MUR/DG Reform Project 21IT42, ITA.CON: "Improving the system of Knowledge Exchange and Collaboration between universities and society in Italy"

Output 3 – Summary paper of KEC activities in regional ecosystems

The report has been developed in the framework of the project " Improving the system of Knowledge Exchange and Collaboration between universities and society in Italy," which was funded by the European Union via the Technical Support Instrument and in cooperation with the European Commission's DG Structural Reform Support.

Most Italian universities co-conduct a wide variety of knowledge exchange and collaboration (KEC) activities with their external partners. These activities vary through different streams, aims and partners. Nevertheless, universities that engage with KEC activities continue to face different kinds of barriers. For instance, lack of recognition, in terms of access to or progression in careers, is one of the main obstacles Likewise, bureaucratic barriers is another factor hindering KEC activities, especially from the perspective of universities' stakeholders, who ask for de-regulation to create bridges between academia and society.

This document, the "KEC Summary Paper", discusses preliminary results of the questionnaire-based interviews conducted with state-owned universities and their external partners [see questionnaire and interviewers guide in Annex B]. Based on the analysis, this paper draws a taxonomy of the KEC activities undertaken by Italian universities. The results show that, 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 and provide a sustainable impact on their own communities and networks.

The document is divided into three sections: an analytical discussion of the data collected from questionnaires and interviews; a literature review of prominent taxonomies of KEC activities; and a new proposed taxonomy of KEC activities in Italy. The KEC Summary Paper responds to Output 3 of the ITA.CON project.

Note: The data presented is based on information **from 56 universities**. As agreed with the Advisory Board, the data from remaining institutions will be incorporated once available.

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Part I. Analytical discussion of the data

Most Italian state-owned universities run knowledge exchange and collaboration (KEC) activities, which take shape in different ways. In recent years, universities have increasingly conducted collaboration activities that have an impact on society. Most universities are adopting various methods and approaches to connect with their surrounding 'ecosystems'[1]. 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 and able to provide a sustainable impact on their own communities and networks.

This document presents data collected through surveys and interviews to 56 Italian universities conducted between February and November 2022. In the interviews, the universities were represented by vice-rectors, or delegates of KEC (defined differently in each institution – see below), while external partners included senior representatives from small and large firms, public administrations, and non-governmental or civil society organisations.

Based on these interviews, it appears that KEC activities depend on a series of factors. These include: the dimension of universities, the type of university, and the location in different areas of the country (north-east; north-west; centre; south and islands and universities near "inner" or urban areas).

This document introduces for discussion prominent questions concerning the KEC activities, including how universities define KEC; if and how they are formalised in official documents (e.g. institutional statutes or strategic plans); which problems universities and their partners have identified as obstacles to their collaboration, and which reforms university representatives prioritise vis-à-vis the Italian higher education system.

The definition of knowledge exchange and collaboration (KEC) in Italian universities

The current state-of-play of KEC definition

There is a common understanding of KEC activities among the interviewed universities. Out of the 56 interviewed universities, 51 have already a definition of KEC, while 5 are currently defining it. Universities refer to KEC activities generally as "third mission", besides teaching and research, which are considered respectively the first and second missions of the university. However, it was possible to note a widespread disaffection with the label "third mission" during the interviews. Representatives from universities, in particular, widely criticised this definition, which is considered out-of-date and unable to grasp the broad impact generated by KEC activities, including on teaching and research. For this reason, for instance, institutions rely on other concepts, such as "technology transfer" and "public engagement", when defining KEC. Others have included objectives to reach, such as "social justice". This evolving trend of universities' KEC definition confirms the literature. Most institutions adopt the "third mission" terminology, yet different patterns are emerging as the role of the university evolves. For instance, the increasingly relevant model of the "civic" university, which presents the three missions of the university (teaching, research and social engagement) as interconnected elements of its role as an "anchor institution" – having its surrounding territory at the core of its activities – is gaining traction in the public debate, reflecting a revised model of the university's engagement (see Section III).

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

In general, there are also differences concerning the definition of "third mission". Overall, it is possible to split the sample of universities that use that definition into two groups: a smaller group using the definition provided by the National Agency for the Evaluation of the University and Research Systems (ANVUR), on which the 10 fields of actions for evaluation of third mission activities are based (Box .1), and a larger group that has created its own definition of third mission. The larger category, in turn, can be further split into different groups: the first outlines a general definition, which often refers to creating benefits for society and generating meaningful impact – also including concepts of "social justice", and SDGs; the second outlines a direct link to the territory (promoting regional development/innovation/well-being); the other groups refer to "technology transfer", "public engagement" and "other" (Figure 1).

Various institutions have formalised the definition of KEC/third mission within strategic documents. While most institutions have mentioned their KEC definition in their "strategic plan" (*piano strategico*), a handful of institutions mention it in their "charter" (*statuto*): some institutions have included the definition both in the *statuto* and in the *piano strategico*.

Figure 1. A representation of definitions used by universities in defining KEC
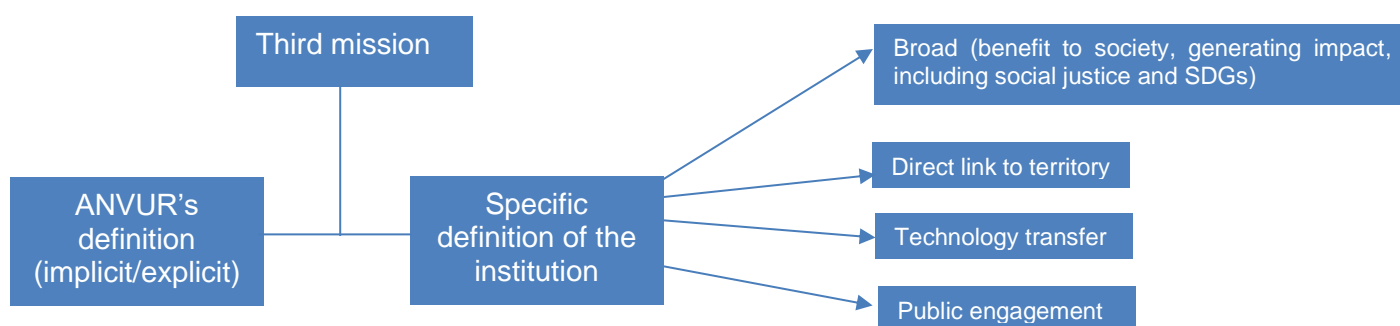
Source: Author's elaboration

The different definition of KEC used by Italian universities

ANVUR's definition (implicit/explicit)

Some institutions embraced ANVUR's definition of third mission, which is: "*The openness of the University towards the socio-economic context through the valorisation and transfer of knowledge. The third mission is a process of knowledge transfer, not only related to technology and encompassing social and cultural benefits (production of public goods).*" (ANVUR, n.d.[1]). Universities sometimes explicitly refer to ANVUR's definition, also by mentioning the documents issued over time by the Agency, such as the *Third Mission of Universities and Research Institutes Evaluation Manual*. In other cases, ANVUR's definition is recalled in its definitions but with no explicit mention.

Box .1. Ten fields of action in ANVUR's 2015-2019 VQR exercise

Intellectual and industrial property valorisation	Academic entrepreneurship	Technology transfer structures and other Third mission intermediaries	Production and management of artistic and cultural heritage
Clinical experimentations and health protection	Lifelong learning and open education	Public Engagement	Production of public goods and policy instruments for inclusion
	Innovative tools to support Open Science	Activities related to the UN 2030 Agenda for Sustainable Development Goals	

Source: https://www.anvur.it/wp-content/uploads/2020/09/Bando VQR 2015-19_25 settembre_2020-signed.pdf

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Specific definition of the institution

Broad definition

There are universities that use the "third mission" concept but adopt a general and broad definition. While using the label of "third mission", these universities omitted direct references to traditional concepts and cited the universities' contribution to society at large. For example, one university's definition cites "all the activities in which the University takes part with the society, supporting the traditional missions of teaching and research, contributing to guiding the cultural progress"[2]. Other universities introduce a specific reference also to emerging notions of social justice and more broadly to SDGs[3].

Direct link to territory

Interestingly, in almost half of the full sample (n=56), institutions cited explicitly their connection to their own territory. For instance, a university cited its direct mission to ensure "the growth of its surrounding territory".[4] Similarly, other institutions mentioned "the commitment of the university to transfer its knowledge and contribute to the development of its territory". These examples assume that universities can have a specific impact on their own socio-economic territorial context.

