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InnoTech Report 2024: Harnessing Innovation in the Global Scenario

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InnoTech Report 2024:
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PREFACE

Preface by Valerio De Molli

"Exploration is the engine that drives innovation. Innovation drives economic growth"

Edith Widder

In the last twelve months we have witnessed a continuous growth in international tensions: from Hamas' attack on Israel that has rekindled a conflict that seemed to be over, to the Houthis' interference in international trade through attacks on commercial ships transiting the Red Sea, to the continuation of the war between Russia and Ukraine that still seems far from being close to a resolution. For Europe, one of the consequences of these crises is the growing uncertainty regarding the resilience of the economy: the latest estimates of the International Monetary Fund forecast in fact a growth in the Eurozone for 2024 at +0.9% (revised down by 0.3 percentage points compared to the previous estimate of October 2023); this revision affects all the four main countries in the area, ranging from a -0.4 p. p. of Germany to a zero revision for Italy which, in any case, shows a growth of +0.7% compared to 2023.

In order to respond to this context of international uncertainty, it is necessary for each country to identify those areas that can contribute most to supporting economic growth, to investing resources in a targeted manner and to implementing policies to stimulate development. Innovation is – without a doubt – a strategic area to focus on, because it cuts across several sectors and allows the economic-industrial eco-system to be competitive internationally and achieve leadership positions, ensuring, in the long term, the creation of added value for the benefit of society as a whole.

It is precisely with the purpose of sharing the best experiences in terms of technological innovation, useful for the development of the economic system, that The European House - Ambrosetti founded the InnoTech Community in 2012, bringing together some of the most important technology companies that are leaders in their sector, and setting itself the goal of pooling the experience of each individual for the benefit of all participants, helping to create a positive impact for the territory of reference and for the country-system.

Within the InnoTech Community, the aim of the Technology Forum is to bring to the attention of the business community the best stimuli on current issues at an international level, so as to transfer privileged information to participants to implement winning strategies in their markets of interest. The mission is, in fact, to understand and embrace the major transformational challenges arising from new and emerging technologies in order to build sustainable competitive advantages for territories and businesses and to improve people's quality of life.

The InnoTech Community's 2024 report, as you will learn more as you continue reading, describes a country in difficulty in terms of innovation: the TEHA Global Innosystem Index (TEHA-GII), which provides a summary of the health of innovation ecosystems, places Italy 24th out of the 37 OECD, BRICCS and other relevant countries taken into consideration, with a drop of 1 position compared to the TEHA-GII 2020 ranking.

In particular, the Innovative Ecosystem sub-indicator is the one in which Italy struggles the most, ranking 32nd.

One of the reasons for this low ranking also lies in the chronic presence of 'many Italies' within a single country: the TEHA Regional Innosystem Index (TEHA-RII), which has been mapping since 2023 the state of health of the innovation ecosystems in all European regions, shows how, even from this point of view, our country is split between North and South; the top five Italian regions in the index are Lombardy, Autonomous Province of Trento, Latium, Emilia Romagna and Piedmont, while the bottom five are all southern Italian regions and are Sardinia, Apulia, Basilicata, Sicily and Calabria. Solving this critical issue is crucial to unlocking innovation potential and fostering a balanced and more sustained growth of the entire national ecosystem, and we look forward to the continued creation and development of innovation ecosystems, which we have begun to define as a highly dynamic territorial area from the economic-entrepreneurial point of view, characterised by high cultural, scientific and technological ferment, attractiveness and social mobility, with effective reward mechanisms and guarantee of equity in access to opportunities.

The creation of an innovation ecosystem also passes through the incentivisation of investments in R&D, which are fundamental for creating a competitive advantage on the market and allowing the entire economic system to position itself as a winner on the market. Setting the goal of increasing R&D investments by Italian companies must be a goal to be pursued continuously: the Italian system, like the European one, shows a chronicity of low R&D investments in relation to GDP, as we can see by comparing it to the American system, a benchmark for investments in innovation. While in 2014 the gap between the EU-27 and the USA was 0.7 percentage points (2.0% and 2.7% R&D investment in relation to GDP, respectively), by 2022 this gap has widened to 1.5 percentage points (2.1% vs. 3.6%).

In the final part of the report, you will find the results of the survey that The European House - Ambrosetti carried out involving the top executives of the companies that are part of the TEHA Club network, which brings together over 400 top executives of national and multinational groups and companies operating in Italy. The results show an assessment of the transformative impact on the business community of the main innovation trends, and outline objectives for future investments.

This analysis and synthesis exercise has been carried out in the firm hope of being a useful knowledge tool, in order to provide a compass for the business community and policy makers called to the great challenge of accelerating the use of innovation in a period of great uncertainty.

Before leaving you to read the report, I would like to express my gratitude to the InnoTech Community 2024 partners – A. Agrati, ABB, AcegasApsAmga, Arriva Italia, Bloom Energy, Cisco Systems Inc., Confindustria Siracusa, DNV, Eni, Green To, Hewlett Packard Enterprise Italia, Hive Energy, Hydac, Istituto Italiano di Tecnologia, Nutanix, Pirelli & C., Impresa Pizzarotti & C., Renovo, Smart Industry, Trasporto Unico Abruzzese, Trentino Sviluppo, Watlow – who have taken up our challenge and who share with us the firm belief that science, research, technology and innovation must be the foundations for the society of the future. It is especially thanks to their contribution that the Community has made incredible progress in achieving this ambitious goal.

Finally, a heartfelt thank you to the team of the InnoTech Hub of The European House - Ambrosetti, led by Corrado Panzeri (Partner and Head of the InnoTech Hub) and composed of Roberta Braccio, Silvia Della Giovanna, Laura Dibenedetto, Giulia Ercole, Maurizio Gregori, Sulaim Munzir Khan, Noemi Lattanzi, Andrea Alejandro Merli, Filippo Minisini, Gherardo Montemagni, Sofia Odolini, Paola Pedretti, Matteo Polistina, Matteo Radice, Davide Skenderi, Alessandro Viviani and Loredana Zaccuri.

Valerio De Molli
Managing Partner & CEO, The European House - Ambrosetti

INTRODUCTION

THE INNOVATION & TECHNOLOGY COMMUNITY

The Innovation and Technology Community ("InnoTech") is the platform of The European House - Ambrosetti established in 2011 within Ambrosetti Club, and has become the benchmark for in-depth analysis and discussion around issues related to the new frontiers of technology and innovation, with the mission to:

Understand and embrace the major transformative challenges arising from new and emerging technologies in order to build sustainable competitive advantages for territories and businesses and to improve people's quality of life

To achieve this mission, the InnoTech Community's activities are developed along an annual path with the purpose of:

- deepening future scenarios arising from new and emerging technologies, over the short, medium and long term, with particular reference to technological mega-trends and the major social and economic changes;
- understanding how Italian excellence in research and technological innovation can play a leading role on a global stage, comparing it with international best practices;
- connecting the actors of the Italian ecosystem (Institutions, Research, Industry and Finance) with their counterparts in the main innovation ecosystem worldwide, to strengthen existing competitive advantages and/or build new ones, and to appropriately position Italy's excellence in the world;
- promoting, enabling, and supporting synergies and opportunities among the main stakeholders of the Italian and European research and innovation ecosystem, through the leading representatives of Institutions, Research, Academia, Industry and Finance;
- promoting an entrepreneurial culture and the idea that innovation and technology are structural sources of sustainable competitive advantage;
- supporting top management in making appropriate strategic decisions regarding innovation and technology;

- identifying concrete actions that policymakers can implement to stimulate and support the various players in the Italian innovation ecosystem, as well as create the conditions for enriching human capital.

More precisely, the InnoTech Community's activities are structured on multiple interconnected levels and involve the implementation of:

***Working Tables*:** closed-door sessions to foster dialogue with key stakeholders. Working Tables are reserved for Community Partners interested in the topic under discussion and any external guests they may invite. The topics to be explored, the meeting location and any external participants are agreed upon with the Community Partners to facilitate the exchange of ideas and synergy in highly innovative areas.

***One-to-one Meetings*:** confidential meetings organized among the Community Partners or other companies belonging to the Community's network, with the aim of identifying opportunities of collaboration and engaging with industry leading companies. These strictly confidential meetings, lasting 1.5 to 2 hours, are aimed at identifying collaboration hypothesis from which concrete projects can emerge.

***Innovation Meetings*:** physical or digital meetings dedicated to a small group of selected business leaders and focused on deepening and debating specific topics of interest related to innovation and technology. Innovation Meetings are opportunities to present and discuss national and international success stories, provide in-depth updates on best practices to take cues from and stimulate the formulation of concrete proposals for policymakers.

***Position Paper*:** annual report with high-level insights on technological trends in the topics addressed by the Working Tables, one-to-one meetings and innovation meetings. In addition to thematic insights, the Paper also provides an overview on the Italian research and innovation ecosystem and guidance for policymakers.

***Technology Forum*:** the main annual event of the InnoTech Community, now in its 13th edition. The Technology Forum brings together the main players of the global innovation scene and is considered one of the reference events in Europe on the topic of innovation and new technologies.

The InnoTech Hub of The European House - Ambrosetti is part of the scope of activities of Ambrosetti Club, established in 1999 and reserved for top managers of national and multinational groups and companies operating in Italy (today it has more than 400 members), which operates with the objectives of:

- contributing concretely to Italy's civil and economic progress;
- offering a contribution to the excellence and optimization of institutions and businesses;
- promoting a system of favourable relations among members.

The European House - Ambrosetti Working Group is led by Corrado Panzeri (Partner and Head of InnoTech Hub) and Alessandro Viviani (Associate Partner) and composed of: Paola Pedretti, Laura Dibenedetto, Maurizio Gregori, Sulaim Munzir Khan, Noemi Lattanzi, Andrea Alejandro Merli, Filippo Minisini, Gherardo Montemagni, Sofia Odolini, Matteo Polistina, Matteo Radice, Davide Skenderi, and supported by project assistants Giulia Ercole, Roberta Braccio, Silvia Della Giovanna and Loredana Zaccuri.

The Working Group is supervised by Valerio De Molli (Managing Partner & CEO, The European House - Ambrosetti).

THE INNOTECH COMMUNITY 2024 PARTNERS

The InnoTech activity path is designed and implemented in collaboration with leading players in the national and international innovation scene. The Partners who joined the InnoTech Community 2024 are listed in the figure below. A heartfelt thank you goes to them for supporting and stimulating the different lines of activity of the InnoTech Community, providing their contribution to analyse in an ecosystemic and highly innovative logic, the different verticals of deepening.

Main Partner

Partner

THE STRUCTURE OF THE REPORT

This document aims to give a precise representation of the Italian innovation ecosystem with a global, European and regional perspective. Its primary goal is to serve as a valuable resource for policymakers, enabling them to assess and make informed decisions aimed at promoting innovation both at a national and, more specifically, regional level. Additionally, it acts as a strategic tool for business leaders by offering valuable insights in support of decision-making in a rapidly evolving market. The Report is structured as follows:

CHAPTER 1.

THE EUROPEAN HOUSE - AMBROSETTI GLOBAL INNOSYSTEM INDEX 2024 (TEHA-GII 2024)

The first chapter is dedicated to the analysis of innovation ecosystems with a global view. The analysis revolves around the analysis of two macro-sets of indicators. On the one hand, Input variables, selected to assess each country's endowment with respect to the determinants of overall innovation performance; four subgroups were considered: Human Capital, financial resources to support innovation, innovation ecosystem and attractiveness of the ecosystem. On the other hand, Output variables, aimed at 'capturing' at the highest level of synthesis the results of innovative effectiveness in terms of the production of innovations and their economic impact; three subgroups were considered: results of basic research activity, outcomes of applied research and ability to generate reference technology solutions. Based on these components, an index aimed at measuring and structurally comparing the innovation performance of innovation ecosystems around the world has been developed, which allows for measuring the status of different innovation ecosystems globally by comparing different countries.

CHAPTER 2.

THE EUROPEAN HOUSE - AMBROSETTI REGIONAL INNOSYSTEM INDEX 2024 (TEHA-RII 2024)

The second chapter is dedicated to the analysis of innovation ecosystems narrowing the analysis to the European and Italian context with a regional detail. The analysis revolves around the analysis of 11 variables grouped into 4 categories: Economic Development, Human Capital, Talent for Innovation and Digital Infrastructures and Technologies. Based on these components, an index aimed at mapping out and structurally comparing the innovation landscape across European regions has been developed.

CHAPTER 3.

THE NEW TEHA BAROMETER ON INNOVATION AND THE PROPOSALS FOR ITALY

The final chapter delves into the findings of a comprehensive survey conducted by The European House - Ambrosetti. Designed as a strategic tool, this survey serves as an assessment on the innovation investment strategies within Italian businesses. Targeting top executives of TEHA Club network enterprises, this survey shed light on how these companies perceive and respond to the transformative impact of global innovation trends. The analysis of survey data gives valuable insight into the evolving landscape of innovation in Italy, while also outlining future investment targets.

