove to be pivotal in this process. Notably, university networks have been crucial in creating instances for inter-universities collaboration and have studied the higher education system and the role of universities in Italy for a long period of time. These networks are the following: NETVAL; APEnet; RUS and CRUI. They play different functions but each of them ensure that knowledge exchange and collaboration activities cover the full range of possibilities discussed in the reform options.

Governance proposals

The Ministry of University and Research would play a pivotal role in implementing reform options, finding an equilibrium among dimensions such as the autonomy of universities, the availability of resources, the diversity of collaboration activities and the participation of other Ministries, public authorities, and representatives from the private sector. Besides mobilising the coordination and consulting entities that are already in place in the country, the Ministry could pilot innovative governance solutions in collaboration with a pool of universities, subnational authorities and other external stakeholders. This pilot exercise should be carefully monitored and evaluated to discuss the possibility to scale-up the approach.

For instance, a group of universities could pilot the KEC strategic plan for internal organisation reform. This would need to be accompanied for collaboration activities with external partners, support from leadership figures, mobilisation of resources and capacities of universities to establish cooperation mechanisms, and experiments with new skills and professional figures. Each university would need to adjust to different needs and opportunities of their own ecosystem.

Possible indicators for the roadmap

The formulation and monitoring of key performance indicators (KPIs) is an essential component of roadmaps throughout the policy cycle. Italy is an international good practice in monitoring and evaluating the impact of universities. ANVUR has not only confirmed but improved frameworks and instruments to evaluate collaboration activities ("third mission" activities).

To monitor the implementation of the roadmap proposed, possible indicators can be based on the three identified priority areas for reforms: i) support the organisation and strategic management of universities; ii) establish effective mechanisms to encourage collaboration between universities and other actors; and iii) equip universities with adequate human and financial resources to facilitate collaboration activities with external partners. While these indicators can help measure to effectiveness of the proposed roadmap, they can be modified.

1. Support the organisation and strategic management of universities

- Number of universities producing a Knowledge Exchange and Collaboration (KEC) strategic plan.

- Number of universities with a KEC office.

- Number of faculty and staff actively engaged in KEC activities within each university.

- Number of universities appointing a dedicated pro/vice-rector/delegate specifically for collaboration activities.

- Number of trained and certified KEC managers in each university.

2. <u>Establish effective mechanisms to encourage collaboration between universities and with other actors</u>

- Percentage increase in collaborative projects established between universities located in the same administrative regions.

- Number of requests received and addressed by a dedicated Ministerial working group or helpdesk, indicating the level of demand for collaboration support services.

- Ratio of collaboration projects involving data protection guidelines compared with all collaboration projects.

- Ratio of new innovation intermediaries involved in KEC activities compared to established intermediaries in each administrative region.

3. <u>Equip universities with adequate human and financial resources to facilitate collaboration activities with external partners</u>

- Inclusion of collaboration-related metrics in faculty and staff performance evaluations.

- Ratio of collaborative initiatives led by early-career researchers compared to established faculty.

- Number of professional skills development opportunities related to KEC.

- Increase in budget allocated for KEC activities, at the central level.

Estimations of costs and concrete proposals for financing sources

As described above, Italy's funding model for state-owned universities is the result of 'block funding' and 'performance-based funding.' This hybrid system merges the traditional consistency of block funding with the competitive, results-oriented approach of performance-based funding. For this reason, the roadmap aims to increase the funding for KEC activities. Due to the experimental nature of the implementation of the reforms, the exact costs of the reforms proposed will be contingent on the scale of implementation provided by the Ministry.

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[28]

Notes

1 'Inner areas' are defined by the National Strategy for "Inner Areas" (SNAI), published in 2013 by the Italian Agency for Social Cohesion, as far away from main centres of supply of essential services.

2 We use here this term as designing the components of the 'quadruple helix': the university, the businesses, the public administrations, the community.

3 This evolving trend of universities' KEC definition confirms the literature. (Carayannis, Barth and Campbell, 2012[26]) (OECD, 2019[27]; UKRI, 2021[28]).