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[2] Quote derived from ITA.CON Questionnaires.

[3] Besides NETVAL other networks and associations have recently been established focusing on social and sustainability dimensions, such as Network of Universities and Research Institutions for Public Engagement (APEnet) and Network of Universities for Sustainable Development (RUS).

[4] Quote derived from ITA.CON Questionnaires.

Technology Transfer

Some of the institutions define their third mission in connection with technology transfer. These universities state, for example, that their third mission activities also involve the "…valorisation of research outputs".[5] In specialised universities, like polytechnics, technology transfer is defined and understood as a profitable and systematic area, where universities have a clear role to play. Within this context, third mission activities benefit from well-established technology transfer offices (TTOs), and by consolidated metrics for performance evaluation[6].

Public engagement

A minority of institutions define their third mission adding other dimensions. Some institutions elaborate a definition based on the concept of "public engagement". Universities refer to this concept as "…any activity of dissemination aimed at the non-scientific public".

Universities have identified clear obstacles for KEC

The interviews revealed that the problems associated with the KEC process are of concern for both the universities and their external stakeholders (businesses, public administrations, civil society). In particular, there are three barriers cited by both university representatives and external partners that stand out: the characteristics of the surrounding productive/industrial ecosystem, the lack of recognition and career incentives for KEC activities, and bureaucratic barriers (Figure 2).

Figure 2. Problems identified by universities and their partners, by three geographical areas

Percentage share

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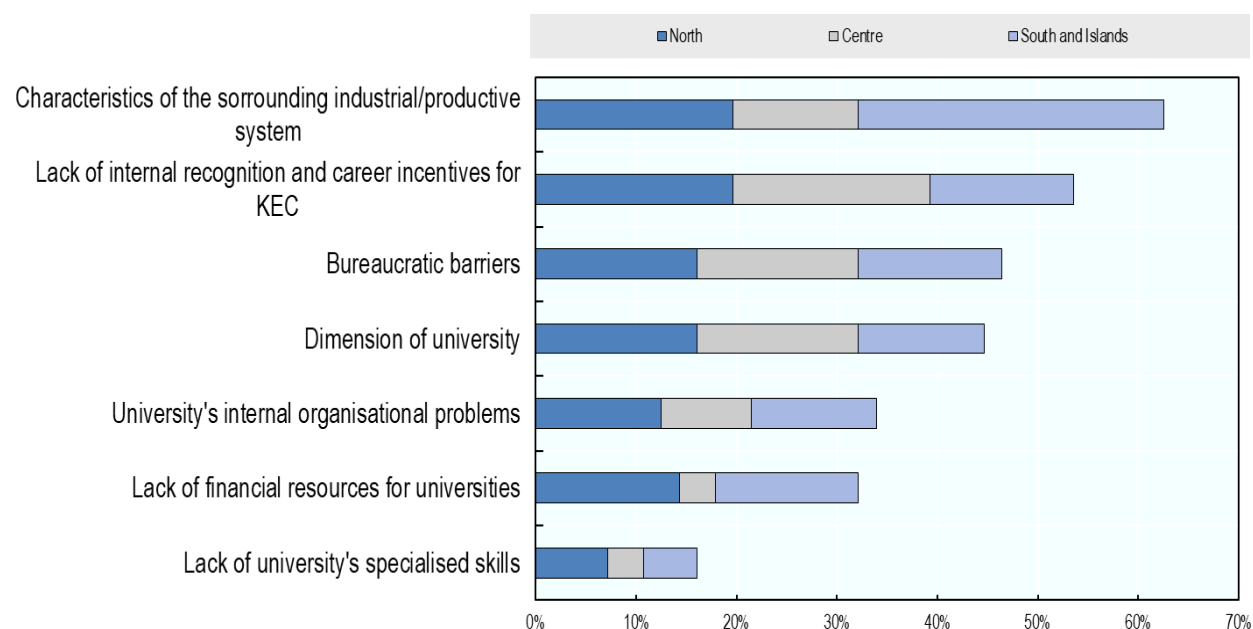
5 Quote derived from ITA.CON Questionnaires.

[6] Although indicators for TT vary based on national and regional contexts, there are commonly used metrics for the evaluation of technology transfer activities, on the European level. These "core" indicators can include: publications & presentations; teaching; networking & events; consultancy; professional development; collaborative and contract research; licensing; company creation (Campbell. et al., 2020[14]).

First, the characteristics of the surrounding industrial/productive system, often refers to the uneven distribution of relevant actors – such as firms - that surround the university. For instance, a university recalled the "weak structure of the productive system, resulting in a reduced presence of technological clusters". Similarly, during an interview, an external partner mentioned "the scarce vitality of the productive ecosystem around the university" as a challenge. Results show that barrier may be heightened for universities located in the south and islands of the peninsula.

Second, the lack of recognition of KEC activities, inside and outside the university stood out as an obstacle to KEC. While a university representative mentioned the "lack of priorities for KEC activities" within the university, a partner evoked the problem of "stalled cultural paradigm". There is a widespread understanding that KEC activities are currently lacking support and stimulus, also through dedicated funding streams. Nevertheless, the evaluation of such activities, especially through the external evaluation procedures run by ANVUR, has acted as a lever in recent years. Another barrier frequently cited is constituted by the lack of adequate incentives on an individual basis, e.g. for career advancement. As put by a university representative: "…there are no means to consider career progression in terms of third mission, hindering the opportunity to involve individuals and bring forward these activities".

Third, bureaucratic barriers were one of the most cited obstacles. This emerged in questionnaires as much as during the interviews: "We need more flexibility, as the university continues to be tied down by rigid regulatory structures, decreasing the incentive to collaborate with external partners", said a university representative. In fact, universities can often be considered as "local administrations". However, universities often do not have the same functions, scope, or structure as PA, and therefore struggle to function in this way. The majority of these "pressing" problems seem evenly distributed in the three geographical areas: north, centre, south and islands. However, barriers arising from the characteristics of the university's socio-economic territory were cited only by universities located in the south and on the islands.

Furthermore, many of the obstacles identified are intertwined. Lack of financial resources may coincide with the lack of career incentives for professors and researchers to run such activities. Similarly, the lack of recognition of KEC may create divergences between universities and their ecosystems. Against this background, reforms need to be multifaceted and consider the linkages between each problem identified, to implement multidimensional policy solutions.

There is symmetry between problems and proposed reforms for KEC

There is coherence between the problems identified by universities and their partners and the solutions that they suggest, as shown by the key words in the word cloud. For instance, "simplification" of norms, in terms of legislation and regulations, was identified as the most urgent reform intervention. This reflects the fact that "bureaucratic barriers" were mentioned as one of the main obstacles to a smooth running of KEC activities, with almost one half of the interviewees expressing this opinion. Answers in questionnaires read "the streamlining of administrative procedures", as well as "guarantee of modalities of acceleration for regulatory procedures".

More in general, some key words stand out, including: "recognition", "evaluation", "resources", "definition", "procedures" (see word cloud below). For instance, partners proposed that "…already existing initiatives could influence in a positive way the role of universities in KEC", highlighting the need to recognise KEC

activities. Concerning evaluation of activities, universities proposed the "…. realisation of ex post, on top of the already existing ex-ante, assessments of third mission projects". Furthermore, an institution put forth "a national plan of financial investment dedicated to third mission activities", recalling the need for dedicated financial resources for KEC activities.

Note: Key words from the answers collected to the question: "*Are there any normative elements (primary or secondary regulations or even soft law) that should be eliminated / corrected / added to overcome the obstacles identified?*", and from notes of the interviews, when the question was extended also to external stakeholders during the interviews.
Source: ITA.CON Survey and Interviews, 2022

Other secondary words drawn from the word cloud can also shed light upon other possible reforms, such as "skills", among others. University representatives referred to the possible reforms pertaining to finding specialised KEC skills within universities. In addition, several interviewees mentioned "professor privilege". This refers to when the university professors and public researchers retain the ownership of the inventions created in the context of their research activity, contrary to what happens for researchers employed in the private sector, where the ownership belongs to the employer and not to the worker. This has been strongly criticized because it could create difficulties in negotiating intellectual property rights[7]. As a possible reform option, one institution proposed that: "…while the creator is depositing the patent, they sign a legally-bound declaration in which they declare to be independent from the university"[8].