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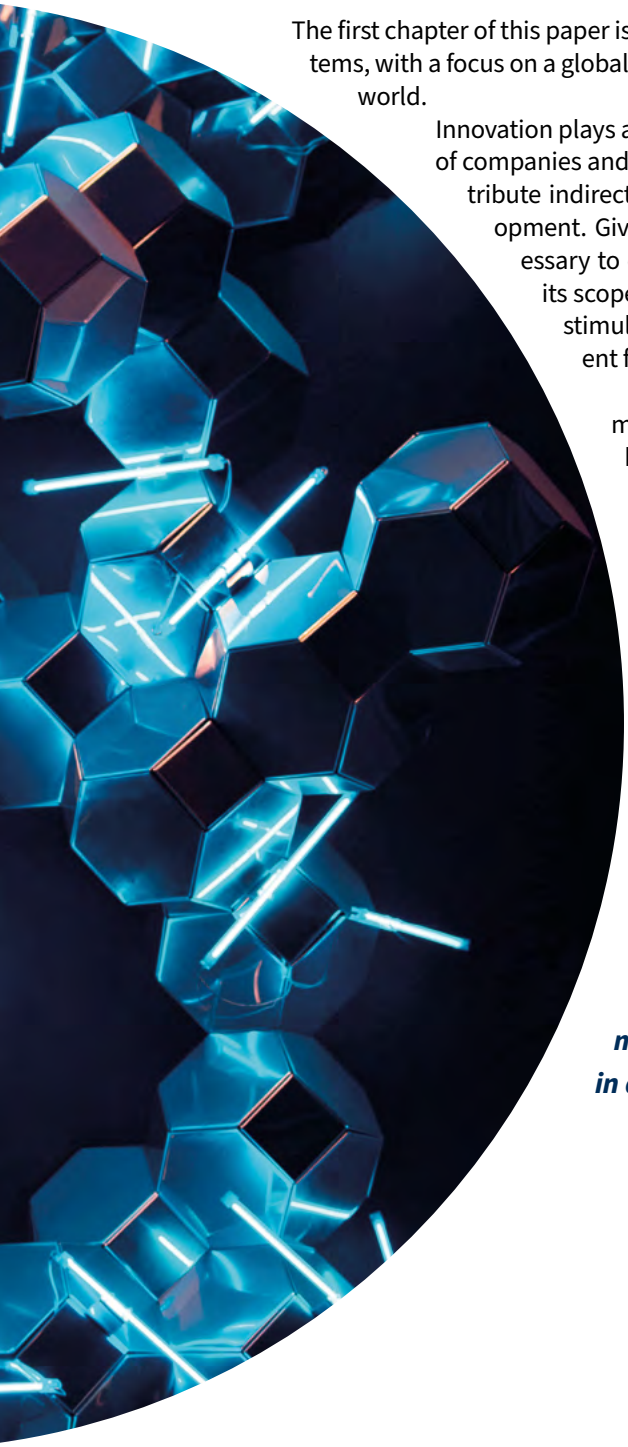
THE EUROPEAN HOUSE - AMBROSETTI GLOBAL INNOSYSTEM INDEX 2024 (TEHA-GII 2024)

1.1 SUSTAINABILITY AND RESILIENCE OF ECOSYSTEMS



The first chapter of this paper is dedicated to the analysis of innovation ecosystems, with a focus on a global view, comparing different countries around the world.

Innovation plays a crucial role in the growth and competitiveness of companies and entire countries. Research and innovation contribute indirectly to prosperity, supporting sustainable development. Given its complex and pervasive nature, it is necessary to consider multiple areas in order to understand its scope and the components on which to intervene to stimulate and support innovation processes in different fields.

The success and results of innovation are determined by the quality and intensity of interactions between key players – academia, policy makers and the business community – and the speed of the relationships between them within a model that is not linear, but, on the contrary, made up of interdependent relationships.

Since its inception (2012-2013), the Inno-Tech Community has initiated a structural reflection on the topic and proposed its own definition of an innovation ecosystem:

"... a highly dynamic territorial area from the economic-entrepreneurial point of view, characterized by high cultural, scientific and technological progress, attractiveness and social mobility, with effective reward mechanisms and guarantee of equity in access to opportunities".

Against this definition, among the necessary components for an innovation ecosystem to flourish, the InnoTech Community recognizes the following:

- ability to attract new intellectual forces;
- ability to enhance existing skills;
- ability to attract new financial capital;
- production of substantial innovations and discontinuities;
- ability to create new markets and/or anticipate relevant trends and to generate widespread entrepreneurship;
- propensity to 'risk' to innovate and widespread culture of innovation;
- concentration of ecosystem research and development infrastructure at international level.

This conceptual modelling made it possible to devise an index aimed at measuring and structurally comparing the innovation performance of innovation ecosystems around the world: The European House - Ambrosetti Global Innosystem Index (TEHA – GII). The GII makes it possible to compare and assess the innovation landscape from a global point of view with a particular focus on Italy.

This chapter examines the structures, activities and dynamics of the different components of the innovation system, analyzing the interactivity and relationships that determine the power and effectiveness of networks, in order to understand the criteria for a viable and successful innovation system.

1.2 THE EUROPEAN HOUSE - AMBROSETTI GLOBAL INNOSYSTEM INDEX: OVERVIEW, STRUCTURE AND METHODOLOGY

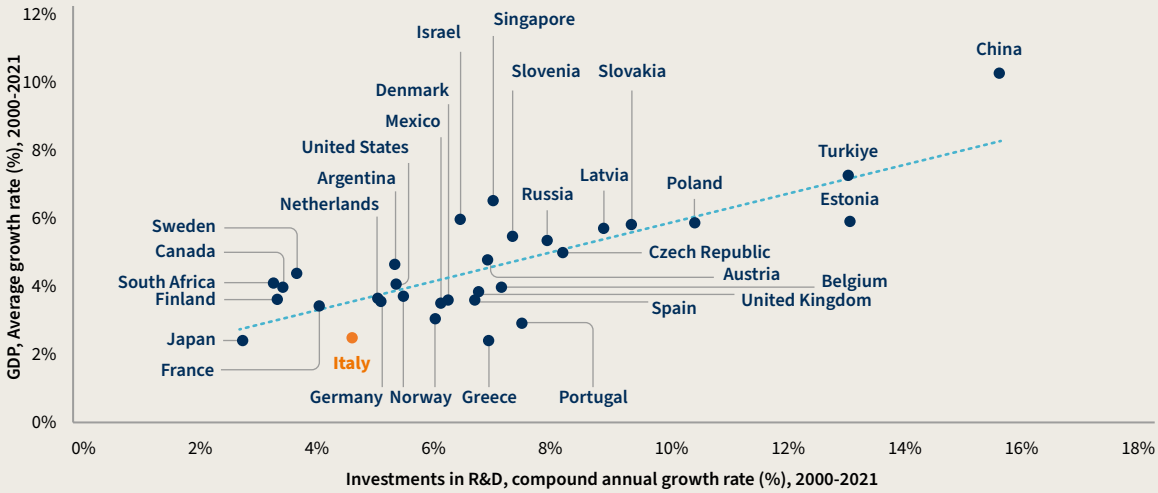


FIGURE 1.
Relationship between R&D investment and GDP (compound annual growth rate and average annual growth rate), 2000-2021.
Source: The European House - Ambrosetti elaboration on IMF and OECD data, 2024.

R&D investment is a key component and an important predictor of a country's economic growth and development. There is a positive correlation between the two variables, as can be seen from the figure above: countries that invest the most in R&D are also those with the highest growth rates.

According to the latest available data, China is confirmed as the leading country in both R&D investment growth and GDP trends.

The allocation of resources for research and development is one of the most influential variables on a country's ability and readiness to innovate: however, several factors affect the ability to 'produce' innovation.

This is another reason why the Global Innosystem Index is an information and decision guidance tool that starts with a clear identification of the overall performance of each country, according to uniform and comparable values over time, and measures the results achieved by each innovation ecosystem on relevant key factors.

In the analysis, the selection of the reference sample followed four orders of variables:

1. **International literature on global innovation centres**, considering major databases such as the World Bank, Eurostat, OECD (Organization for Economic Co-Operation and Development), Scimago and WIPO (World Intellectual Property Organization);
2. **Production of innovation** – in-depth studies were carried out on each country to assess the actual production of innovation worldwide (scientific publications on a global scale, success of patenting activities, etc.);
3. **Investment in education** pertaining to STEM (science, technology, engineering, and mathematics) subjects as promoters of innovation enablement and the development of efficient ecosystems with the capability to attract prosperity to countries;
4. **Comparability and coverage** – the countries were compared by assessing their relative size, socio-economic conditions and the availability of data on the chosen indicators.

FIGURE 2.
Flags of the 37 selected countries.

On the basis of these criteria, 37 high innovation performance countries were identified.

The results of the top-performing countries in each category were compared with those of Italy to quantify any existing gaps and to understand what the hindering factors and possible areas for action are.

The results of each ecosystem were then represented at the level of two macro-sets of indicators.

A. **Input variables**, selected to assess each country's endowment with respect to the determinants of overall innovation performance; four subgroups were considered:

- **Human capital**, to measure the predisposition of each countries' population in embarking on a career path in line with R&D activities (personnel employed in R&D functions per 1,000 inhabitants) as well as the predisposition of younger age groups to study and learn science subjects (tertiary education) and their aptitude for these subjects (PISA scores);
- **Financial resources for innovation**, to map the availability of funds at all relevant levels of investment/financing (total R&D investment, component of public and private R&D investment, deployment of venture capital, indirect public support through R&D tax incentives);
- **Innovative ecosystem**, considered as the set of indicators to identify the capacity of each ecosystem to provide protection to innovation actors and transform innovation into new business ideas;
- **Attractiveness of the ecosystem**, understood as a set of variables designed to measure the capacity of each country to develop an environment capable of attracting investment and new talent, being capable of stimulating collaborative synergies between universities and the private sector.

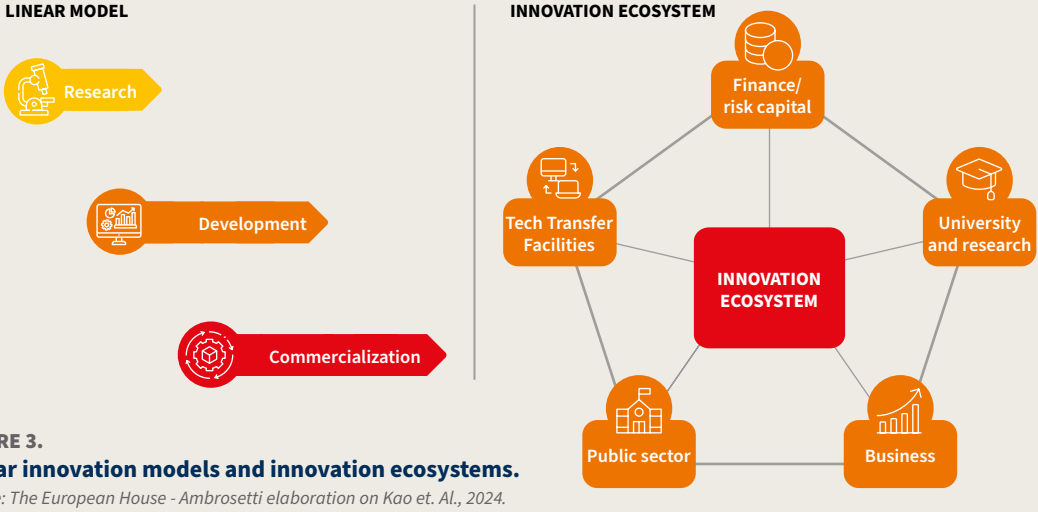


FIGURE 3.
Linear innovation models and innovation ecosystems.
Source: The European House - Ambrosetti elaboration on Kao et. Al., 2024.

B. Output variables, aimed at 'capturing' at the highest level of synthesis the results of innovative effectiveness in terms of the production of innovations and their economic impact:

- **Results of basic research activity**, to measure the amount of 'new knowledge' that is generated in each innovation ecosystem (e.g. number of publications and number of citations);
- **Outcomes of applied research**, i.e. the transfer of knowledge from basic research to the market, assessed e.g. by the number of patent applications and the success of patenting activity (number of patents obtained against the number of patent applications filed);
- **Ability to generate reference technology solutions**, measured by the share of R&D-intensive sectors' exports in relation to total manufacturing exports and the commercial export-import balance of R&D intensive activities.

It should be noted that, compared to the indicator developed in 2023, 14 new variables have been included in the 2024 edition. In particular, within the Input section, education budget as a percentage of GDP, proportion of ranked universities in the top 200, digital skill measurement, tertiary education rate, VC investment per capita, supercomputer cores per capita, public sector AI strategy, tech unicorns per 100k inhabitants, unicorn valuation as a percentage of GDP, net FDI inflows as a percentage of GDP, coders per capita and the Global Attractiveness Index. In the output section, the new variables include the trade balance on technology products and the H-index per 1,000 researchers.

For each variable of the TEHA-GII 2024, a database was constructed over the time span 2008-2021 (or the latest available data), reconstructing a homogeneous and comparable dataset and using information available from international statistical sources.