4 Call for Knowledge Transfer Managers: https://www.concorsipubblici.com/sites/default/files/allegati-concorso/ddg_497_21_bando_d_knowledge-transfer-manager.pdf

7 Open innovation is a paradigm that suggests firms should not rely solely on their internal research and development activities to advance their technology but should also utilize external ideas, resources, and paths to market. It involves collaborating with external partners, such as customers, suppliers, and research institutions, to co-create value and drive innovation. Another concept is that of Open science which refers to the movement to make scientific research, data, and dissemination accessible to everyone, allowing for greater transparency, collaboration, and participation in the scientific process. Open science involves sharing research outputs, data, and methodologies openly with the public and the global research community.

Annex A. The methodology of the ITA.CON project

The ITA.CON project was designed to gather information about challenges and opportunities for knowledge exchange and collaboration (KEC) activities from all state-owned universities in Italy and their partners, and to compile a list of policy proposals aimed at enhancing universities' potential to create

societal and economic value. These reforms are intended to guide Italian policymakers to unleash the potential of effective collaboration between universities and their stakeholders.

ITA.CON was implemented during the 2021-2023 period, through two main phases. The first phase served to take stock of existing and collect new qualitative and quantitative data from state-owned universities on their knowledge exchange and collaboration (KEC) practices. The second phase consisted of analysing the data collected and formulating actionable policy results. Throughout the duration of the project, we interacted with a total of 59 out of the existent 67 state-owned universities in Italy.

First phase of the project: taking stock of KEC activities, their opportunities and challenges

The first phase consisted of five main outputs/activities:

1. "KEC survey" directed to Italian universities, to understand: i) their vision of the universities' social impact in general, and of the role they specifically envisage/desire to play in their territory; ii) their perceived unmet needs in terms of skills and/or resources to achieve the expected results; iii) their perception regarding the usefulness of a new professional profile (the 'KEC professional') embedded within their organization as a structural and essential pillar; iv) their need to develop/revise their strategic plans according to the impending transition challenges.

2. "Desk-based analytical review", presenting all existing data on KEC in Italy (e.g. those collected by the National Agency for the Evaluation of the University and Research, ANVUR, and by the university networks, such as the Network for the Valorization of Research (NETVAL).

3. "Site visits" (conducted remotely) to state-ruled Italian Universities, and their selected external partners (notably representatives from firms, public administrations and/or civil society organisations) to openly discuss about their innovation ecosystem and the results of the survey, and how they plan to put in practice what they propose to do, taking into consideration the background of the staff currently involved in KEC activities, the expected results and the specific needs and suggestions to improve KEC performances and impact on the local and national context.

4. "KEC summary paper", which discusses preliminary results of the questionnaire-based interviews conducted with state-owned universities and their external partners. Based on the analysis, the paper draws a taxonomy of the KEC activities undertaken by Italian universities, including two variables of interest: i) location of universities, distinguishing between inner or metropolitan areas; ii) dimension of university, according to number of full-time students enrolled.

5. "International webinar", with selected international experts and case study examples of co-creation activities between universities and external partners stemming across other OECD countries, which can help Italy identify best practices.

6. "KEC report", which aimed to regroup the obstacles to a smooth running of KEC activities, identified in the first phase of the project, into four overarching themes that can start drawing the path to possible policy solutions. These themes include: i) governance of societal innovation policies; ii) characteristics of territories and universities (ecosystem); iii) training/education and human resources; iv) incentives and financial resources.

The information and data collected through the KEC survey and through online interviews, was systematically coded through Atlas.ti. The codification exercise generated a dataset (hereinafter, the "ITA.CON dataset") of 142 binary variables (dummy variables). The dataset includes a sample of 23 small universities, 22 medium-sized universities, and 11 large universities; 24 universities located near "inner" areas, and 32 universities located near urban centres; and 19 universities in the north, 18 in the centre, and 19 in the south and islands. In addition, out of the full sample, 48 are generalist universities, 2 are

polytechnics, and 6 are university institutes of special order ("*Istituti di istruzione universitaria a ordinamento speciale*"). Gathering data from questionnaires and interviews, we could enumerate a total of 337 KEC activities conducted by 56 universities. While we recognise that this number does not represent the totality of KEC activities run by each university, it can be useful to give a snapshot of their range.