Intermediation: the need for a common view

One of the objectives of the ITA.CON project is to understand the perceived relevance and the characteristics of possible new professional profiles in charge of the management and valorisation of the universities' knowledge exchange and collaboration activities. In recent years, the Ministry of Economic Development (MISE) has supported the introduction in the universities of a new professional, referred to

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[7] In December 2022, the Council of Ministers of Italy approved the decree modifying the Industrial Property Code set forth in Legislative Decree No. 30 of February 10, 2005 (draft law) (Governo Italiano, 2022[15]). Put forth in the context of the NPRR, the new decree aims to bring the ownership of inventions made by research personnel to the university to which they belong, realigning the Italian discipline with that of other European countries. The impact of this decree can be analysed in the next phases of the project.

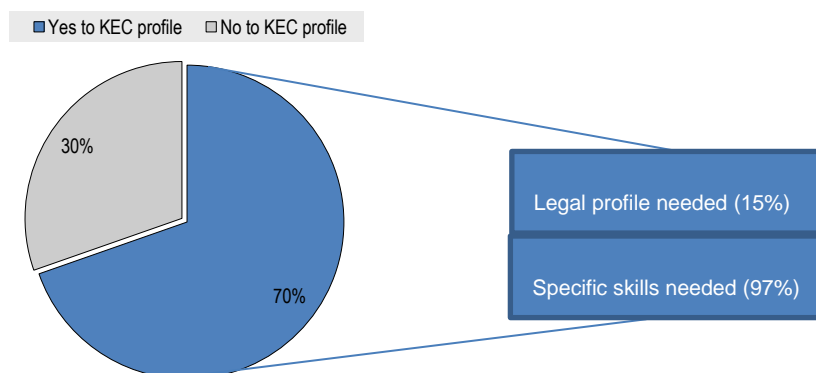[8] Quote derived from ITA.CON Questionnaires.

as the "Knowledge Transfer Manager", to support the Technology Transfer Offices (TTOs) in accomplishing their mission[9].

For the time being, out of the full sample, 39 universities, representing 70% of the sample, stated that the university, intended as an institution, can manage KEC activities independently. 17 universities, representing 30% of the sample, stated that the university, intended as an institution, cannot manage KEC activities independently. As an explanation for this, universities and partners stated that the responsibility for KEC activities and processes need to be shared among different actors in the ecosystem acting in synergy, rather than attributed to a single professional profile within the university. Through the questionnaire, a university representative stated that: "The concretisation of societal impact depends on the active engagement of external entities in the process of defining economic, social, and cultural problems that require university intervention"[10]. Such affirmations recall the challenge of the lack of recognition of KEC as well as the characteristics of the industrial/productive system in which the university is located, both stated as main obstacles in conducting KEC activities. When asked to provide an alternative to the KEC profile, universities proposed the involvement of professionals external to the university, with a different and "non-academic" vision of the outside context, than an internal staff of the university. A university also proposed to install a recurrent conference, through which firms, public administrations and universities can meet and discuss about priorities. During the next phases of the project, these alternatives can be further explored.

When stating that the university can manage KEC activities independently, all 39 universities expressed their support to the introduction of a KEC professional, stating that a full-time staff/profile, recognised within the institution, and purposely trained and dedicated to KEC activities could help facilitate interactions between the universities and their ecosystem. These university representatives also specified the type of profile necessary for this position. While only 15% of universities (6 institutions of the 39 which agreed to the profile) underlined the need for a legal profile, 97% of universities (38 institutions of the 39) mentioned the need for the individual to have specific skills. This includes project management (50%); doctoral-level degree or equivalent (23%); and proven knowledge on third mission activities (13%) (Figure .3).

Figure .3. Most Italian universities agree to creating a professional figure for KEC

The share of universities that, through the survey or interviewed, expressed their opinion on creating a KEC profile

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

[10] Quote derived from ITA.CON Questionnaires.

Note: The first graph (to the left) represents the percentage of universities that agreed (39/56) or disagreed (17/56) with the creation of a KEC profile. The ones who agreed to a KEC profile provided a positive answer to the survey question "Do you believe that the university (understood as an institution) can cope independently (i.e., with its own personnel and expertise) with IS activities?" and chose "option b) also by dedicated full-time staff (e.g., Knowledge Exchange Officer)" on the survey, or provided a positive answer to the question "Do you think that a KEC professional, that acts as an interface between university and its territory can be useful?" during the interviews. The ones who disagreed to a KEC profile provided a negative answer to both questions.

To the right of the pie chart, the boxes represent the subdivision of answers of universities to the question "If the answer is b), what characteristics (profile) should this staff have?" on the survey and during the interviews. Out 39 universities who are in favour of a KEC profile, 38/39 outlined specific skills for the profile, while 6 universities indicated a legal profile. For this section, universities can choose one or more answers.

Source: ITA.CON Survey and Interviews, 2022

Furthermore, interviews revealed that a dedicated office composed of multiple full-time personnel could be useful. One university, in particular, stated that "the role of a KEC professional could not be fulfilled by one single person". A dedicated office, with multiple specialised positions would be a better fit to deal with searching and receiving partnership requests from external stakeholders"[11]. Interestingly, as it stands, only a third of universities have a dedicated office to KEC (while a TTO is present in almost all state-owned universities).

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[11] Quote derived from ITA.CON Questionnaires.

Part II. Existing taxonomies of knowledge exchange and collaboration activities

On the international stage, there have been various attempts at creating a taxonomy of knowledge exchange and collaboration activities (KEC) over time. From the early 2000's, studies have put forth categorisations of the activities that universities are conducting with external partners. Table 1 regroups the examples, providing an overview of their different characteristics, such as the definitions used, the focus and the new features of each taxonomy. The objective is not to provide an exhaustive list, but to gather the main and most influential models and to observe evolutions and new trends. The table is followed by a discussion of how each taxonomy changed and incorporated different dimensions of KEC, mirroring the evolution of KEC activities. The section concludes by presenting a possible new taxonomy for Italy.

Literature review of KEC activities

Knowledge exchange and collaboration is a multifaceted topic, which has evolved over time following stimuli from science and society. The different models of KEC activities that exist reflect this feature. Early models refer to the third mission concept and trace back to an idea of (commercial) research valorisation that is not institutionalized and more often linked to the individual researcher, the lab, the team or the department of universities. They are nevertheless useful to capture the breadth of the concept. Recent models reach beyond the commercialisation of research, by integrating the social dimension through the inclusion of civil society. Table 1 illustrates a categorisation of KEC activities, over time.

Table 1. Different models of KEC activities

Title of taxonomy	Source/Author	Year	Definitions used	Categorisations	Focus and novelty presented
Radar model of the third mission functions	Laredo & Mustar	2000	Third mission	• Scientific institutions • Educational system • Economic system • Public authorities • Media, public debate,etc	Research valorisation

Conceptual reference framework for the analysis of activities of the third mission	Molas, J., Salter, A., Patel, P., Scott, A., Duran X. (2002), Measuring Third Stream Activities.	2002	Third mission	• Capabilities
				  o Knowledge capabilities
				  o Facilities
				• Activities:
				  o Research
				  o Teaching
				  o Communication
					Research valorisation

Classification for University Third Mission (E3M) project	European Indicators and Ranking Methodology for University Third Mission - E3M, Fostering and Measuring Third Mission in Higher Education Institutions - Green Paper.	2012	Third mission	Third Mission activities related particularly to: • Education • Research • engaging the intellectual, human and physical resources of the university – Social Engagement	Introduction of social engagement

Title	Authors	Year	Field	Key concepts	Notes
Pathways to impact and the strategic role of universities	Hughes, A., Kitson, M.	2012	Knowledge exchange	• People-based activities • Community-based activities • Commercialisation activities • Problem-solving activities	Introduces different knowledge exchange mechanisms (hidden connections) involving contributions from all disciplines and partners from the public and third (not for profit) sectors as well as private.
The Quintuple Helix innovation model	Carayannis, E.G., Barth, T.D. & Campbell	2012	Innovation		Civil society has a crucial role, mainly through the media and cultural system (quadruple helix) and then the natural environment (especially climate change and its consequences) (quintuple helix). Social and cultural aspects are also encompassed, and the socio-ecological transition require a new function in society for universities

Knowledge Exchange taxonomy	Knowledge Exchange Framework Research England	2016	Knowledge exchange/transfer	• Facilitating the research exploitation process
				  ○ Commercialisation (TT)
				• Skills and human capital development
				  ○ Exploiting the physical asset of the HEI
				• Knowledge networks and diffusion
				• Entrepreneurship and enterprise education
				  ○ Supporting the community/public engagement
					profound change in the third mission definition and the institutionalization process (carried out at institutional level and not at Unit of Assessment level)