	DIMENSION	PROXY	RATIONALE	SOURCE
INPUT	**Human Capital**	R&D personnel per 1000 employees	Impact of innovation on employment	OECD
		Total graduates pursuing STEM fields	Human capital advancement potential	OECD
		Universities ranked top 200 globally as a proportion of total ranked universities	Capability of research institutions to produce innovation	QS
		PISA score (average of science and math)	Capability of youth	OECD
		Digital skill measurement	Level of technological proficiency	Eurostat
		Tertiary education rate	Propensity to pursue higher education	OECD
		Education budget as a percentage of GDP	Capability of economy to produce positive educational outcomes	World Bank
	Financial resources for innovation	Private investment in R&D as a percentage of GDP (BERD)	Private sector propensity to invest in R&D	OECD
		Public investment in R&D as a percentage of GDP (GERD)	Public sector propensity to invest in R&D	OECD
		R&D expenditure supported by public sector	Public incentives for R&D	OECD
		Venture capital investment per capita	Capability of feasible pursuits of innovation & entrepreneurship	Dealroom
	Innovative ecosystem	New businesses creation per capita	Innovation driven through competition	World Bank
		Quality of patent ecosystem	Capacity to protect novel ideas	International Property Alliance
		Number of public sector AI initiatives per capita	Public sector capacity to innovate	UNESCO
		Tech unicorns per 100k inhabitants	Success of new tech companies	CB Insights
		Coders per capita	Programming capability of population	Github
		Supercomputer Cores (processing power) per capita	Capability of high end innovation	Top500
		Unicorn valuation as a percentage of GDP	Success of new tech companies	CB Insights
	Attractiveness ecosystem	Percentage of expenditure on R&D (HERD) financed by industry	Private sector propensity to invest in R&D	OECD
		Share of R&D financed abroad	R&D investment from corporate leaders abroad	OECD
		Net mobility of students	Attractiveness of education ecosystem	OECD
		FDI Inflows as a percentage of GDP	Tech transfer capabilities	World Bank
		Global Attractiveness Index	Capacity to welcome foreign investments	TEHA
OUTPUT	**Effectiveness of innovative ecosystem**	Patent applications per 1000 inhabitants	Prevalence of patenting activities	WIPO
		Success rate of patent applications	Development of novel ideas	WIPO
		High tech exports as a percentage of total manufacturing exports	Impact of innovation on economic structures	World Bank
		Trade balance on technology products	Impact of innovation on economic structures	World Bank
		Citations per 1000 researchers	Quality of research papers	Scimago
		Publications per 1000 researchers	Capacity of research	Scimago
		H-index per 1000 researchers	Impact of research	Scimago

FIGURE 4.

Table of key variables of the TEHA-GII 2024.

Source: The European House - Ambrosetti elaboration on data from Eurostat, OECD, WIPO, CB Insights, International Property Alliance, Dealroom, QS, World Bank and Scimago, 2024.

1.3 THE RESULTS OF THE EUROPEAN HOUSE - AMBROSETTI GLOBAL INNOSYSTEM INDEX 2024 (TEHA-GII 2024)

The TEHA-GII 2024 was constructed by processing data from the last 3 available years, i.e. from 2019 to 2021. With the aim of analyzing its evolution over time, the 2020 indicator (based on the 2016-2017-2018 data) was also recalculated, taking into account the additions of the 14 variables.

It should be noted that, in light of the addition of the new variables & countries, it is not possible to compare the TEHA-GII 2024 with the indicator developed in the 2023 report "InnoTech Report 2023: the Italian innovation ecosystem, challenges and opportunities".

The results of the TEHA-GII shows Singapore in first place with a score of 5.41 followed by Israel with 5.21 points and Estonia with a score of 5.17. The first two countries show an overall improvement in their score compared to the value recorded in 2020. In terms of ranking, Switzerland is the country that gained the most positions, rising 9 positions from the TEHA-GII 2020 to TEHA-GII 2024.

Italy is at the back of the pack, precisely in 24th position, a decrease in a position compared to last year's ranking. Italy's score is 3.19 – slightly down (-0.38) compared to 2020.

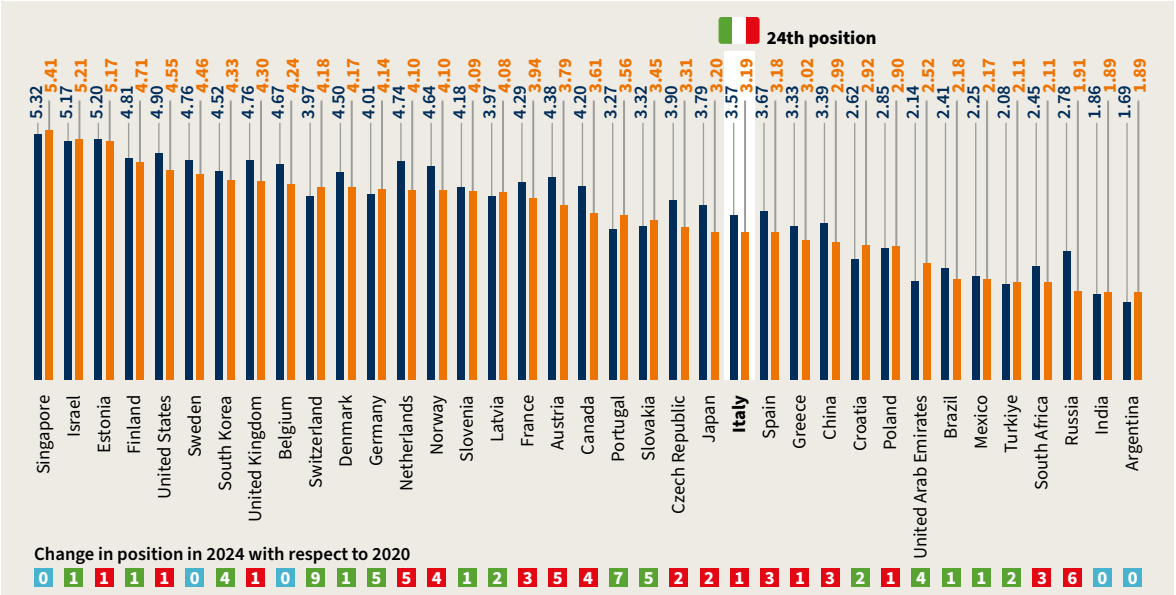


FIGURE 5.
The European House - Ambrosetti Global Innosystem Index 2024.
Source: The European House - Ambrosetti elaboration, 2024.

TEHA-GII 2020
TEHA-GII 2024

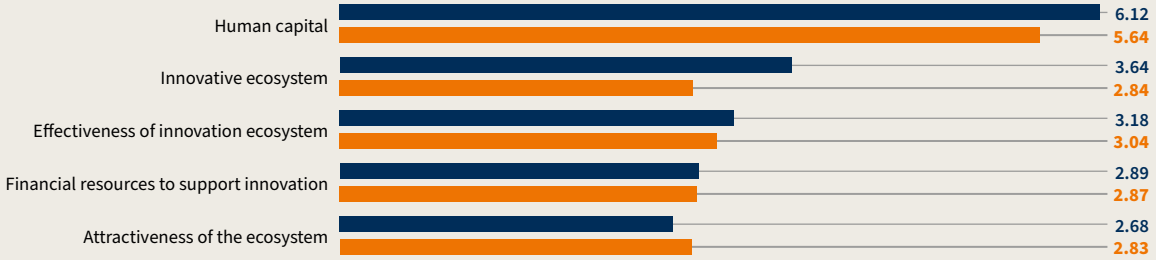


FIGURE 6.
The European House - Ambrosetti Global Innosystem Index 2024.
Source: The European House - Ambrosetti elaboration, 2024.

Overall, the changes in the TEHA-GII compared to the previous period of analysis are the result of the trends in each macro-category, both output and input. Compared to the average of the three-year period 2016-2018 (represented by the 2020 index), the TEHA-GII 2024 showed improvement in only one dimension "Attractiveness of the ecosystem".

In the remainder of the chapter, the results of each sub-indicator are described and depicted.

1.3.1 Human Capital

The first area of analysis of The European House - Ambrosetti Global Innosystem Index relates to Human Capital. This indicator measures the endowment of qualified resources to carry out R&D at present and in perspective.

Overall, Sweden ranks first with a score of 8.31 – up 0.11 points from the 2020 indicator. This is followed by Denmark (7.86) and Finland with 7.56. Within this framework, Italy ranks 28th with a score of 4.88.

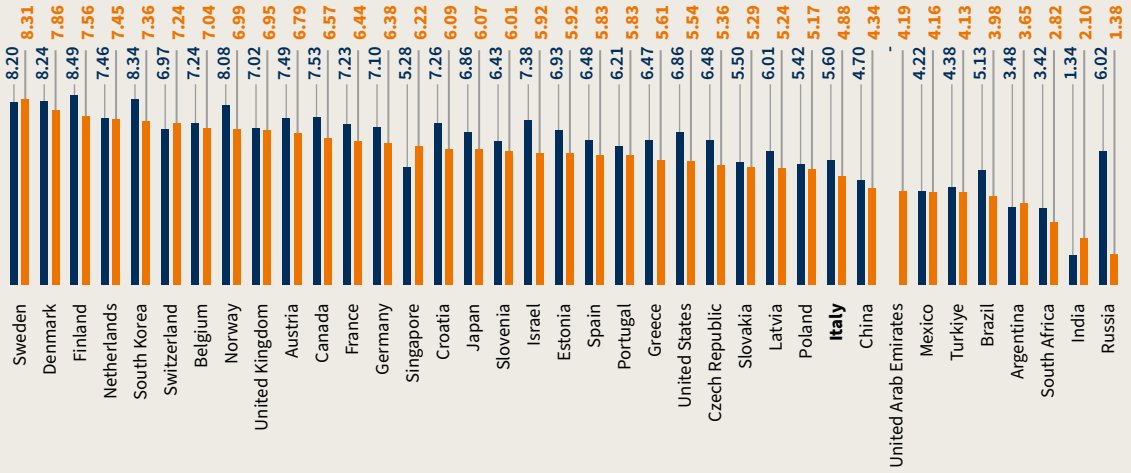


FIGURE 7.
Positioning of innovation ecosystems in the "Human Capital" area.
Source: The European House - Ambrosetti elaboration, 2024.

In the following, the seven variables that make up the Human Capital macro category are analyzed individually: R&D personnel, graduates in STEM, universities ranked top 200, PISA scores in the areas of Mathematics and Science, digital skill measurement, tertiary education rate, and education budget.

In 2021, South Korea ranks first with 17.26 people dedicated to R&D per thousand employees – higher than Sweden (16.55) and Finland (16.16). Italy ranks 24th with a value of 6.33.

Considering the share of science graduates in the total number of tertiary graduates in the last three years, Germany comes first with a value of 35.99% – followed by South Korea (31.63%) and Croatia (30.06%). In this respect, Italy ranks 17th worldwide with 22.7% of graduates being STEM graduates.

With respect to the proportion of top 200 universities to all ranked universities, Sweden comes first with 75.00% of universities in top 200, followed by Netherlands with 61.54% of institutions in the top 200, and Denmark with 60.00%. Italy ranks 21st overall with 7.14% of universities in the top 200.

The 2022 PISA Score was analyzed with the aim of understanding how the preparation of young students may, in the future, influence the innovative performance of individual countries. In particular, the analysis considered the cumulative score in the math and science subjects. In these areas, the highest scoring country is Singapore (568), followed by China (547.5) and then Japan (541.5). Italy is in 23rd place with a score of 474.

In terms of digital skill measurement, the rankings are as follows: Finland (79.18), Netherlands (78.94), Norway (78.71). Italy placed 20th with a score of 45.60.

As the penultimate KPI, we look at the tertiary education rate, where South Korea ranks first with 69.63% of individuals aged 25-34 with tertiary education, Canada ranks second (64.57%), and Japan ranks third (63.29%). Italy is in 26th position with 28.28%.

Lastly, we consider the education budget as a percentage of the GDP, Sweden ranks first with 7.41%, followed by Norway (7.09%) and Denmark (6.77%) with Italy ranked 26th with 4.22%.

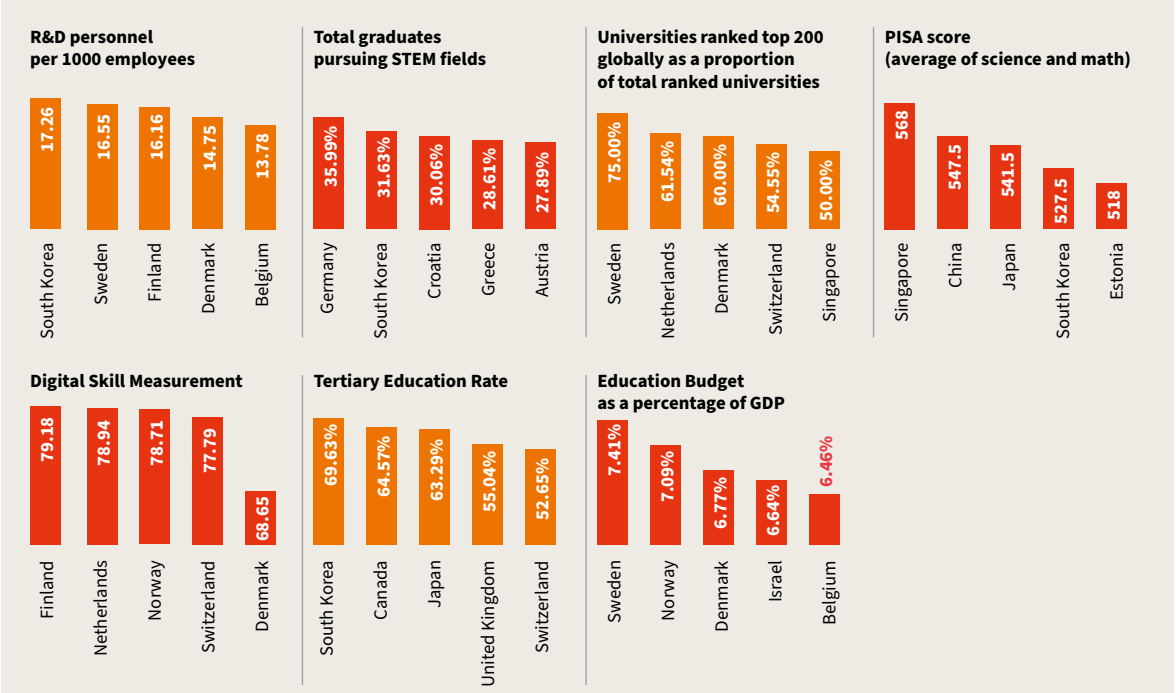


FIGURE 8.

Ranking of the top 5 ecosystems on the indicators that make up "Human Capital", latest available data.

Source: The European House - Ambrosetti elaboration, 2024.

A case study on how Finland is pioneering within the space of human capital

Finland has come out in third place for Human Capital with a score of 7.56, solidifying itself as a forerunner for the development of exceptional human capital.