Second phase of the project: drawing the path to actionable policy solutions

The second phase of the ITA.CON project focused on the verification and analysis of results gathered and the formulation of feasible policy reforms. The activities of the second phase of the project consisted of three stakeholder workshops, held from May to September 2023. The three workshops were organised in the three macro-regions of the country – North, Centre and South – and hosted by a regional university:

1. The first workshop was held at the Scuola Sant'Anna, in Pisa, Tuscany, on 24 May 2023, with around 25 participants from the central regions of Italy;
2. The second was held at the University of Naples Federico II, in Naples, Campania, on 12 September 2023, with around 70 participants from the southern regions of Italy;
3. The third was held at the Polytechnic of Milan, Lombardy, on 21 September 2023, with around 40 participants from the northern regions of Italy.

The workshops aimed at verifying information and practices of universities' KEC activities gathered in the first phase of the project, through questionnaires and interviews with all 67 Italian state-owned universities. The workshops provided a neutral environment to discuss the collaboration agenda of universities, taking into account the current state-of-play of the national higher education system as well as the heterogeneity of Italian regions.

The results of the workshops served to support Italian policy-makers in consulting a wide range of relevant actors and to choose actionable policy reforms to enhance KEC activities in Italy.

The location of the three workshops were chosen based on two main factors: accessibility and mobilisation of stakeholders, and the type of hosting institution. By holding the workshops in the north, centre and south of Italy, the project was able to gather the opinions of a wide variety of university representatives and stakeholders, operating in different regions and local contexts. In addition, the workshops were hosted by different types of universities, reflecting the typologies of institutions present in Italy, such as: university school with special order (Pisa – Centre); generalist (Naples - south); and polytechnic (Milan – north).

The workshops brought together representatives of the universities and their external partners. The university representatives were nominated by each Rector. Participants varied from delegates and/or vice-rectors of third mission activities to administrative staff, working on their institutions' third mission offices. External stakeholders were composed of a variety of representatives, operating on the national and local level. This includes private firms, civil society organisations, national research institutes, and confederations of firms.

The discussions at each workshop [template agenda in Annex B] were organized into two main sessions: the first aimed to verify the challenges for collaboration between universities and external stakeholders; the second aimed at identifying the root causes of these challenges and formulating preliminary policy reforms.

Participants were divided into four tables, each discussing a priority area for KEC activities, as identified in the first phase of the project:

1. Governance of social innovation policies. This refers to the elements that hinder, at the institutional level (universities, local governments, central government), the smooth-functioning of KEC processes/activities.

2. Characteristics of territories and universities. This refers to the elements that hinder the connection/encounter between the university and the realities of the territory.

3. Training and human resources. This refers to the expertise available to the university to cope with KEC projects with external entities.

4. Incentives and financial resources. This refers to the incentives for faculty and researchers and "dedicated" financial resources (at central, local, and university levels).

The first two workshops, in Pisa and Naples, helped to define a first list of preliminary recommendations. Because of the satisfying results of the two meetings in terms of information and recommendations received from participants, the last workshop in Milan, served also to verify the preliminary list and define which recommendations to prioritise and how to organize their implementation.

Annex B. The KEC Survey and interview questions (in Italian)

KEC Survey

1. Che definizione di "impatto socio-economico" (IS) utilizza l'istituzione?

2. L'IS è (o sarà) inserito nella missione dell'istituzione (Statuto, Piano strategico, altro documento…)? (se è già inserito, si prega di allegare i documenti o i link ad essi)

3. C'è un programma di attività per sviluppare l'IS dell'istituzione? Si prega di allegare il programma (o il link)

4. Esistono obiettivi strategici dell'università che fanno riferimento allo sviluppo della città/della regione/del paese? Se sì, citare gli obiettivi per ciascun livello e le azioni messe in atto dall'ateneo per raggiungerli (1. Locale, 2. Regionale, 3. Nazionale). Specificare anche se vi siano obiettivi di sviluppo di portata internazionale.

5. In particolare, quale ruolo/quali attività ha svolto l'istituzione durante l'emergenza COVID-19 (da marzo 2020 in poi)? In che modo queste attività hanno influito sulla definizione di IS e sulla strategia dell'Istituzione?