Civic vs "uncivic" university	Goddard, J., Hazelkorn, E., Kempton, L, Vallance, P.	2016	Third mission	Uncivic: • Teaching and Research are at the core of the university's mission and action, while Third mission is at its periphery. Few overlappings and hard boundaries among the missions are in place. Civic: • Teaching, Research and Engagement are in synergic relation to make the university action "transformative, responsive and demand-led"	How is the passage from a "compartmentalized" vision of the different missions of the university to a more integrated idea of civic university. This is where third mission and exchange with outside actors are not located at the periphery of the university system but rather at its core, generating positive feedback loops toward transformative, responsive and demand-led actions.
Policy Instruments & policy mixes for knowledge transfer	OECD	2019	Knowledge Transfer	Policy instruments - Financial - Regulatory - Soft Interactions among policy instruments - contradiction -complexity Precondition - facilitation	

				- synergy Country conditions & Policy trends	

Note: This table presents the most prominent examples of models of KEC/third mission activities on the international stage.
Source: Author's contribution

With the development of each model, the definition of KEC has also evolved. Third mission continues to be a prevalent terminology, although increasingly criticised because this term suggests that the collaboration and engagement with outside stakeholders does not represent a first level priority for the university and plays a residual role with respect to the first two missions (teaching and research).

Recent models of KEC activities display this change. For instance, the Knowledge Exchange Framework (UKRI, 2021[2]) introduced by the HEFCE/Research England, puts forth a taxonomy of activities that captures the profound change in the 'third mission definition' and its institutionalization process. In fact, the KEF, differently from the Research Excellence Framework, is an assessment exercise carried out at institutional level and not at Unit of Assessment level (i.e., department, team, and other possible disciplinary aggregations).

Recent literature has also focused on the role of the Civic University model (Goddard et al., 2016[3]). This model shows the transition from a "compartmentalised" vision of the different missions of the university to a more integrated idea of civic university, where the collaboration and exchange with outside actors are not located at the periphery of the university system but rather at its core, integrated with teaching and research activities, and generating positive feedback loops toward transformative, responsive and demand-led actions.

The Italian case

Mirroring the international trend, the recognition of knowledge exchange and collaboration (KEC) activities in Italy has also evolved over time. While the most prominent literature of categorisation of KEC activities stems from the United Kingdom (see Table 1), Italy has made efforts to categorise the KEC activities of its universities, taking into account the specific characteristics of their territories.

The Italian governance of the research and higher education system has at its core the MUR, in charge of elaborating policies to promote scientific and technological research and allocating funds to universities and public research organizations. The role of ANVUR is also crucial, since it is responsible for the mandatory assessment of the quality of universities and research centres, recipients of public funding (private universities and research centres can be evaluated 'on demand'). The Ministry of Economic Development (MISE) has also played a role in the valorisation of technology transfer activities, in cooperation with NETVAL.

Against this background, institutional actors as well as university organisations, have been pivotal in establishing a thorough and widely-diffused understanding of the different types of KEC activities and their impact. This includes the Ministry of University and Research (MUR), National Agency for the Evaluation of the University and Research Systems (ANVUR), as well as Network of Universities and Research Institutions for Public Engagement (APEnet), Italian Universities Rectors' Conference (CRUI), Network of Universities for Sustainable Development (RUS) and Network for University Research Valorisation (NETVAL), among others. Since the early 2000s, MUR, recently through the ANVUR, has contributed to the recognition of technology transfer and progressively, through its evolution, of the 'wider' third mission. This was done first by supporting the creation and expansion of technology transfer offices in Italian Universities, and then by promoting the assessment of 'case studies' illustrating the universities' societal impact.

Taxonomy of third mission developed by institutional actors

Recognising the potential of universities to generate economic and societal value, since 2011, ANVUR has actively pursued the goal of evaluating the third mission. In turn, this has helped in broadening the definition of technology transfer given in the Ministry's mandate, to embrace other forms of KEC that produce impact on the social, cultural and economic context. Specifically, the *Third Mission of Universities and Research Institutes Evaluation Manual* published by ANVUR in 2015 (ANVUR, 2015[4]), proposed a typology articulated into areas, evaluation criteria, indicators and evaluative questions.

ANVUR's most recent evaluation exercise cycle, Evaluation of Research Quality (*Valutazione della Qualità della Ricerca*, VQR) 2015–2019, allowed to further develop this taxonomy. Carried out by ANVUR in 2020-2022, on the basis of the guidelines established by MUR, the exercise was aimed at evaluating not only the results of scientific research achieved in the evaluation period, but also of the third mission activities that generated impact in the same period. The ANVUR does not provide a strict definition of impact and leaves universities to identify their own narrative and indicators, while classifying the range of KEC activities in ten specific areas, named "fields of actions". In the document on the Evaluation panel criteria, issued by ANVUR in January 2021, these areas have been extensively described (see Box .1[12]). Even though the definitions evolve in parallel to the activities run by universities, these ten fields have created a common taxonomy upon which institutional actors and universities can agree.

KEC taxonomies developed by university associations

The Italian higher education system is also supported by various associations that specialise and represent different forms of KEC. NETVAL, APEnet, RUS, and CRUI, have provided room for exchange, support and studies on different KEC models (Box .2). For instance, since 2002, NETVAL has made the first attempts to monitor technology transfer activities, academic spin offs, patenting and licencing through the management of an annual survey and a specific report. These provide information on the state-of-the-art of technology transfer in Italy and on the role of public research in the development of national economy. Considering the relevance of technology transfer data in the wider context of impact from public research, in the past few years NETVAL has been implementing its yearly survey in collaboration with MUR, Italian Patent and Trademark Office in the Ministry of Economic Development (UIBM-MISE), CRUI and Director Generals' of Universities Conference (CODAU).

In addition, since 2016, a collaboration between NETVAL and the Ministry of Health has been established and the data collection has been extended to include valorisation and transfer of clinical research results, through the engagement of Scientific Hospitalization and Care Institutes (IRCSS). In 2020 the Ministry of Health and NETVAL signed a Memorandum of Understanding (MoU) regarding the collaboration in the production of an annual survey of the technology transfer activities in the IRCCS and the professional training development of the staff employed by the IRCCS in their respective structures of technology transfer.

More recently, APEnet conducted a survey on universities' public engagement, shedding light on the implementation, opportunities, and pitfalls of these types of activities. In addition, the RUS ran a survey on universities' SDGs engagement and objectives. The creation of these networks reflects that universities are recognising new KEC frameworks, such as SDGs. Some universities have installed delegates/vice-rectors with portfolios dedicated to public engagement, sustainable development, and technology transfer. The survey revealed that, in the full sample, 5 universities have a delegate or vice-rector for public engagement, and 19 have a delegate or vice-rector for technology transfer.

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[12] See also: https://www.anvur.it/wp-content/uploads/2020/09/Bando-VQR-2015-19_25-settembre_2020_signed.pdf

Box .2. Associations of Italian Universities dealing with various aspects of KEC

NETVAL: Network for University Research Valorisation

NETVAL was established in 2002, soon after the entry into force of Law n. 383/2011 which established the so called "Professor's privilege", according to which university researchers own intellectual property rights on the inventions they generate. This legal framework made it more complicated for universities, where TTOs were starting to be established or had just been recently created, to transfer research results and to interact with businesses. In this context the new network NETVAL was established to develop joint strategies, capacity building and exchange good practices to promote technology transfer activities.

APEnet: Network of Universities and Research Institutions for Public Engagement

Active since 2018, APEnet became an association in 2022 at the University of Turin. The Network plays a role in giving shape to proposals and projects, which refer to a concept of Public Engagement as a set of values and direct institutional actions to generate social, cultural and economic growth. APEnet aims to be a space for discussion, study and design of tools and actions, for sharing and strengthening the knowledge and skills necessary to promote the important cultural change that today sees universities and research institutions as protagonists for an "inclusive growth" of the country through listening, dialogue and collaboration with society. There are 41 founding bodies including universities, polytechnics, high schools and research bodies, but there are already numerous requests for membership from other institutions. The Association will also be open to the productive world, the third sector, public institutions, citizens and the world of education to define objectives and projects together.