One of the key elements of Finland's educational strategy is a fluid curriculum that evolves over time – it is regularly reviewed and updated to ensure it equips students with the skills needed in the modern world. The Finnish National Core Curriculum was last updated in 2016 for the purpose of "increasing the meaningfulness of learning and enable every pupil to feel successful" with the ultimate goal of guiding pupils to become lifelong learners. The curriculum also encourages multidisciplinary learning and an emphasis on music, the arts, and outdoor activities.

Finland also enables education for all with free public education programs – pre-primary education (including one compulsory year) to universities. This means there are no tuition fees for students, whether they're citizens or coming from EU/EEA countries and Switzerland, creating ease of access for those who want to pursue education and, ultimately, increasing the number of those who pursue education, facilitating effective human capital development.

Source: The European House – Ambrosetti elaboration on various reports by the Finnish National Agency for Education, 2024

1.3.2 Financial Resources for Innovation

The second area of the TEHA-GII considers financial resources to support innovation, analyzing public investment in support of R&D and the availability of private capital to support the development of innovations.

United Kingdom has the best score of 6.88 – gaining the first position; it is followed by Israel (6.73) and the United States (5.62). Italy is in the 22nd position with a score of 2.28 – down from the value recorded in the 2020 index (2.70).

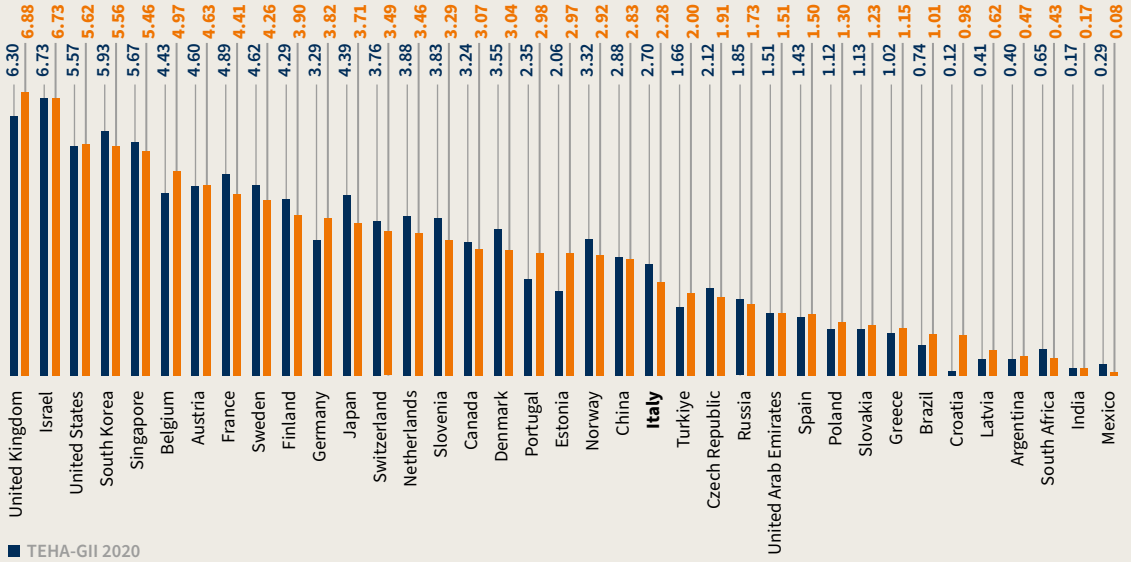


FIGURE 9.

Positioning of innovation ecosystems in the area "Financial resources for innovation"

Source: The European House - Ambrosetti elaboration, 2024.

In the following, the individual sub-indicators that make up the category "Financial Resources for Innovation" are analyzed, namely, business investment in R&D (BERD) in relation to GDP, the total amount of public R&D investment in relation to GDP (GERD), indirect public support through R&D tax incentives, and finally venture capital deployment per capita.

Considering private R&D investment as a percentage of GDP, i.e. BERD (Business Expenditure on Research and Development), Israel ranks first (5.06%), followed by South Korea (3.90%) and USA (2.68%). Italy ranks 23rd with private investment in R&D amounting to 0.87% of national GDP.

Analyzing public investment in R&D, i.e the value of GERD (Gross Domestic Expenditures on Research and Development), Israel ranks first with 5.56%, followed by South Korea (4.93%) and the USA (3.46%). Italy is in 23rd position with 1.45%.

Government tax incentives to invest in R&D score 0.31% in the UK; next with almost no gap is France with 0.29%, followed immediately by Belgium with 0.24%. Italy ranks 8th with a score of 0.14%.

The last indicator looks at the venture capital market and its level of maturity. In this respect, Singapore emerges as the benchmark country, obtaining the highest value with $961.47 in funding per capita, followed by the US ($711.97 per capita) and Israel ($686.95 per capita). In this ranking, Italy is in 27th position with $13.90 in funding per capita.

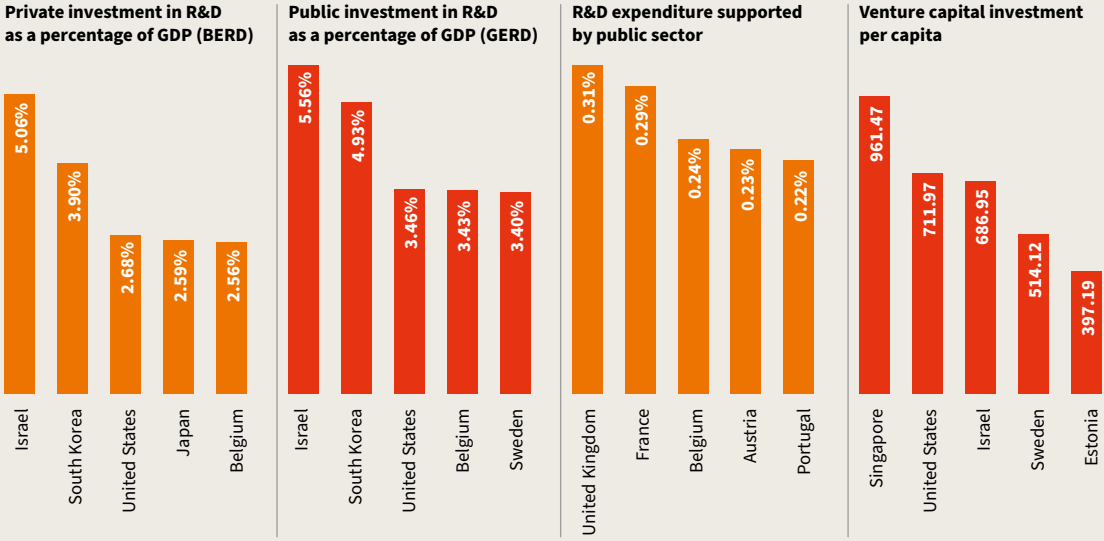


FIGURE 10.

Ranking of the top 5 ecosystems on the indicators that make up "Financial Resources for Innovation", latest available data.

Source: The European House - Ambrosetti, 2024 elaboration.

A case study on how Israel has emerged as a leader for innovation financing

Israel, as a relatively newer economy, has been able to establish itself as a leader in innovation financing – particularly with its strong venture capital and startup ecosystem.

The density of innovation has played a significant role in elevating Israel's innovation ecosystem. A high concentration of startups, research institutions, and innovation financing entities (governmental incentives, venture capital, private equity, and growth equity) in a small geographical area like Israel creates a breeding ground for collaboration and the exchange of ideas. This close proximity will also foster competition, pushing firms to innovate faster and develop better products.

The Israeli public sector is one of the key enablers for innovation financing through the Israel Innovation Authority (IIA). The IIA offers financing worth 20-50% of the total R&D expenditure for conducting research within highly innovative fields like medical devices, hardware, and cleantech. Other activities of the IIA include tax incentives & stimulus packages for startups & private investors, business incubators, and the creation of clubs for angel investors.

91%
of R&D in Israel is performed by private sector

500,000
employees in the tech sector (14% of all employees)

18%
of the GDP comes from the high-tech sector

Source: The European House – Ambrosetti elaboration on various reports by the Israeli Innovation Authority, 2024

1.3.3 Innovative Ecosystem

The third section of the TEHA-GII – Innovative Ecosystem – measures the capacity of an ecosystem to protect the innovation produced and to transform innovative ideas into new business realities.

In 2024, Estonia takes first place with an overall score of 7.96 – down from the 2020 index by 1.00 point. This is followed by Singapore in second place with 6.50 points. In third position is the USA with a score of 5.12. Italy is in 32nd position with a score of 1.68.

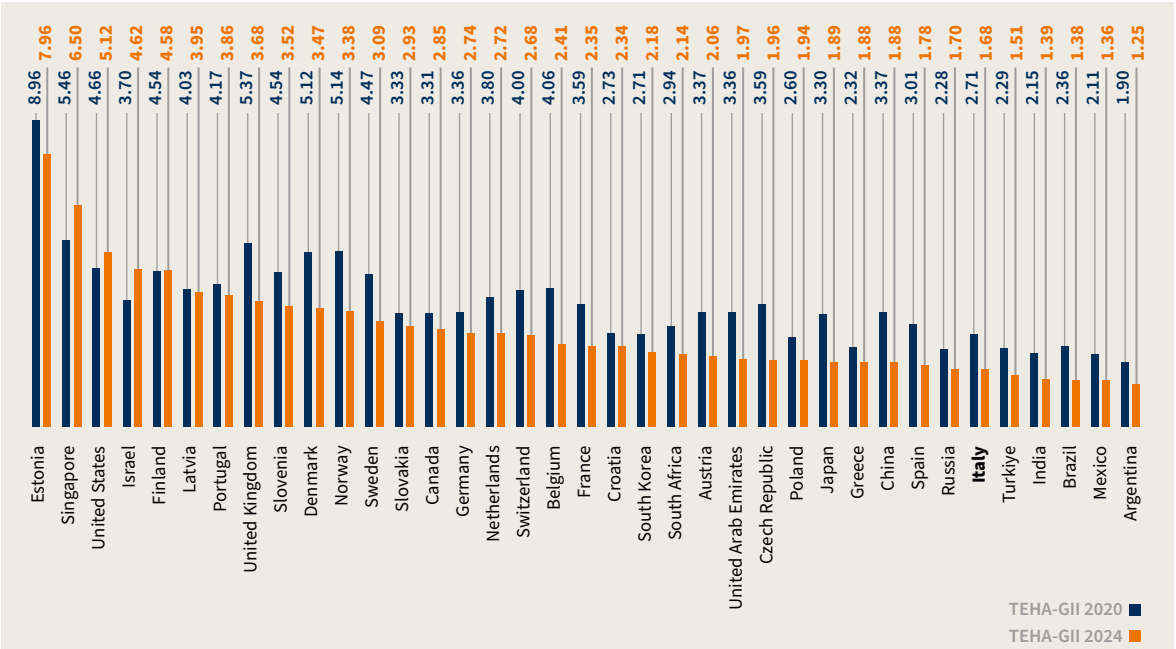


FIGURE 11.
Positioning of innovation ecosystems in the "Innovative Ecosystem" area.
Source: The European House – Ambrosetti elaboration, 2024.

The category of the Innovative Ecosystem consists of seven sub-indicators: new business registrations per capita, Intellectual Property Rights Index, public sector AI initiatives per 10k inhabitants, tech unicorns per 100k inhabitants, coders per capita, supercomputer cores per capita, and unicorn valuation as a percentage of GDP.

The first indicator refers to the registrations of new enterprises per thousand inhabitants, Estonia leads the way with 24.19 new enterprises created per 1,000 inhabitants of working age (15-64). This is followed by the UK with a score of 18.10 and the South Africa with 12.49. Italy ranks second last with approximately 2.96 new registered enterprises per 1,000 inhabitants.

The second indicator evaluates a country's ability to protect intellectual property. Finland takes first place with a score of 8.48, followed by Switzerland with 8.42. In third place is the Singapore with a score of 8.34. Italy ranks 26th with 6.13 points.

The third indicator evaluates the number of public sector initiatives pertaining to artificial intelligence adoptions launched per 10k people in a given country. Estonia ranks first (0.21), followed by Slovenia (0.12) and Singapore (0.07). Italy ranks 28th with 0.003 AI initiatives per 10k inhabitants.

The number of tech unicorns per 100k evaluates the number of tech startups that have achieved unicorn status – i.e when a startup attains a valuation exceeding $1 billion. Singapore (0.28), Israel (0.24), and the US (0.20) are leaders within this category. Italy ranks 30th with 0.003 unicorns per 100k inhabitants.

Coders per capita looks at the number of individuals pursuing professions wherein coding knowledge is beneficial. Singapore leads the way with 0.49 developers per capita, followed by Netherlands (0.22) and Estonia (0.21). Italy ranks 30th with 0.06 developers per capita.

Next, we look at the number of supercomputer cores per capita, gauging the processing power of high-performance computing facilities (largely used to abet research efforts) in countries. Finland ranks first with 0.56 supercomputer cores per capita, followed by the US (0.12) and Japan (0.09). Italy shows a relatively strong showing ranking 5th with 0.08 supercomputer cores per capita.

Lastly, unicorn valuation as a percentage of GDP shows the contribution of successful, innovative startups towards the economy. The rankings are as follows: Estonia (25.98%), Singapore (19.90%), and Israel (10.35%). Italy ranks 32nd with 0.10% contribution to the GDP.