6. Quali delegati o referenti e/o quali aree sono coinvolti nella realizzazione del programma e/o per la condivisione periodica di obiettivi e risultati?

7. Nel budget dell'Istituzione sono previsti stanziamenti specificamente dedicati ai progetti di IS? Che percentuale del budget rappresentano?

8. Esiste staff (personale docente e/o tecnico-amministrativo) specificamente dedicato (in full o part-time) ai progetti di IS

9. Nei progetti di IS, sono stati impiegati indicatori di attività/processo e/o di risultato? Se sì con quale frequenza vengono misurati? Se possibile, si prega di compilare la tabella qui sotto con un

massimo 5 indicatori. Se esiste nell'Ateneo un 'cruscotto' esteso, si prega di allegarlo, oppure di fornire il link

10. Quali sono stati i risultati raggiunti dall'Ateneo in termini di IS? (si prega di riferire i risultati agli indicatori di cui alla risposta 13).

11. Gli obiettivi (e i budget allocati alle relative attività) vengono periodicamente rimodulati e aggiornati sulla base dei risultati ottenuti?

12. Quali sono le relazioni con i partner esterni (piccole-medie imprese, pubbliche amministrazioni) nel territorio dell'ateneo?

13. Alcune missioni del PNRR prevedono in maniera esplicita che le Università esercitino un ruolo nella ripresa e nella resilienza del Paese

14. Qual è l'approccio che l'ateneo sta seguendo per garantire che i fondi del PNRR assicurino impati immediati e di medio/lungo termine?

15. Come sta cambiando l'ateneo, soprattutto dal punto di vista organizzativo e della gestione dei progetti di ricerca e dei rapporti con i partner esterni (le imprese, amministrazioni pubbliche e società civile)?

16. Quali sono stati gli elementi facilitanti riscontrati per la messa in opera delle attività di IS? (indicarne al massimo 5 ed ordinarli in scala di priorità, dal più al meno importante)

Interni all'Ateneo

Esterni all'Ateneo

17. Quali sono stati gli elementi di ostacolo riscontrati per la messa in opera delle attività di IS? (indicarne al massimo 5 ed ordinarli in scala di priorità, dal più al meno importante)

Interni all'Ateneo

Esterni all'Ateneo

18. Ci sono elementi di carattere normativo (norme primarie o secondarie o anche soft law) che andrebbero eliminate/corrette/aggiunte per superare gli ostacoli individuati?

19. Ritenete che l'università (intesa come istituzione) possa far fronte autonomamente (cioè con il proprio personale e le proprie competenze) alle attività di IS?

Se sì, le attività di IS dovrebbero essere svolte:

a) esclusivamente da personale impiegato anche in altri compiti

b) anche da personale dedicato a tempo pieno (es. Knowledge Exchange Officer)

24. Se la risposta è b), quali caratteristiche (profilo) dovrebbe avere questo personale?

25. Se la risposta alla domanda 22 è stata no, quali potrebbero essere le alternative?

The interview questions

Attività	Descrizione
Presentazioni partecipanti	• Referente dell'ateneo presenta i partecipanti; • Presentazione OCSE/MUR.
Introduzione del progetto ITA.CON	Gli obiettivi del progetto ITA.CON sono tre: **Primo**, comprendere l'interpretazione che le università danno delle attività di *Knowledge Exchange and Collaboration* (KEC) in maniera da giungere ad una definizione il più possibile