CRUI – Conference of Italian University Rectors

Since 2007, CRUI has been the association of recognized state and non-state Italian universities. Founded in 1963 as a private association of rectors, over time it has acquired a recognized institutional and representative role and the ability to influence the development of the university system through intense study and experimentation. The CRUI provides: guidance and coordination tool for university autonomy; privileged place for experimenting with models and methods to be transferred to the university system; laboratory for sharing and disseminating best practices; modern study and analysis center available to universities.

RUS – Network of Universities for Sustainable Development

Established in 2016, the Network disseminates good practices of sustainability, both inside and outside the universities (at an urban, regional, national and international level), in order to increase the positive impacts in environmental terms, ethical, social and economic aspects of the actions implemented by members of the Network, so as to contribute to the achievement of the SDGs, and in order to strengthen the recognition and value of the Italian experience at an international level.

Source: (APEnet, n.d.[5]); (RUS, n.d.[6]); (CRUI, n.d.[7]); (NETVAL, n.d.[8]) .

Part III. Creation of a new framework for Knowledge Exchange and Collaboration

Italian universities carry out KEC through a wide range of activities, spanning a variety of sectors, and using diverse approaches. These chosen approaches and the obtained outcomes are in turn influenced by structural features of the institutions, including size, their location, sectoral specialisation, disciplines, but also by their strategy, policy and development priorities, such as objectives, resources, processes and results. It is important to take these characteristics into account when generating a taxonomy.

An important role is played by universities' location. Universities contribute to knowledge spill overs, i.e., positive externalities benefitting the regional community. However, the capacity to generate these positive externalities depends, in turn, on the geographical context in which the university operates.

Universities located in regions with lower per capita income, lower private investment in R&I, a more fragile and less internationalised industrial structure, may face difficulties connecting their research activities with local innovation needs. Similar considerations can be made for social, cultural and educational aspects. Conversely, universities located in areas where the economic activity is intense (capital and labour concentration) have a higher probability to successfully connect their research activities with the production of patents, the creation of start-up companies and other processes related to innovation and economic growth. It should be recognised, however, that universities can enhance opportunities of international networking and innovation for the territories, regardless the characteristics of the latter.

Therefore, it should be realised that there is no one-size-fits-all approach. To promote societal impact in all regions, contextual differences as well as institutional diversity should be taken into account for KEC. A national research and innovation system that is able to consider diversity can meet the many and complex needs to cope with the transitions-related societal challenges and insure an equitable and inclusive development.

A new taxonomy of KEC activities of Italian state-owned universities

The objective of a taxonomy is to classify information based on recognisable traits and patterns. In consequence, a taxonomy of KEC activities could help to understand which types of activities universities co-conduct with their partners, while taking into consideration different characteristics that can influence these activities, pertaining both to the university that is taken in consideration and to the ecosystem in which the university is located.

The taxonomy presented in this section systematises the qualitative data collected through surveys and interviews and offers an objective view on the results. It adopts the following definition of KEC: *all activities that universities undertake with external partners to create economic, societal, and environmental value within their ecosystems*. In addition, the taxonomy considers two variables describing the location of universities, including: 1) location of the university in the three geographical areas of the country (north;

centre; south and islands); and 2) location of university near "inner" areas[13] or not[14]. The methodology and criteria used for the taxonomy is explained in Annex A.

A national snapshot of KEC activities

The analysis reveals that all the 56 interviewed Italian state-owned universities conduct KEC activities. The full sample includes: 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 ("*Istituto 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 the KEC activities run by universities.

In an effort to extract from the survey and interviews a taxonomy of the KEC activities conducted by Italian state-owned universities, we could identify six main categories: socio-cultural activities; technology transfer; academic entrepreneurship; SDG-related activities; lifelong learning and open education; and 'other' (Table .2). These categories result from a grouping of the ten ''fields of action' listed in the ANVUR assessment exercise (VQR) for the 2015-2019 period (see Part I). As all universities were evaluated on the basis of the ANVUR fields of action, these fields can represent an easily understood common ground and language for KEC activities in Italy.

What are the different types of KEC activities that universities and partners co-conduct?

Based on interviews and questionnaires, KEC activities of Italian universities have mostly been conducted through a socio-cultural lens. A total of 142 socio-cultural KEC activities were counted, 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. At the same time, activities within the technology transfer domain continue to be present: these activities represent the second biggest group, with 120 activities counted. They include projects of support for intermediation structures, and valorisation of research, such as filing new patents and licenses. Furthermore, 34 activities in academic entrepreneurship were counted. 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. Activities related to the 2030 Agenda and the Sustainable Development Goals (SDGs) were less often cited by universities, with only 21 activities counted. In addition, only 16 lifelong learning and open education activities were counted, which included projects such as designing summer schools, and upskilling and reskilling courses for adults in particular domains. Finally, 4 residual KEC activities were categorised as other; this includes projects for awards and crowdfunding activities.

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[13] "Inner" areas (characterised by their distance from the main service centres, including education, health and mobility (European Network for Rural Development, n.d.[16])) are defined by the National Strategy of Internal Areas (SNAI) set forth in 2013. The strategy defined 72 "Inner Areas" – overall, 1,077 municipalities and about 2,072,718 inhabitants (Agenzia per la Coesione Territoriale, 2013[9]). Within these areas, there are 24 municipalities – 5 of which are located close to a body of water – where a state-owned Italian university is located in proximity of 30 to 40km. Annex A provides further details on this allocation.

[14] This categorisation warrants a caveat: distances between universities and the centre of the municipality considered an "inner area" are "euclidean". This impedes from considering the physical geography/topology of universities' ecosystems.

Table .2. Taxonomy of KEC activities conducted by Italian universities in cooperation with external partners

Category cluster	Description	Some examples	Number of cases found	Share of universities, per dimension (small, medium, large)	Share of universities, per location (Inner or not) and (north; centre; south & islands)
Socio-cultural activities	These activities refer to any projects in the social and/or cultural realm. In particular, this includes other sub-categories such as: 1. "the production of public goods and policy instruments for inclusion"; 2. "production and management of artistic and cultural heritage" 3. Public engagement.	1. Launch of the "Museum of nature and man" for a city museum itinerary for ctiziens; 2. Service providers for support to local administrations for the integration of migrants; 3. Support for implementation of projects to regional administrations working with the consequences of the earthquake.	142	-Small: 91.3% (21/23) -Medium-sized: 90.9% (20/22) -Large: 100% (11/11)	-Inner: 95.8% (23/24) -Not inner: 90.6% (29/32) - North: 94.7% (18/19) -Centre: 88.7% (16/18) -South & Islands: 94.7% (18/19)
Technology transfer activities	Any activities related to technology transfer offices, incubators, science and technology parks, consortia and associations for the Third Mission). This also includes commercialisation of research outputs and valorisation activities.	1. Expansion of industrial PhDs programmes; 2. Scouting activities to verify utility of research results.	120	-Small: 73.9% (17/23) -Medium-sized: 90.9% (20/22) -Large: 72.7% (8/11)	-Inner: 79.2% (19/24) -Not inner: 81.3% (26/32) - North: 94.7% (18/19) -Centre: 55.6% (10/18) -South & Islands: 89.5% (17/19)
Academic Entrepreneurship	Activities related to spin-offs; support with start-ups; and accelerators.	1. Support of start-ups; 2. Training and education courses on new entrepreneurial ideas by individuals; 3. Support to start-ups during COVID-19 pandemic.	34	-Small: 30% (7/23) -Medium-sized: 45.5% (10/22) -Large: 45.5% (5/11)	-Inner: 37.5% (9/24) -Not inner: 40.6% (13/32) - North: 42.1% (8/19) -Centre: 27.8% (5/18) -South & Islands: 47.4% (9/19)
Activities related to the UN 2030 Agenda for Sustainable Development Goals	Activities related to sustainable development; SDGs and the 2030 Agenda.	1. Projects to promote the attainment of SDGs with public administrations	21	-Small: 30.4% (7/23) -Medium-sized: 31.8% (7/22) -Large: 27.3% (3/11)	-Inner: 20.8% (5/24) -Not inner: 37.5% (12/32) - North: 47.4% (9/19) -Centre: 22.2% (4/18) -South & Islands: 21.1% (4/19)
Lifelong learning and open education activities	Activities related to formal or informal continuing/executive education, MOOCs;	1. Summer Schools	16	-Small: 21.7% (5/23) -Medium-sized: 31.8% (7/22) -Large: 27.3% (3/11)	-Inner: 20.8% (5/24) -Not inner: 31.3% (10/32) - North: 36.8% (7/19) -Centre: 27.8% (5/18) -South & Islands: 15.8% (3/19)
Other	Activities related to crowdfunding; awards.	1. awards for researchers; 2. crowdfunding projects	4	-Small: 0% (0/23) -Medium-sized: 18.2% (4/22) -Large: 18.2% (2/11)	-Inner: 8.3% (2/24) -Not inner: 12.5% (4/32) - North: 21.1% (4/19)