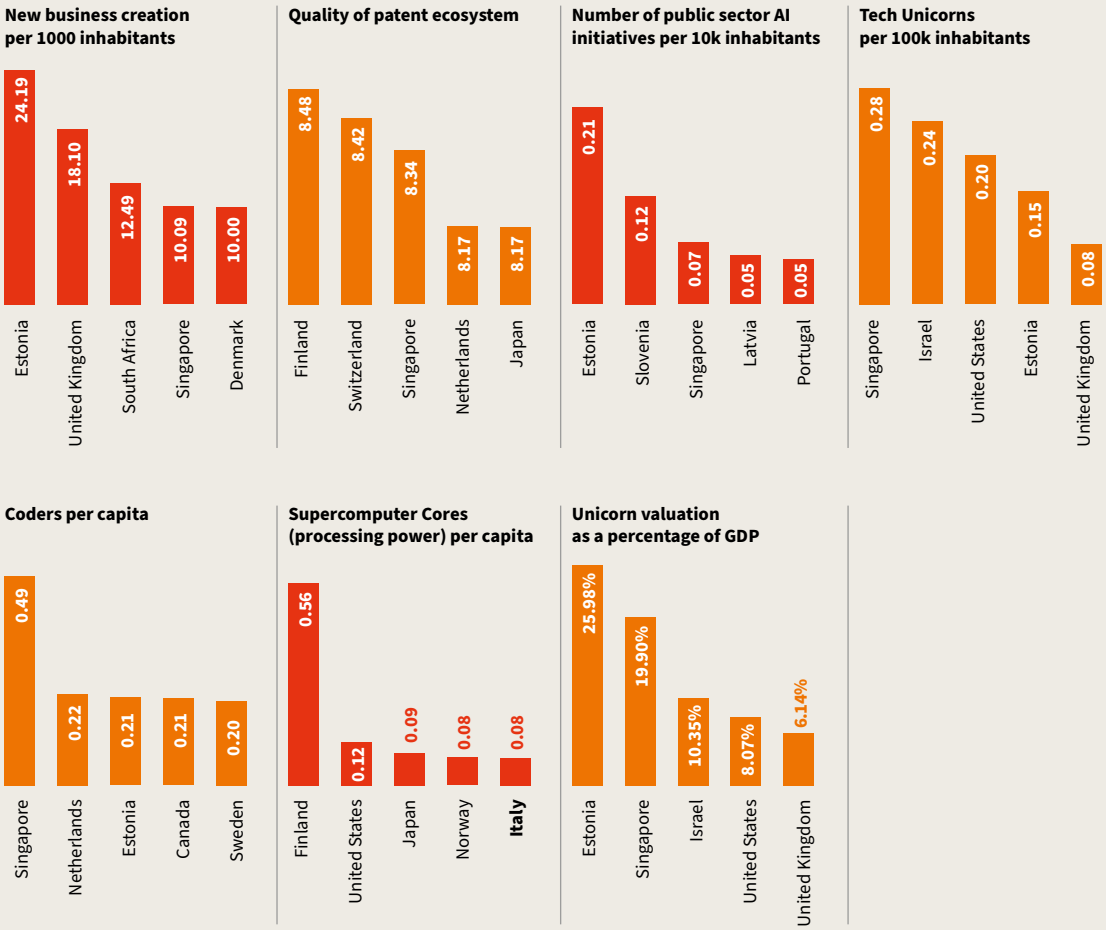


FIGURE 12.

Ranking of the top 5 ecosystems on the indicators that make up the "Innovative Ecosystem" area, latest data available.

Source: The European House – Ambrosetti elaboration, 2024.

How Estonia has become a digital frontrunner in the EU

Estonia sets the benchmark for technological innovation and digitalization within the European Union – crucial for establishing oneself as an innovative ecosystem.

Estonia is a pioneer for digital technologies & the e-government, wherein citizens can handle most interactions with the government online, from filing taxes to voting in elections increasing efficiency and transparency. Estonia also actively advocates for EU policies that promote digitalization across the bloc, such as a unified Digital Single Market within the EU to remove barriers for digital trade allowing for the free flow of goods and services across borders.

The technology ecosystem in Estonia is at the forefront of technological innovation in the world. Estonia is the home of several unicorn status startups like Wise & Bolt. Startups have largely been bolstered by government backing – e.g tax breaks, e-Residency programs, and funding opportunities. Estonians also have a high level of digital/tech literacy through competent educational facilities.

Source: The European House – Ambrosetti elaboration on European Commission data, 2024

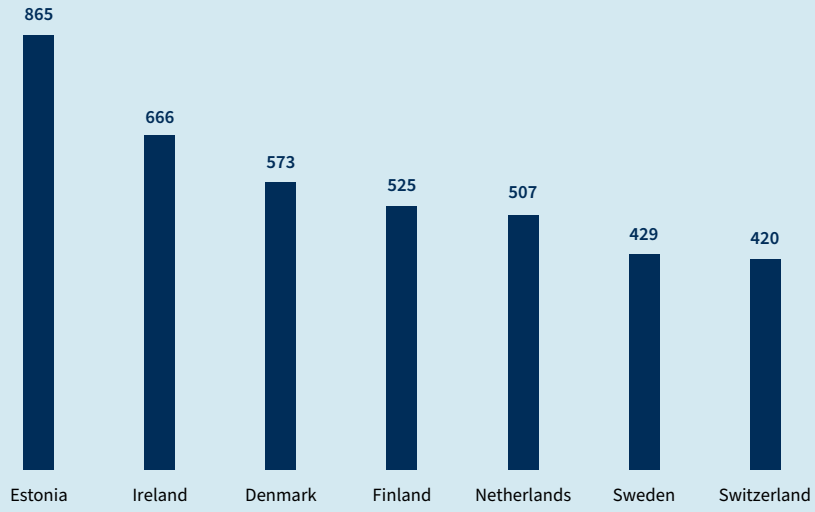


FIGURE 13.
Startup density per 1 million population, 2020.
Source: The European House – Ambrosetti elaboration on Dealroom data, 2024.

1.3.4 Attractiveness Ecosystem

The fourth area of the TEHA-GII measures a country's ability to develop an attractive environment for investment & new talent and to stimulate collaborative synergies between universities and businesses.

Singapore takes first place with an overall score of 5.16 (+0.96 points vs. 2020). It is followed by the Israel 4.26 points – in line with the performance recorded in 2020 – and China with 4.02 points. Italy is in 24th position with 2.60 points, up 0.14 points from 2020.

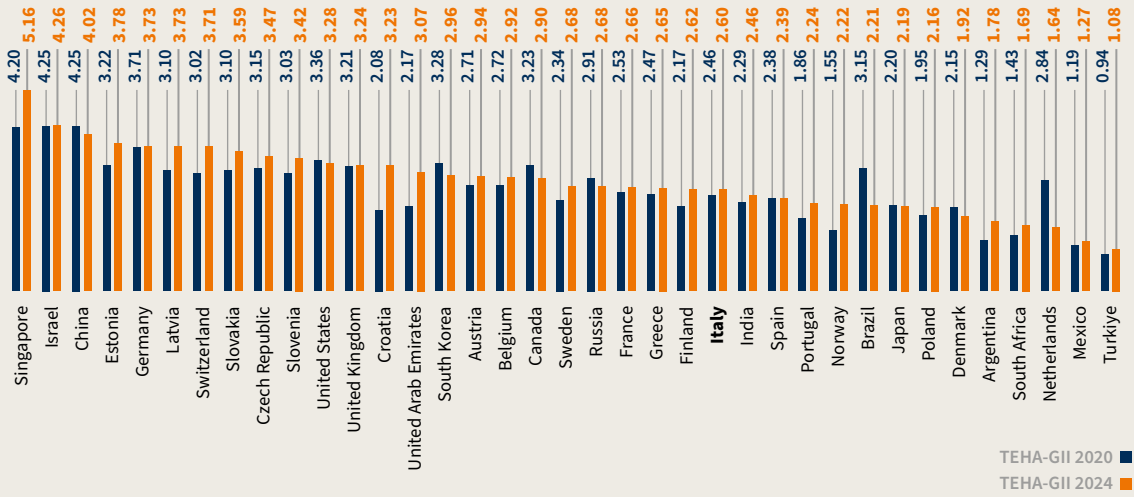


FIGURE 14.
Positioning of innovation ecosystems in the "Attractiveness Ecosystem" area.
Source: The European House – Ambrosetti elaboration, 2024.

Considering the individual sub-indices that make up the category of Attractiveness Ecosystem, the capital share of university expenditure invested in research and development (HERD – Higher Education Expenditure on R&D), the amount of university research financed from abroad, the net mobility of university students, FDI inflows as a percentage of GDP, and the Global Attractiveness Index are analyzed below.

With respect to the first evaluated element (HERD), China ranks first with 31.39% of university system expenditure invested in R&D. Russia follows with a share of 30.92%. South Korea concludes the podium with 14.06% of university expenditure invested in research. In this area, Italy is in 14th place with a value of 6.27%.

The second indicator analyzed considers the share of research expenditure that is financed from abroad. Israel ranks first with 51.42% of expenditure financed from abroad – 17.97 percentage points behind Latvia (33.45%) and the Czech Republic (28.89%). Here, Italy is in 17th place (9.89%).

Next, the net student mobility rate was analyzed, i.e. the net flow of students moving during their studies. Here, Slovakia ranks first with a value of 20.03%, followed by Estonia (7.85%) and Latvia (6.34%). Italy ranks 13th with 4.11%.

Net FDI inflows as a percentage of GDP shows us the level of new technologies, knowledge, and expertise brought in from foreign companies. Singapore ranks first with 30.17%, followed by Denmark (8.54%) and Sweden (7.75%). Italy lags behind, ranking 35th with 3.06%.

Lastly, we look at the Global Attractiveness Index, an index by The European House – Ambrosetti, creating a representative profile of the attractiveness and competitive sustainability of countries through four macro-areas of attractiveness (Openness, Innovation, Endowment and Efficiency). Germany leads the way with a score of 100, followed by the US (94.66) and the UK (92.67). Italy ranks 16th with a score of 66.31.

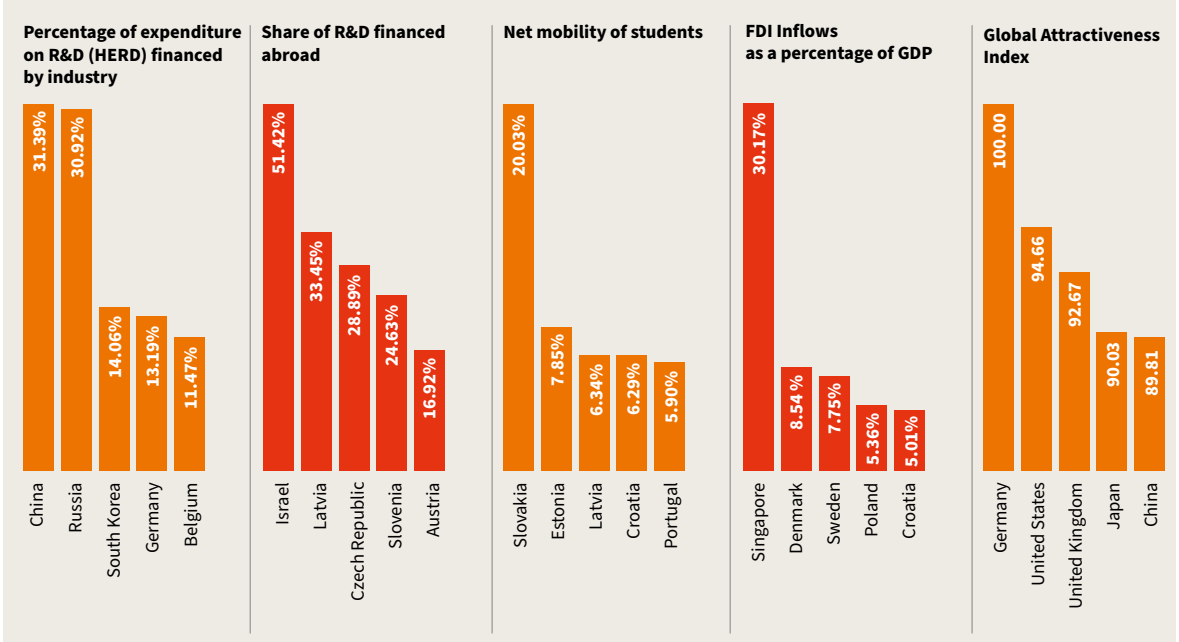


FIGURE 15.
Ranking of the top 5 ecosystems on the indicators that make up the "Attractiveness Ecosystem" area, latest data available.
Source: The European House - Ambrosetti elaboration, 2024.

How Singaporean logistical supremacy has bolstered its attractiveness

Singapore's attractive ecosystem can largely be attributed to its supremacy within the fields of trade and logistics.

Singapore's geographic advantage, being situated at the crossroads of major trade routes between Asia and the rest of the world, combined with regulatory measures to make trade friendly (free trade) and to create a pro-business environment (tax incentives, streamlined regulations, and a corruption-free environment) has resulted in Singapore's success as a leader in trade and logistics.

Furthermore, Singapore caters to specialized areas like cold chain logistics for perishable goods, chemicals, and high-value art & valuables, whilst also utilizing technologies like blockchain and AI to improve efficiency and transparency in supply chains. Singapore is also home to the National University of Singapore, one of the world's top 10 universities. All of these factors combined have led to a very attractive ecosystem.

Source: The European House – Ambrosetti elaboration on various sources, 2024

1.3.5 Effectiveness of innovative ecosystem

The last area of the TEHA-GII aims to capture the innovative effectiveness of ideas and their economic impact. This area encompasses seven output variables: the number of patent applications per 1,000 population, the success of patenting activity, the export rate of high-tech goods compared to total manufacturing exports, trade balance on technology products, the number of citations per 1,000 researchers, the number of publications per 1,000 researchers and the H-index per 1,000 researchers.