	utile, inclusiva e condivisa di queste attività e verificare il ruolo attribuito dalle università all'impatto sociale delle attività di KEC;
	Secondo, identificare i fattori che favoriscono/ostacolano lo svolgersi delle attività di KEC e ne amplificano/riducono l'impatto;
	Terzo, proporre alle autorità responsabili misure (nella forma di incentivi, linee-guida, atti d'indirizzo, atti normativi veri e propri) da adottare per facilitare le attività di KEC da parte delle università, e ottimizzarne l'efficacia.
	Lo strumento principale per raggiungere, in maniera diretta, i primi due obiettivi, e, in maniera indiretta, il terzo è un survey, condotto sulla base di un questionario e di un'intervista a ciascuna delle 67 università statali, distribuite sul territorio nazionale.
	Il questionario è inviato alle Università che lo restituiscono riempito dopo 14 giorni. Le risposte vengono vagliate dal team del progetto che le utilizza per condurre le interviste. Alle università intervistate viene domandato di coinvolgere anche stakeholder esterni all'accademia, che, a loro avviso, hanno qualcosa da dire sulle attività di KEC.
1 – Il questionario *Standard* *Per tutte le università*	• il questionario era sufficientemente chiaro? [SI/NO] • Ci sono state difficoltà particolari a rispondere a qualche domanda? [SI/NO] - Se SI, quali?
2 – Definizione KEC Basata sulle risposte del survey	**Se non ci sono problemi a capire dal questionario quale definizione l'Università fornisce delle attività di KEC, si passa oltre, altrimenti si chiede:** • **Come definireste le attività di Knowledge Exchange and Collaboration with the Society?** **Domanda per gli stakeholders presenti:** • Siete d'accordo con questa definizione? (data dall'Università nel questionario o nell'intervista)
3 – Ruolo dell'impatto sociale per l'Università Basata sulle risposte del survey	**Se** non ci sono problemi a capire dal questionario il ruolo che l'Università attribuisce all'impatto sociale delle attività di KEC, si passa oltre, altrimenti si chiede **ai rappresentanti dell'Università**: • *Se già inserito:* Come si è sviluppata la sensibilità verso l'IS e come è stata formulata nella missione, e perché è stata inserita in [questo documento]? *SEE BOX TO THE RIGHT* • Nel definire il piano annuale o pluriennale delle attività di KEC dell'Ateneo, si tiene conto anche del loro impatto sociale? [SI/NO] SI
4 – Il ruolo e i cambiamenti del PNRR Basata sulle risposte del survey	**Se NON** è già stato specificato/non è chiaro: - l'approccio che l'ateneo sta seguendo per garantire i risultati dei fondi PNRR; (Verificare su investimenti in risorse umane e strumentali) OPPURE - i cambiamenti organizzativi e della gestione dei progetti di ricerca con partner esterni? Sennò si chiede: • Qual è l'approccio che l'ateneo sta seguendo per garantire che i fondi del PNRR assicurino impatti immediati e di medio/lungo termine? • - Come sta cambiando l'ateneo, soprattutto dal punto di vista organizzativo e della gestione dei progetti di ricerca e dei rapporti con i partner esterni (le imprese e gli stakeholder)? Questa domanda si può anche rivolge agli stakeholder esterni presenti

5 – Elementi ostacolanti/facilitanti per KEC e impatto sociale Basata sulle risposte del survey	Se **NON** sono stati già elencati nel questionario i fattori che favoriscono/ostacolano lo svolgersi delle attività di KEC e ne amplificano/riducono l'impatto sociale si chiede **ai rappresentanti dell'Università**: • Quali sono i fattori che, a vostro avviso, favoriscono/ostacolano lo svolgersi delle attività di KEC e ne amplificano/riducono l'impatto? **Questa domanda si rivolge in ogni caso agli stakeholder esterni presenti** **INOLTRE, se** tra i partecipanti all'intervista vi sono rappresentanti di organizzazioni o di amministrazioni locali o regionali, si chiede: • Qual è la natura della collaborazione tra voi e l'ateneo? Come e da chi è stata iniziata?
6 – Misure normative	Se **NON** sono state già elencate nel questionario le misure (nella forma di incentivi, linee-guida, atti d'indirizzo, atti normativi veri e propri o altro) che potrebbero facilitare le attività di KEC e ottimizzarne l'efficacia e l'efficienza si chiede **ai rappresentanti dell'Università**: • Quali potrebbero essere, a vostro avviso, le misure, (nella forma di incentivi, linee-guida, atti d'indirizzo, atti normativi veri e propri o altro) che potrebbero facilitare le attività di KEC e ottimizzarne l'efficacia e l'efficienza, anche in termini d'impatto sociale? **Questa domanda si rivolge in ogni caso agli stakeholder esterni presenti**
7. AOB	• Ci sono ulteriori elementi significativi, legati alle attività di KEC ed al loro impatto sociale che non avete avuto modo di citare nel questionario o, fin qui, nell'intervista? • Ulteriori commenti/osservazioni/rilievi critici