				-Centre: 5.6% (1/18) -South & Islands: 5.3% (1/19)

Note: All the activities presented above are conducted by Italian universities in cooperation with external partners.
Source: Author's elaboration based on ANVUR's 10 fields of action (see Box 1)

Universities' dimension influencing KEC activities

The dimension of the university[15] can be a factor influencing the KEC activities co-conducted by universities and their partners. Overall, results confirm the "popularity" of each KEC activity, regardless of the university's size. On average, small, medium-sized and large universities conduct mostly socio-cultural activities, with a share of 91.3%, 90.9%, and 100%, respectively. However, results also illustrate that, in half of KEC categories, medium-sized universities are more active than both small and large universities. This is true for technology transfer, SDGs, and lifelong learning and open education activities. This result can be tied to the "dimension" argument raised by universities during the interviews, where a small institution can benefit from less administrative burdens but is limited by less human capital, while a large university can be limited by a scattered variety of internal actors conducting activities. Within other categories, such as academic entrepreneurship and "other", the share of medium-sized universities conducting these activities match the share of large universities.

With which type of partners do universities collaborate?

Most interviewed universities display collaboration with external partners, i.e. conduct KEC activities, according to the previously given definition (Figure .4). The most common external partner for universities in Italy is private firms, including SMEs and start-ups, with almost half of the universities having at least one collaboration with these actors. The collaboration with SMEs can be explained partly by the characteristics of the Italian productive sector, which is vastly dominated by small firms. Collaboration with firms, however, can be difficult. Universities reported a series of obstacles featuring these collaborations, with mismatches in administrative procedures and difficulties in finding the right skills for a specific task (See Part I).

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 of several universities, regardless of their size and location. In addition, several universities have specific partnerships with the municipality in which they are located within contexts of specific projects, such as social and technology transfer activities, and valorisation of certain areas of municipalities, among others.

The partnership with regional governments is expected to become even more important in view of the conspicuous amount of funds that Italy is receiving from the European Commission within the Recovery and Resilience Plan. In fact, the resources of the Italian National Recovery and Resilience Plan (*Piano Nazionale Ripresa e Resilienza*, PNRR) are funnelled, for an important portion, through the regional governments. Therefore, the PNRR 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.

Interestingly, the interviews revealed that some universities have struggled to deal with handling the processes and generating projects to acquire the funds. Specifically, certain universities reported that they did not participate in calls for "*tenders*" due to lack of administrative capacities.

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[15] The dimension of each university is based on the number of students within each university, according to 2021/2022 data from the MUR database (see Annex A).

Figure .4. The types of partners with which universities co-conduct KEC activities

Percentage share
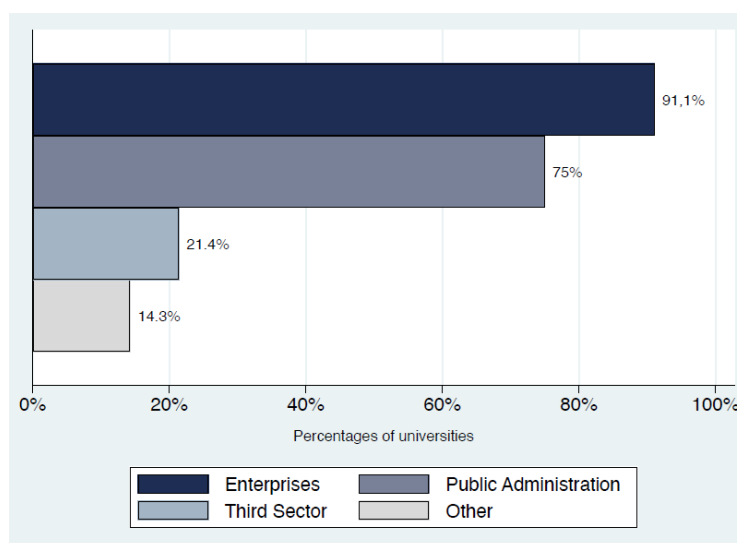
Note: The totals of the bar graphs illustrate the share of universities out of the full sample (56) that, on the national level, (through the questionnaire and by invitation to the interviews) identified a specific partner. The results showed that 51/56 universities collaborate with enterprises (91%); 42/56 universities collaborate with public administration; 12/56 universities collaborate with the third sector (21.4%); 8/56 universities collaborate with others (14.3%).
Source: ITA.CON Survey and Interviews, 2022

Accounting for Italy's three regional areas (north, center, south and islands)

From east to west, the North is more engaged in KEC activities

While taking into account the location of universities in the north, centre, and south and islands of the peninsula, we can see differences in the types of KEC activities (Figure .5). The data collected shows that, on average, universities located in the north are more engaged in KEC activities with external partners. In addition, and always on average, universities in the north conduct a wider variety of activities. In particular, results show that technology transfer and socio-cultural activities are the most popular for institutions in the north.

The universities in the north include those located in the following regions: Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna, Valle d'Aosta, Liguria, Lombardia, Piemonte (Annex A). Most of these regions, relatively more developed, also result as "strong innovators" in the 2021 Regional Innovation Scoreboard (European Commission, 2021[9]). It is thus expected that universities located in these regions are more prone to co-conduct activities with their partners.

Universities in the south and islands are the second group of universities in terms of their engagement to implement KEC activities. Southern universities can be more active in finding new partners with which to collaborate, to find resources and continue their engagement. This is also supported by data about the different types of activities that they conduct. While most of them conduct socio-cultural and technology transfer activities, half of them conduct at least one activity of academic entrepreneurship.

Universities located in the centre result as the group displaying lower engagement with collaboration activities. On average, socio-cultural projects are the most popular among universities in central Italy. Conversely, their propensity towards other types of activities, such as technology transfer, SDGs-related

activities, among others is lower. For instance, only a third of central universities conduct at least one activity related to lifelong learning and open education, and SDGs.

Figure .5. Universities' KEC activities, by type of activity and by three geographical areas
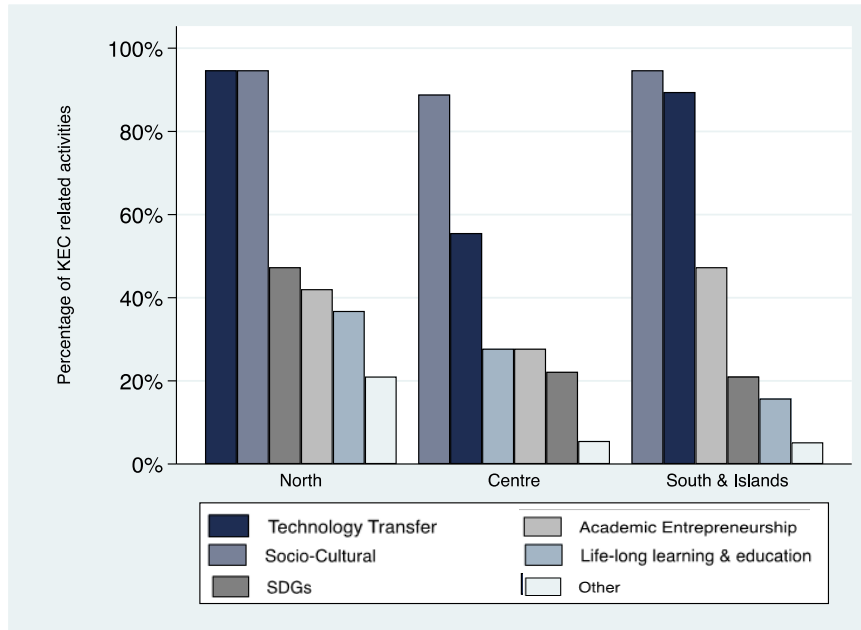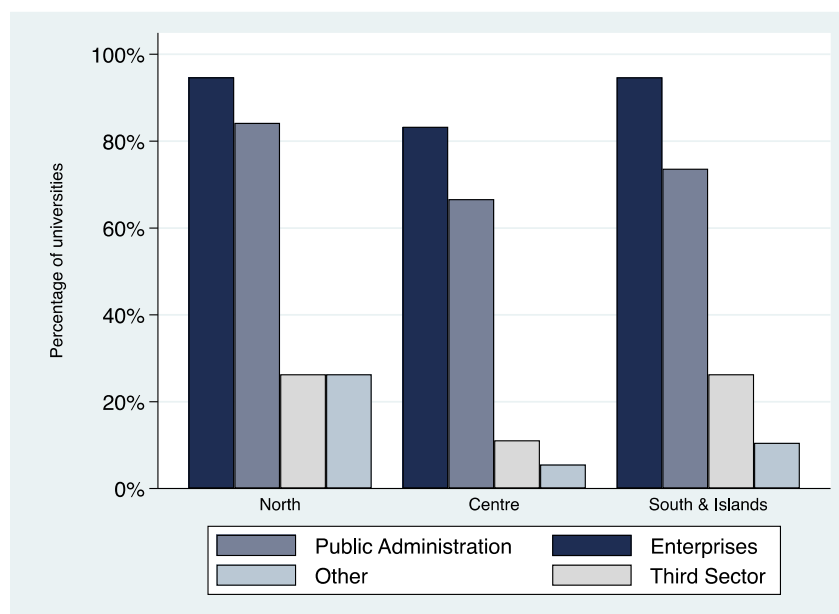
Percentage share