Singapore is ranking first, scoring 5.00 points in TEHA-GII 2024 - slightly down from 2020 score (5.17). It is followed by Latvia (4.69) and Estonia (4.67). In this area of the TEHA-GII, Italy ranks 10th worldwide with an overall score of 3.74 – increasing 0.23 points compared to the value recorded in 2020.

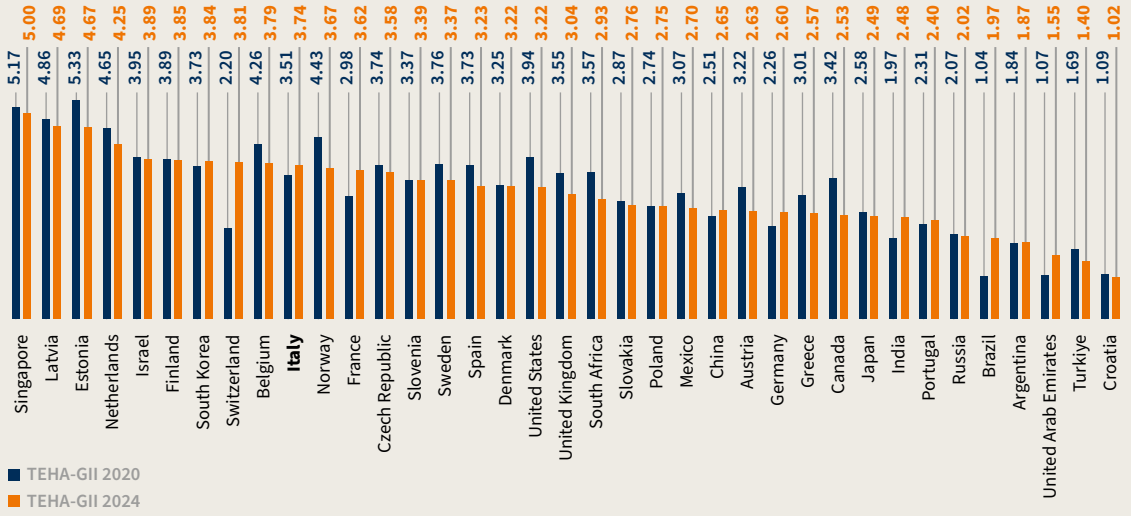


FIGURE 16.
Positioning of innovation ecosystems in the "Effectiveness of Innovative Ecosystem" area.
Source: The European House – Ambrosetti elaboration, 2024.

In the following the individual sub-indicators that make up the area "Effectiveness of the innovation ecosystem" are described.

The first sub-indicator considered the number of patent applications filed, worldwide, per 1,000 inhabitants, considering the population of the respective country. South Korea ranks first with 4.40 patent applications per thousand inhabitants. It is followed by Singapore with 2.50 and Japan with 2.34 patent applications per 1,000 inhabitants. Italy ranks 20th with just 0.18 patent applications filed per thousand inhabitants.

The second sub-indicator considers the success rate of patenting activity in a 3 years period, i.e. the number of patents obtained in relation to the number of patent applications filed. France ranked first with a success rate of 93.53%. It is followed by Belgium (85.77%) and Russia (84.81%), with Italy finishing in fifth place.

The third sub-indicator takes into account the share of exports of high-technology sectors – i.e. chemicals and pharmaceuticals, ICT and aerospace – in a country's total manufacturing exports. From the analysis carried out, Singapore came out on top with a 54.01% share of high-tech exports in total exports. This is followed by South Korea with 34.75% and China (30.68%). Finally, Italy is in 31st position with 8.04% of exports related to high-tech sectors.

Next, the fourth sub-indicator shows us the trade balance (export minus imports) of technology adjacent industries as a percentage of the GDP, showing whether countries already possess technical prowess or whether they need to import technologies. Finland comes first with 2.81%, followed by Israel (2.74%) and India (2.08%). Italy ranks 27th with -0.16%, showing that Italy has a deficit because it imports more technology than it exports.

The fifth sub-indicator assesses the quality of academic research by considering the number of citations per 1,000 researchers. Switzerland is in first place with more than 13.4 thousand citations per 1,000 researchers. It is followed by Denmark with 10.3 thousand citations per 1,000 researchers. Third place for Italy with 9.7 thousand citations for every 1,000 researchers.

The second-last sub-indicator assesses the number of publications per 1,000 researchers and gives an indication of a country's capacity to produce new basic knowledge, as academic publications tend to be a proxy for the advancement of basic research, i.e. the more frontier research that is generated in the academic sphere. Italy ranks first with more than 813 publications per 1,000 researchers, confirming its position as one of the international hubs for the generation of new knowledge. Estonia is following in second position with 765 publications/1,000 researchers and Spain ranks third with 715 publications per thousand of researchers.

Lastly, the H-index per 1,000 researchers shows us productivity and citation impact of publications. Estonia leads the way with an index of 74.37, followed by Latvia (55.60) and Slovenia (37.87). Italy ranks 20th with an index of 8.38.

How South Korea's innovation ecosystem is among the most effective

South Korea is a global leader in the development of new technologies, as well as being a key pioneer in high-level research of innovative subject matters.

South Korea spends a significant portion of its GDP on research and development, being one of the largest spenders globally within this category. Additionally, the South Korean government prioritizes moving beyond simply copying existing technologies and focuses on "first mover" strategies, encouraging original discoveries and innovation. This strategy of developing new & innovative ideas has led to breakthroughs such as EUV lithography, stacked NAND flash memory, stem cell advancements in regenerative medicines, among a plethora of other defining breakthroughs.

Source: The European House – Ambrosetti elaboration on various sources, 2024

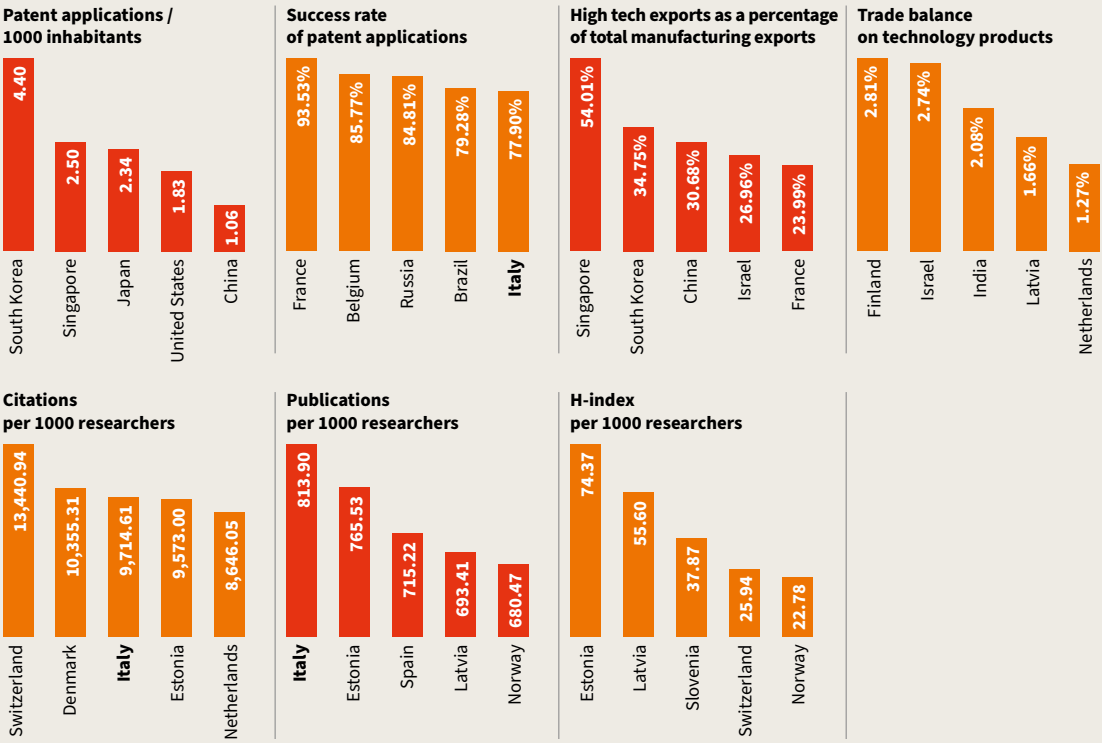


FIGURE 17.

Ranking of the top 5 ecosystems on the indicators composing the area "Effectiveness of the innovation ecosystem", latest available data.

Source: The European House – Ambrosetti elaboration, 2024.

1.4 Population segmentation of innovation ecosystems

In order to understand innovative ecosystems within context, it is necessary to segment them by size. For this chapter, we divide the indexed countries into two proportions – those with a population larger than 30 million people and those with less than 30 million people.

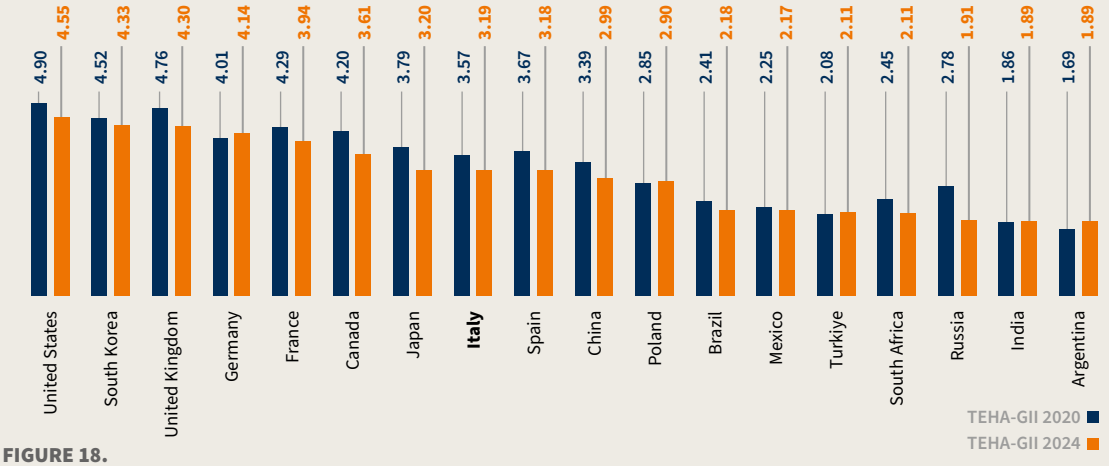


FIGURE 18.

Ranking of ecosystems on the overall indicator, countries with more than 30 million citizens.

Source: The European House - Ambrosetti elaboration, 2024.

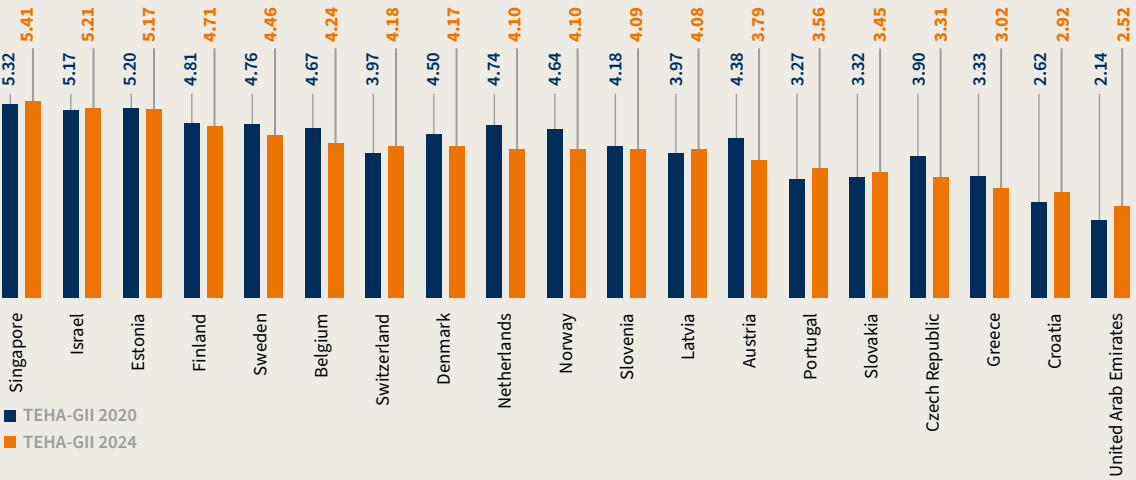


FIGURE 19.

Ranking of ecosystems on the overall indicator, countries with less than 30 million citizens.

Source: The European House - Ambrosetti elaboration, 2024.

The contrast between the indexes of larger and smaller economics is quite evident, given that the average index of large economies is 3.03 while the average index of smaller economies is 4.02 – a very significant difference of 32.67%.

We hypothesize that a variety of factors are responsible for such a significant discrepancy between larger and smaller populations:

1. **Innovation Density** – Innovation often thrives in clusters where researchers, entrepreneurs, and investors are geographically concentrated. This proximity fosters collaboration, knowledge sharing, and the cross-pollination of ideas, leading to a higher density of innovation. Higher innovation density is significantly easier to achieve in geographically smaller countries (and consequently smaller population), given that innovators and innovation enablers will be concentrated within a smaller geographic area.
2. **Resource Dilution** – Larger populations often require more resources to be allocated towards basic needs like education, infrastructure, and healthcare. This can leave less funding available for research and development (R&D), a key driver of innovation.
3. **Bureaucracy** – Complex bureaucracies in large countries can stifle innovation. Implementing new ideas and navigating regulations can be slow and cumbersome, discouraging innovation.

2

THE EUROPEAN HOUSE - AMBROSETTI REGIONAL INNOSYSTEM INDEX 2024 (TEHA-RII 2024)

Each European country is characterized by its own unique peculiarities, and more specifically, these countries are divided into various administrative divisions, like regions, states, or provinces, each marked by distinctive traits in terms of cultural, economic, and social dynamics. As such, the performance and identity of each country are shaped by the combination of these diverse factors, each contributing to the nation's distinctiveness. The overall performance of a country is influenced by different factors, such as the presence of innovative enterprises, universities, research centers, and the presence of digital infrastructures and technologies. However, the uneven distribution of these elements across different areas lead to differences in terms of innovation performance on a more local scale.