Annex C. Agenda of ITA.CON Stakeholder Workshop (in Italian)

Tempo	Durata	Dettagli/descrizione della sessione
10:30 – 11:00	30 minuti	**Registrazione dei partecipanti**

11:00-11:20	20 m	**Intervento di apertura** ▪ Rettore/Rettrice ▪ Ministero dell'Universtià e delle Ricerca (MUR) ▪ Commissione Europea **Presentazione del progetto e analisi preliminare** **Il Segretariato dell'OCSE** : ▪ Breve introduzione per illustrare gli obiettivi del progetto; ▪ Descrizione della prima fase del progetto che ha identificato le 'sfide' proposte a ciascun tavolo di lavoro.
11:20-11:30	10 m	**Creazione dei "tavoli di lavoro" per le discussioni:** ▪ I partecipanti riceveranno istruzioni incluso istruzioni sul "tavolo di discussione" a cui partecipare. ▪ I 4 tavoli lavoreranno in parallelo e discuteranno ciascuno delle sfide/fattori di ostacolo legati a uno dei quattro diversi temi: 1. Assetti istituzionali per le politiche di innovazione sociale; 2. Caratteristiche dei territori e delle università (ecosistemi); 3. Formazione/istruzione e risorse umane; 4. Incentivi e risorse finanziarie.
1 1:30-12:30	60 min	**Tavolo di discussione sulle sfide/fattori di ostacolo :** ▪ Gli organizzatori forniranno informazioni di base e faciliteranno la discussione a ogni tavolo. ▪ Sulla base di un elenco di sfide/ostacoli identificati nelle fasi precedenti del progetto, i partecipanti discutono e verificano l'elenco degli ostacoli e aggiungono/rimuovo elementi, se necessario. ▪ I partecipanti identificano le determinanti ("cause profonde") delle sfide/ostacoli elencati e generano una gerarchia delle determinanti.
12:30-13:15	45 min	**Discussione plenaria 1:** ▪ I relatori presenteranno il risultati delle discussioni ai rispettivi tavoli. Seguirà una discussione generale per definire una gerarchia condivisa dei fattori di sfida/ostacolo e delle rispettive 'cause profonde'.
13:15-14:15	60 min	**PRANZO**
14:15-15:15	60 min	**Tavolo Esercizi (proposte di riforma)** ▪ Verranno ricostituite le 4 tavole (stessa composizione di prima) per discutere delle possibili riforme capaci di rimuovere le 'cause profonde' delle sfide/ostacoli precedentemente individuati e gerarchizzati. ▪ I partecipanti "mapperanno" le opzioni di riforma secondo tre dimensioni: importanza, priorità, e fattibilità.

15:15- 16:00	45 min	**Discussione plenaria 2:** ▪ I relatori presenteranno ai tavoli i risultati delle discussioni. ▪ Le proposte di riforma saranno discusse e valutate da tutti i partecipanti.
16:00- 16:15	15 minuti	**Osservazioni conclusive di MUR/OCSE/Commissione Europea** ▪ Conclusioni e messaggi principali del workshop e prossime fasi del progetto.

Annex D. The ITA.CON database

The dataset presents 56 observations (each observation represents one university) and presents a large amount of variables (x=142). It is formed only by categorical and dichotomous variables, except for the variable number of students, which is a discrete quantitative variable. The following section illustrates the results of the analysis for each variable of interest, on which the paper is based.

1. Summary statistics of variables

Descriptive Statistics of full sample

Variable	Number of universities	Share of universities (in percentage)
Universities total	56	100
Small universities	23	41.1
Medium universities	22	39.3
Large universities	11	19.6
Northern universities	19	26.8
Centre universities	18	39.3
Southern & Islands universities	19	33.9
Inner universities	24	42.8
Non-inner universities	32	57.1
KEC activities total	56	100
Socio-cultural	52	92.9
Technology Transfer	45	80.4
Academic Entrepreneurship	22	39.3
SDGs	17	30.4
Life-long learning & education	15	26.8
Other	6	10.7
Collaborations total	56	100
Collab enterprise	51	91.1
Collab other	8	41.1
Collab PA	42	7.5
Collab third sector	12	21.4

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