Note: The values of the bar graphs show the percentage of universities that report one or more activities for each type.
Source: ITA.CON Survey and Interviews, 2022

Enterprises and public administrations are the most common partners in all three geographical areas

On the national level, the most common partner with which universities co-conduct KEC activities are enterprises and public administrations, in all three areas (Figure 6). On average, most universities in all three areas have at least one collaboration with enterprises and public administrations. However, differences between the three areas are more evident for collaborations with the third sector. Almost a third of universities in the north and in the south and islands collaborate with partners in the third sector, such as non-governmental organisations. Conversely, based on questionnaires and interviews, in the centre, only a small percentage of universities collaborate with the third sector.

Figure 6. The variety of partners with which universities conduct KEC activities, by three geographical areas

Note: The values of the bar graphs show the percentage of universities that report collaboration (through the questionnaire and by invitation to the interviews) in KEC activities with each type of partners.
Source: ITA.CON Survey and Interviews, 2022

Accounting for "inner" and non-inner areas

Universities near "inner" areas are more engaged in socio-cultural activities

While taking into account universities located near "inner" areas, the results show that, on average, these universities are more active in socio-cultural activities than those located in urban centres, with 95.8% of inner universities conducting KEC in this area, compared to 90.6% of urban universities (

Figure Error! **No text of specified style in document.**.7).

Figure Error! No text of specified style in document.**.7. Universities' KEC activities, by type of activity and by proximity to "inner" areas**

Percentage shares
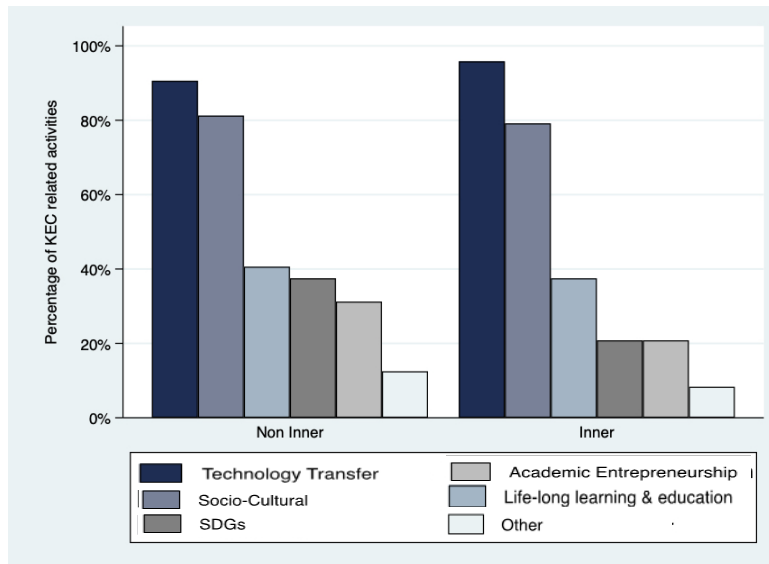
Note: The values of the bar graphs show the percentage of universities that report one or more activities for each type
Source: ITA.CON Survey and Interviews, 2022

On the other hand, universities near urban centres are more active than ones near inner areas in conducting other types of KEC activities, including: technology transfer (81.3% and 79.2%, respectively), academic entrepreneurship (40.6% and 37.5%, respectively), SDGs (37.5% and 20.8%, respectively), lifelong learning (31.3% and 20.8%, respectively), and other (12.5% and 8.3%, respectively). These results confirm that the location of the university can influence the types of KEC activities conducted by universities.

External partners of universities near inner or urban areas are similar

While taking into account universities near inner or urban areas, the type of partners with which both groups collaborate paint a very similar picture (Figure .8). The most common external partners for both groups are enterprises and public administrations, with 91.7% of 24 universities near inner areas and 90.6% of 32 universities near an urban area having created partnerships with firms. Similarly, 79.2% and 71.9%, respectively, collaborate with the public administration. Collaborations with the third sector and other entities are also very similar between the two groups of universities.

Figure .8. The types of partners of universities, by proximity to "inner" areas

Percentage share

Note: The values of the bar graphs show the percentage of universities that report collaboration (through the questionnaire and by invitation to the interviews) in KEC activities with each type of partners.
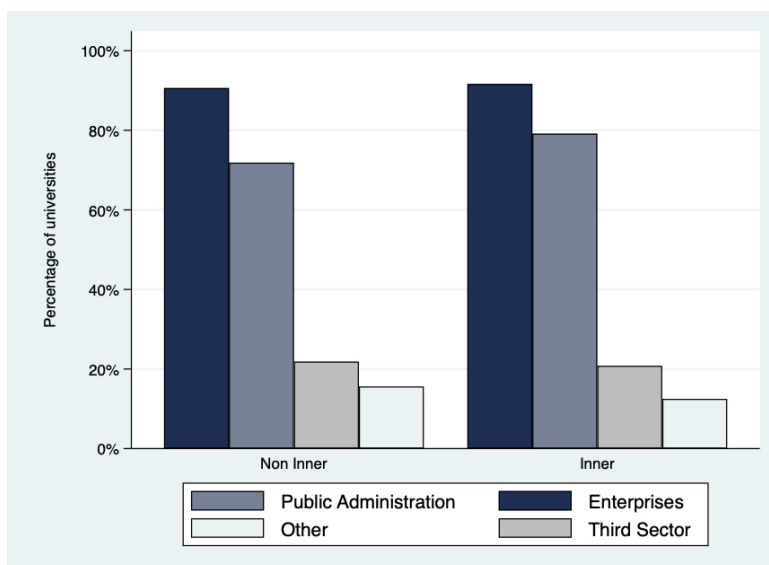Source: ITA.CON Survey and Interviews, 2022

Conclusions

The analysis presented in the paper confirms that, while there is an increasing demand for universities to engage with external partners, KEC activities face obstacles that can limit the actors' ability to efficiently connect and build structural relationships and provide a sustainable impact on their own communities and networks.

The present assessment also took into account other territorial features, such as the location of universities in three geographical areas of the peninsula – north, centre, south and islands - as well as those situated in the defined "inner areas". Results showed that location can play a role in influencing the collaboration activities of Italian universities: the ecosystem in which a given university is located can influence the engagement of universities' KEC activities. In high-income regions, universities are more inclined to co-conduct KEC activities with their partners; in inner areas, universities conduct mostly socio-cultural KEC activities.

In the next phases of the project, the analysis could explore economic and social characteristics of a university's surrounding ecosystem, and the influence of collaboration between universities. Although beyond the scope of the project, measuring the impact of specific KEC activities could also help better understand the impact of universities' KEC on their communities.

Understanding the socio-economic characteristics of a particular territory (region or province) in which the university is located would provide additional information to assess the impact of collaboration activities of universities. For example, socio-economic indicators such as GDP per capita, well-being, population-density, among others, are all factors that could be taken into account.

The collaboration between universities is an important point. Against the backdrop of a national agenda promoting competition between universities, the interviews revealed that certain regions have incentivized the collaboration of universities in their territory. The next outputs of the ITA.CON project will aim to explore further granularity in the analysis.