The InnoTech Community of The European House – Ambrosetti has developed an index to map out the innovation landscape across European regions: The European House -Ambrosetti Regional Innosystem Index 2024 (TEHA-RII 2024). This comprehensive indicator evaluates the 242 European regions, categorized according to the Nomenclature of Territorial Units for Statistics (NUTS) 2 system, offering a detailed overview of regional innovation capabilities and performance.

The TEHA-RII leverages data from the Eurostat database, the European Patent Office and the QS World University Ranking. It employs key performance indicators that serve as proxies for significant economic and social factors that influence the innovation performance of a region. The 2024 edition of the TEHA-RII includes a total of 11 indicators, grouped into 4 categories: Economic Development, Human Capital, Talent for Innovation and Digital Infrastructures and Technologies.

Economic Development

Human Capital

Talent for Innovation

Digital Infrastructures and Technologies

The composition of these categories is detailed as follows:

ECONOMIC DEVELOPMENT:

1. **Gross Domestic Expenditure in Research and Development (GERD)** as a percentage of GDP to measure the proportion of wealth invested in R&D, serving as an indicator for a region's commitment to fostering innovation.
2. **Gross Domestic Product** as an indicator of a region's overall economic well-being and prosperity. It reflects the capacity of a region to generate wealth and the resources available for investments in innovation and development.
3. **Number of patents** filed with the European Patent Office to quantify the level of technical and technological advancement in a region. A higher number of patents highlights a vibrant innovation ecosystem, where new ideas are being developed.
4. **Percentage change in the number of business units** as an indicator of the dynamism of a region's business environment.

HUMAN CAPITAL:

5. **Universities** as the number of universities that are ranked among the top one hundred in Europe as an indicator of the overall quality of tertiary educational within a region. It suggests a stronger educational ecosystem capable of encouraging innovation.
6. **Tertiary education attainment** as a percentage value of the population aged between 25 to 64 years, a proxy for the quality of the region's human capital in terms of level of education.
7. **Participation rate in education and training** as a percentage value of the total population age between 25 to 64 years, serves as a proxy of the lifelong learning, upskilling, and reskilling among adults. A high participation rate reflects the presence of an ongoing learning culture that is crucial to fostering innovation.

TALENT FOR INNOVATION:

8. **Human resources employed in the Research and Development** sector as a percentage value of the total employed population, as a proxy of a region's dedication to produce new knowledge, products, processes, and methods.
9. **Human Resources in Science and Technology (HRST)** as a percentage value of the total population employed, as an indicator of the proportion of workforce dedicated to the generation, advancement, and diffusion of scientific and technological knowledge. This indicator signals a region's capacity to innovate and support cutting-edge industries.
10. **Employment in High-Tech sectors and knowledge intensive services** as a percentage of the total population employed, as a direct measure of the human resources involved in sectors at the forefront of innovation.

DIGITAL INFRASTRUCTURES AND TECHNOLOGIES:

11. **Percentage of households where at least one member has access to internet** from home, serving as an indicator for the population's access to fixed broadband connectivity and a region's digital readiness for innovation.

Compared to last year, TEHA-RII 2024 has introduced 3 new KPIs: the percentage change in the number of enterprises, the universities and the employment in High-Tech sectors and knowledge intensive services. For each variable the timeline considered was 2018-2022. The index was built based on a total of 37,268* observations.

* The number of observations was calculated based on the available data for each indicator, multiplied by the number of years considered and the 242 NUTS regions.

2.1 The results of The European House – Ambrosetti Regional Innosystem Index 2024

The TEHA-RII 2024 is based on data spanning from 2021 to 2022, consolidating the KPIs previously described, each dedicated to portraying a significant element that relates to or influences the innovation performance of a region. This approach has allowed to define a comprehensive overview of the innovation performance for each region for 2024, looking at various aspects.

Additionally, to facilitate the comparison with past trends and understand changes over the recent years, another indicator, the TEHA-RII 2020, was calculated. This indicator is based on data spanning the three years from 2018 to 2020. Comparing the TEHA-RII 2024 with the TEHA-RII 2020 provides insights into the evolution of innovation performance over time for the different regions.

The TEHA Regional InnoSystem Index 2024 shows the *Île-de-France* region leading the ranking with a score of 7.37, followed by *Stockholm* with a score of 6.47. The subsequent three positions feature *Hovedstaden* (Denmark), *Helsinki-Uusimaa* (Finland), and *Praha* (Czech Republic) with respectively 6.09, 5.91 and 5.72.

By extending the scope of observation and looking within the top fifty regions, three Italian regions have secured their position. *Lombardia* ranks 39th with a score of 4.13, followed by *Provincia Autonoma di Trento* at the 48th position with a score of 3.94. Third in Italy, and 49th in Europe positions the *Lazio* region with a score of 3.93.

Continuing within the leading Italian regions that appear among the top one hundred European regions, the next ones that ranks the highest are *Emilia-Romagna* 76th, *Piemonte* 82nd, *Toscana* 90th and *Friuli-Venezia Giulia* 97th, with remarkably similar score of 3.61, 3.52, 3.42 and 3.36.

On the other hand, among the lowest ranking, always concerning the Italian scenario, the five lowest regions are *Calabria* 191st, *Sicilia* 180th, *Basilicata* 179th, *Puglia* 178th, *Sardegna* 175th, registering scores that are between 2.37 and 2.60.

While overall, all the last positions on the European level are covered by Greek regions, in particular the *Ionia Nisia* region is ranked last with a score of 1.06.

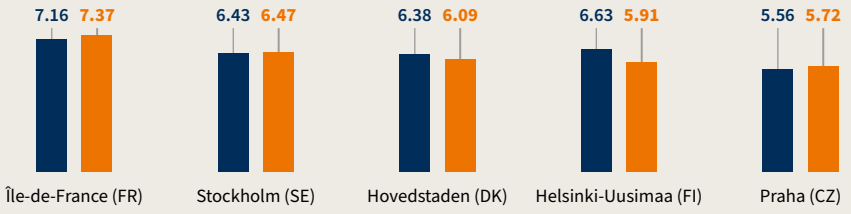


FIGURE 1.
TEHA–RII 2024: Top 5 European Regions (index score from 1 to 10).
Source: The European House – Ambrosetti elaboration, 2024.

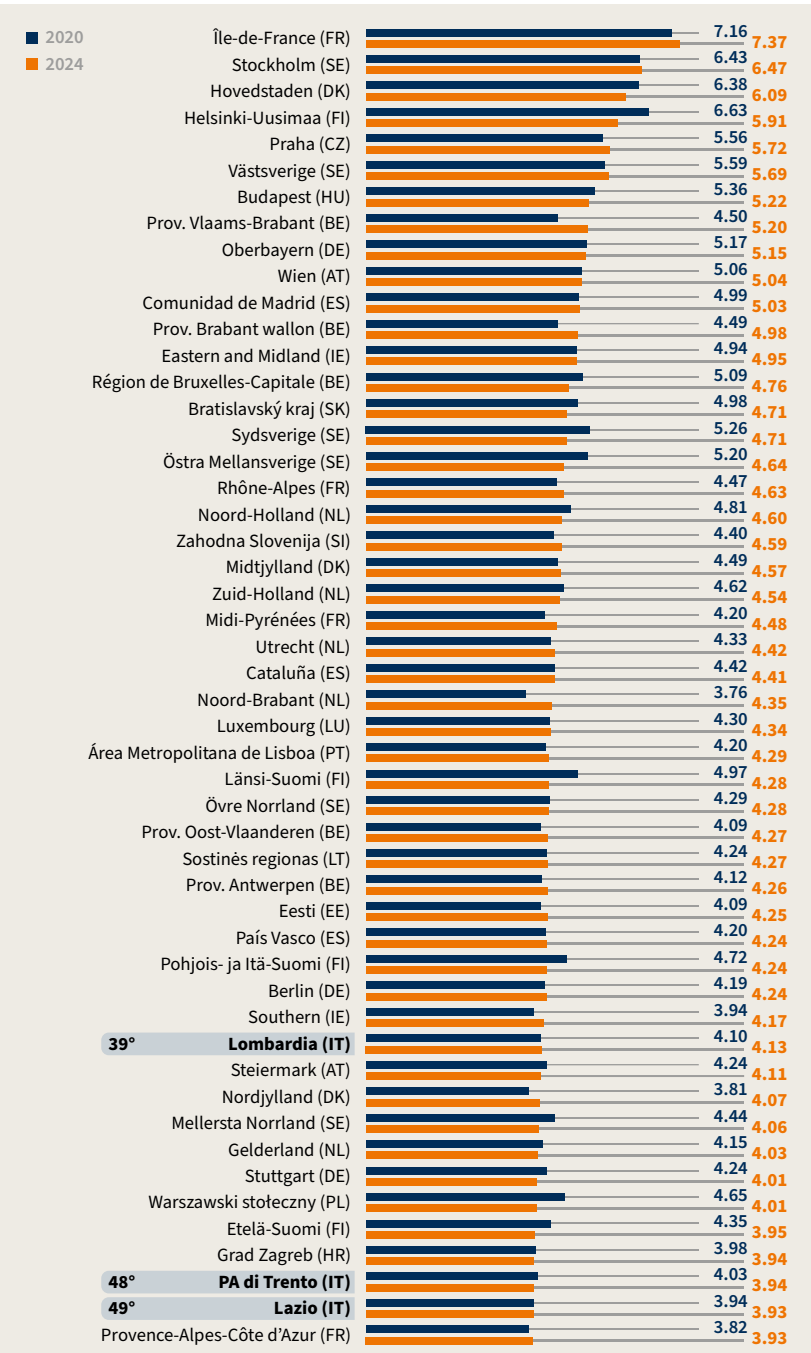


FIGURE 2.

The European House - Ambrosetti - Regional Innosystem Index 2024: Top 50 European Regions (index score from 1 to 10).

Source: The European House – Ambrosetti elaboration, 2024.

2.2 The positioning of the Italian regions in the European context

To better understand the position of the Italian regions in the 11 KPIs that make up the index, a comparison was made between the average of the Italian regions and the top 10 regions of the European Union.

By looking at the four categories assessed, Italian regions consistently fall behind the top 10 European regions across almost all the categories, specifically for the Human Capital and Talent for Innovation ones.

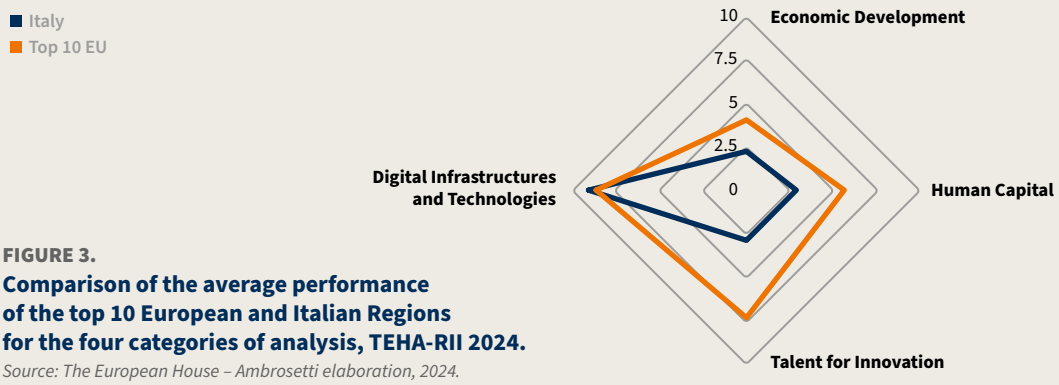


FIGURE 3.
Comparison of the average performance of the top 10 European and Italian Regions for the four categories of analysis, TEHA-RII 2024.
Source: The European House – Ambrosetti elaboration, 2024.

Expanding the observation to the specific KPIs that compose the index would offer a detailed overview of the strengths and weaknesses in innovation across Italian regions.

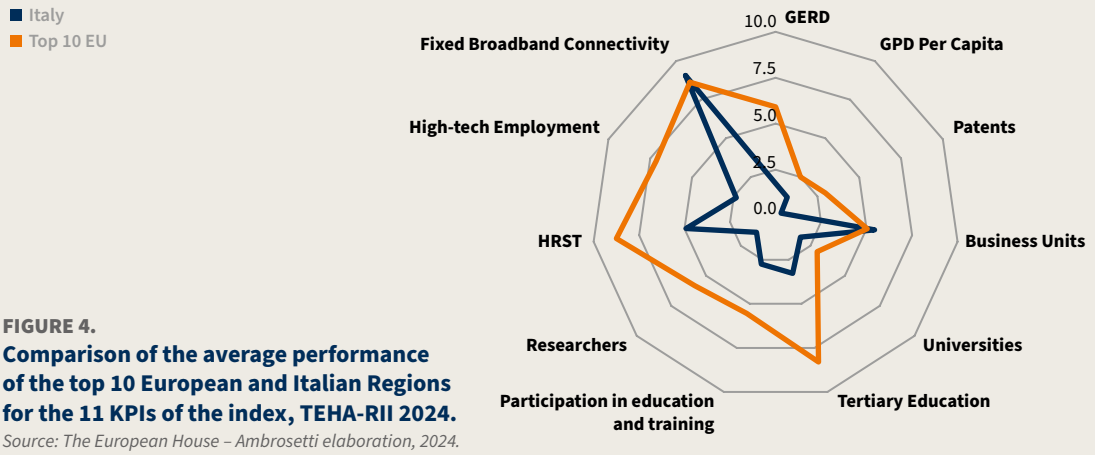


FIGURE 4.
Comparison of the average performance of the top 10 European and Italian Regions for the 11 KPIs of the index, TEHA-RII 2024.
Source: The European House – Ambrosetti elaboration, 2024.