Finally, although beyond the scope of the ITA.CON project, understanding the impact that these activities have on the universities' surrounding areas is also crucial. For instance, within the socio-cultural domain, it would be interesting to understand and measure the benefits that a single project can have on its territory. Nevertheless, this underlines the complexity of the evaluation of KEC activities, especially within the non-technological domains, an obstacle also underlined by the universities that were interviewed during the project.

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Annex A. Methodology for categorisation of universities and taxonomy

This Annex reports the data methodology used for this paper. Information was collected through the KEC questionnaire and through online interviews. Data generated by questionnaires and interviews was systematically coded through Atlas.ti. The codification exercise created a dataset (hereinafter, the "ITA.CON dataset") of 142 binary variables (dummy variables). Any linear transformation of dichotomous dummy variable (e.g., to z-scores) will not change either the shape of the distribution or the correlation of scores on that variable with those of any other variable and so there's no meaning in standardizing a dummy variable.

The sub-sections below provide the methodology and categorisations of the university used in the analysis of this paper, based on each university's location (according to the three regional clusters, that is, north, centre, and south and islands), dimensions, and typology. Finally, the Annex presents a categorisation of all the 67 state-owned universities, extracted directly from the final ITA.CON dataset.

Categorisation on university location in three regional clusters

Universities were classified by their location according to three geographical areas, covering the regions of the Italian peninsula. The categories are based on Istat data from (Istituto Nazionale di Statistica, 2016[10]). The regions are thus classified as follows:

1. North (Nord): Valle d'Aosta, Liguria, Lombardia, Piemonte, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna.

2. Centre: (Centro): Toscana, Umbria, Marche, Lazio.

3. South and Islands (Sud & Isole): Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna.

The dichotomous categorization for each university is represented in the table below.

Categorisation on university location, "inner areas" or not

Universities were classified also by location between "inner areas" and urban centres. The criteria for selection is based on the National Strategy of Internal Areas (SNAI) set forth in 2013 by the Italian Agency of Territorial Cohesion, which defined 72 "Inner Areas" – overall, 1,077 municipalities and about 2,072,718 inhabitants (Agenzia per la Coesione Territoriale, 2013[11]). Within this selection, the results show that there are 24 state-owned universities, 5 of which close to maritime localities, located near "inner" areas, and 34 universities located near urban areas. The dichotomous categorization for each university (n=1 for inner areas, and n=0 for urban areas) is represented in the table below.

Categorisation on university dimension

The universities have also been classified by their dimension. The classification is based on the number of students within each university, according to 2021/2022 data from the MUR database: http://ustat.miur.it/dati/didattica/italia/atenei. The classification respects the following criteria:

- Small universities: less than 15 000 students enrolled

- Medium universities: 15 001 to 39 999 students enrolled

- Large universities: more than 40 000 students enrolled.

The dichotomous categorization for each university is represented in the table below.

Classification of all Italian state-owned universities (n=67)

	Type of university			Dimension of university			Location of university			
	Generalist	Polytechnic	Special	Small	Medium-sized	Large	North	Centre	South and Islands	Inner areas
GSSI	0	0	1	1	0	0	0	0	1	1
IUSS Pavia	0	0	1	1	0	0	1	0	0	0
Politecnico di Milano	0	1	0	0	0	1	1	0	0	0
Politecnico di Torino	0	1	0	0	1	0	1	0	0	0
Scuola IMT Alti Studi Lucca	0	0	1	1	0	0	0	1	0	0
Scuola Normale Superiore	0	0	1	1	0	0	0	1	0	0
Scuola Sant'Anna	0	0	1	1	0	0	0	1	0	0
SISSA	0	0	1	1	0	0	1	0	0	0
Università Ca' Foscari Venezia	1	0	0	0	1	0	1	0	0	0
Università degli Studi	1	0	0	0	1	0	0	0	1	1

Chieti-Pescara									
Università degli Studi del Molise	1	0	0	1	0	0	0	0	1	1
Università degli Studi del Piemonte Orientale	1	0	0	1	0	0	1	0	0	0
Università degli Studi dell'Aquila	1	0	0	1	0	0	0	0	1	1
Università degli Studi della Basilicata	1	0	0	0	1	0	0	0	1	1
Università degli Studi della Campania	1	0	0	0	1	0	0	0	1	1
Università degli Studi di Bari	1	0	0	0	0	1	0	0	1	0
Università degli Studi di Bergamo	1	0	0	0	1	0	1	0	0	0
Università degli Studi di Brescia	1	0	0	1	0	0	1	0	0	0
Università degli Studi di Camerino	1	0	0	1	0	0	0	1	0	1
Università degli Studi di Catania	1	0	0	0	1	0	0	0	1	1
Università degli Studi	1	0	0	1	0	0	0	0	1	1

di Catanzaro									
Università degli Studi di Ferrara	1	0	0	0	1	0	1	0	0	0
Università degli Studi di Firenze	1	0	0	0	0	1	0	1	0	1
Università degli Studi di Foggia	1	0	0	1	0	0	0	0	1	1
Università degli Studi di Macerata	1	0	0	1	0	0	0	1	0	0
Università degli Studi di Messina	1	0	0	0	1	0	0	0	1	1
Università degli Studi di Milano	1	0	0	0	0	1	1	0	0	0
Università degli Studi di Milano - Bicocca	1	0	0	0	1	0	1	0	0	0
Università degli studi di Modena e Reggio Emilia	1	0	0	0	1	0	1	0	0	0
Università degli Studi di Napoli L'Orientale	1	0	0	1	0	0	0	0	1	1
Università degli Studi di Padova	1	0	0	0	0	1	1	0	0	0
Università degli Studi di Palermo	1	0	0	0	0	1	0	0	1	1

Università degli Studi di Parma	1	0	0	0	1	0	1	0	0	0
Università degli Studi di Reggio Calabria	1	0	0	1	0	0	0	0	1	1
Università degli Studi di Roma "Foro Italico"	1	0	0	1	0	0	0	1	0	0
Università degli Studi di Siena	1	0	0	0	1	0	0	1	0	1
Università degli Studi di Teramo	1	0	0	1	0	0	0	0	1	1
Università degli Studi di Torino	1	0	0	0	0	1	1	0	0	0
Università degli Studi di Trento	1	0	0	0	1	0	1	0	0	0
Università degli Studi di Trieste	1	0	0	0	1	0	1	0	0	0
Università degli Studi di Urbino	1	0	0	1	0	0	0	1	0	1
Università degli Studi di Verona	1	0	0	0	1	0	1	0	0	0
Università degli Studi Roma Tre	1	0	0	0	1	0	0	1	0	0
Università del Salento	1	0	0	0	1	0	0	0	1	0

Università della Calabria	1	0	0	0	1	0	0	0	1	1
Università di Bologna "Alma Mater"	1	0	0	0	0	1	1	0	0	0
Università di Cassino e del Lazio Meridionale	1	0	0	1	0	0	0	1	0	1
Università di Napoli Federico II	1	0	0	0	0	1	0	0	1	0
Università di Pisa	1	0	0	0	0	1	0	1	0	0
Università di Roma La Sapienza	1	0	0	0	0	1	0	1	0	0
Università per Stranieri di Siena	1	0	0	1	0	0	0	1	0	1
Università Politecnica delle Marche	1	0	0	0	1	0	0	1	0	0
Università degli Studi di Perugia	1	0	0	0	1	0	0	1	0	1
Università degli Studi della Tuscia	1	0	0	1	0	0	0	1	0	1
Università degli studi di Sassari	1	0	0	1	0	0	0	0	1	0
Università degli Studi	1	0	0	0	1	0	0	1	0	0

di Roma "Tor Vergata"										

Statistical analysis and results

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.

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

Annex B. K.E.C. Survey and Interview Questions

K.E.C. Survey (in Italian)

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

	Nome/tipologia indicatore	Descrizione	Frequenza di rilevazione (es. annuale, mensile…)
1			
2			
3			
4			
5			

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 impatti immediati e di medio/lungo termine?

15. 17b. 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)

17. *Interni all'Ateneo:*

    a. *Esterni:*

18. 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)

19. *Interni all'Ateneo:*

20. *Esterni:*

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

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

23. 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?

Guide for Interviewers (available in italian)

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 <u>definizione</u> 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? - L'ateneo ha un ruolo proattivo o passivo nel cercare la collaborazioni?
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 <u>all'impatto sociale</u> 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]? • Nel definire il piano annuale o pluriennale delle attività di KEC dell'Ateneo, si tiene conto anche del loro impatto sociale? [SI/NO]
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