The performance differences across Italian regions in the TEHA-RII 2020 and TEHA-RII 2024 reveals an overall improvement, especially for the regions that ranks lower in the ranking. *Lombardia* remains the top performer in Italy, achieving 4.13 points, gaining four positions from TEHA-RII 2020 on the European scale, moving from 43rd to 39th. Additionally, despite registering a slight decrease in the TEHA-RII for 2024 compared to the 2020 index, both the *Provincia Autonoma di Trento* and *Lazio* confirmed their position as the second and third best regions in Italy in terms of innovation performance.

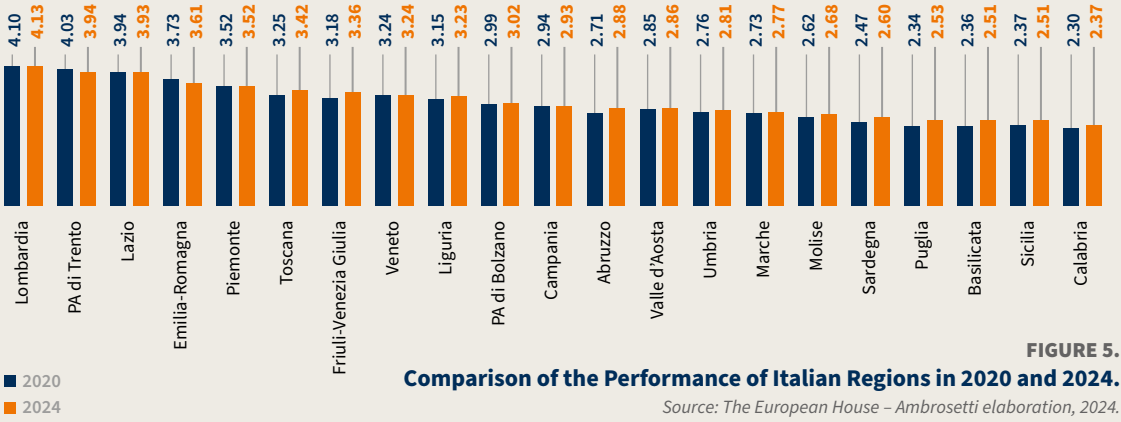


FIGURE 5.
Comparison of the Performance of Italian Regions in 2020 and 2024.
Source: The European House – Ambrosetti elaboration, 2024.

The most notable aspect of the overall performance is the marked disparity between the regions in northern Italy and those in the south. The southern regions rank all on the second half of the classification, underscoring a significant disparity in performance.

Having provided an overview of the performance of Italian regions, the analysis will now shift its focus to the individual categories and their corresponding KPIs.

2.2.1 Economic Development

The "Economic Development" category aggregates indicators that reflect a region's economic resources, the vibrancy of its business environment, and its capacity for generating new knowledge through the publishment of new patents.

Notably, for the sphere of research and development (R&D) expenditure, the leading positions are held by regions from Germany. Specifically, *Stuttgard* leads with an expenditure of 6.87% of the GDP, closed followed by *Braunschweig* with (6.26%) and *Tübingen* (5.47%).

Within the Italian context, *Emilia Romagna* ranks highest for R&D expenditure, yet it stands at the 59th position (2.10%), with *Piemonte* and *Lazio* trailing at the 61st (2.04%) and 63rd (1.99%) positions, respectively.

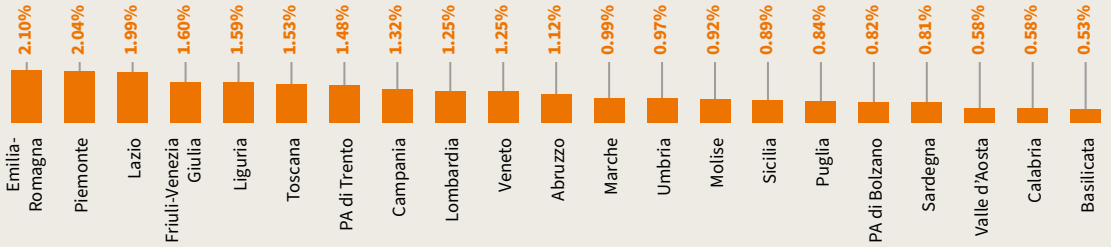


FIGURE 6.

Gross Expenditure in Research and Development as a percentage of the GDP for the Italian regions (Percentage value), 2021.

Source: The European House – Ambrosetti elaboration, 2024.

Analysing Gross Domestic Product reveals that Italy has eight regions ranking among the top 50 in Europe. Notably, *Lombardia* stands out, securing the 2nd position, with a GDP of €440 billion. It is only surpassed by *Île-de-France*, which leads with a GDP of €783 billion, while it precedes *Oberbayern* in Germany, which ranks 3rd with a GDP of €320 billion.

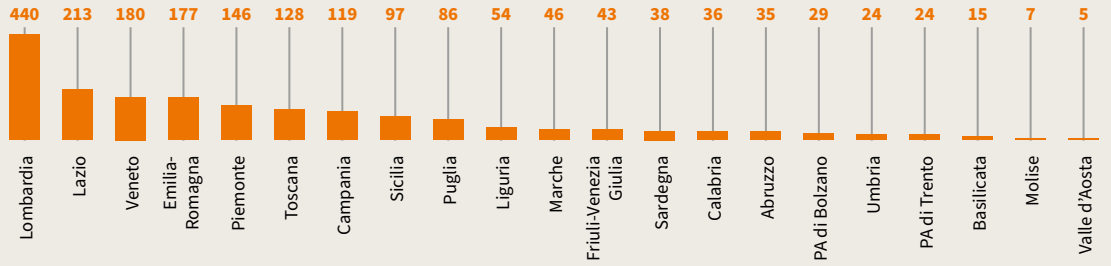


FIGURE 7.

Gross Domestic Product of the Italian regions (Billions of euros), 2022.

Source: The European House – Ambrosetti elaboration, 2024.

In the realm of patents applications, *Lombardia* emerges as the leading Italian region, ranking 10th with 1,547 patents applications filed. However, despite the favourable position, a stark contrast becomes evident when comparing it to the top-ranking region, *Oberbayern* in Germany, which leads with 5,537 more patents than *Lombardia*.

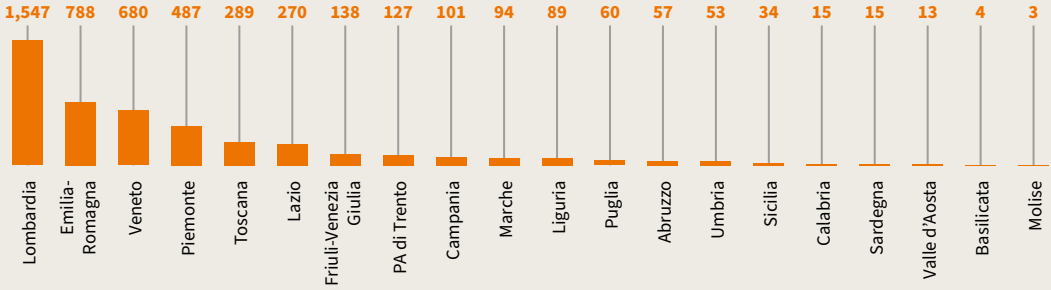


FIGURE 8.

Patent Applications Filed at the European Patent Office, by Applicant's Region of Residence, *data not available for Provincia Autonoma di Bolzano*, 2022.

Source: The European House – Ambrosetti elaboration, 2024.

In assessing business dynamism, reflected through the percentage change in the number of enterprises, Italy surpasses the score of the top ten european regions scoring an average percentage change of +3.51%, compared to the +2.53% of the top 10 regions in Europe for innovation performance. This indicates a vibrant and evolving business landscape in Italy, suggesting resilience and a capacity for renewal among Italian enterprises. More in detail, *Campania* is the leading region at the 40th position, registering a +4.99% of business units, followed by the *P.A. di Trento* ranking 41st (+4.94%).

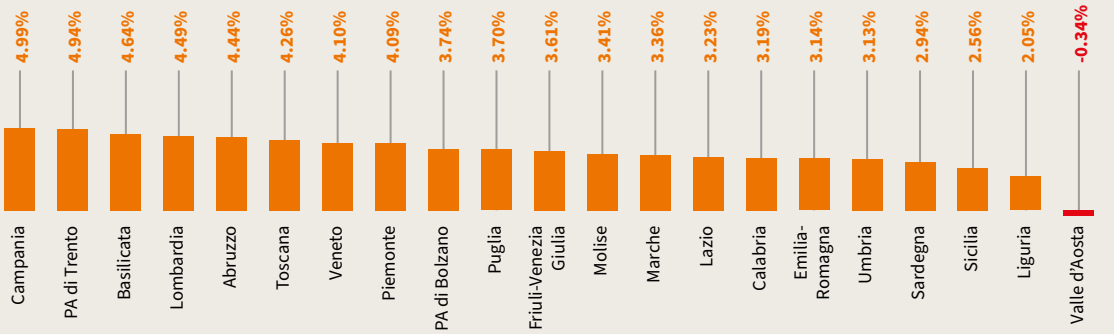


FIGURE 9.

Percentage change in business units for each Italian region, according to structural business statistics of the manufacturing sector (Percentage value), 2021.

Source: The European House – Ambrosetti elaboration, 2024.

Stuttgart's Leadership in R&D Investments

The Stuttgart region is situated within the federal state of Baden-Württemberg in southwest Germany, with a population of around 2.8 million. The region is renowned for its economic strength, which is supported by a modern industrial infrastructure and a strong focus on innovative technologies.

As seen through the TEHA-RII 2024 index, Stuttgart stands out as a frontrunner in terms of investments for Research and Development in Europe. Its leading position can be attributed to its exceptional research infrastructure, top-tier universities and pioneering cutting-edge technologies. The region hosts prestigious research institutions such as the University of Stuttgart, Fraunhofer Institutes, and more research institutes, all dedicated to advancing innovation. This supportive ecosystem for innovation and research fosters companies within the region to allocate substantial investments in R&D, contributing to 16% of corporate R&D expenditure in Germany.

Moreover, the federal state where Stuttgart is located, renowned for the importance given to R&D, is currently pursuing a strategic policy that focuses on research areas with a high potential for growth. With this goal in mind, the state has established an ecosystem that enables high-level research together with close cooperation with local industries, fostering areas like STEM subject and medicine.

Source: The European House – Ambrosetti elaboration on various sources, 2024.

2.2.2 Human Capital

Moving to the second category, human capital, once again Italy lags behind the top 10 regions in Europe in terms of innovation performance. This category aims to measure the availability of educated human resources by combining the number of universities that are ranked among the top one hundred in Europe, the number of people that obtained a tertiary education degree and the participation in educational programs.

When considering the number of universities ranked among the top one hundred in Europe, it's evident that certain regions stand out due to the presence of educational institutions recognized globally. These institutions are classified following the QS World university Ranking, a classification that embeds different characteristics that are summed up into three categories, namely: Sustainability, Employment Outcomes and International Research Network.

The top position is held by the *Île-de-France* region, which counts 8 universities among the top 100 in the EU.

Noteworthy is the result of three Italian regions that stand out: *Lombardia* with 3 universities and *Toscana* and *Piemonte* with 2 each. Additionally, *Campania*, *Veneto*, *Emilia-Romagna* and *Lazio* each have one university ranked among the best one hundred in Europe.

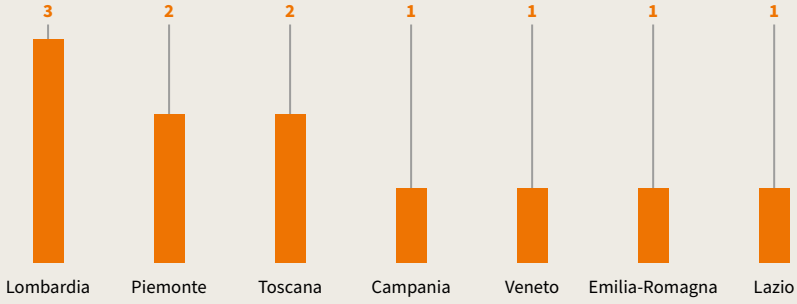


FIGURE 10.
Italian regions' number of universities that are ranked among the top 100 in Europe (Number of Universities), 2022.
Source: The European House – Ambrosetti elaboration, 2024.

The leading regions with the highest percentage of individuals holding a tertiary education are *Sostinės Regionas* in Lithuania, Prov. *Brabant Wallon* in Belgium, and *Warszawski Stołeczny* in Poland, with tertiary education rates of 62.10%, 60.70% and 57%.

On the other hand, the top Italian regions only begin to appear after the 150th position.

The forefront Italian region in this category, according to the TEHA-RII 2024, is *Lazio*, ranked 177th with a rate of 26.70%, closely followed by *Lombardia* at the 188th position and *Emilia-Romagna* at the 198th. However, if we only look at the data available from 2022, region *Lombardia* (with a rate of 21.80%) loses the second place in the rankings, being surpassed by *Emilia-Romagna*, *Marche, Umbria,* and *Liguria,* that register rates of 22.80%, 22.60%, 22.50% and 22.30% respectively. On the other hand, regions like *Calabria*, *Puglia,* and *Sicilia*, are among the lowest for tertiary education in Italy, ranking at 234th, 235th and 237th with rates of 16.60%, 16.20% and 15.20%. This ranking reveals a substantial challenge for Italy in enhancing the level of higher education attainment among its population, as compared to other European regions.

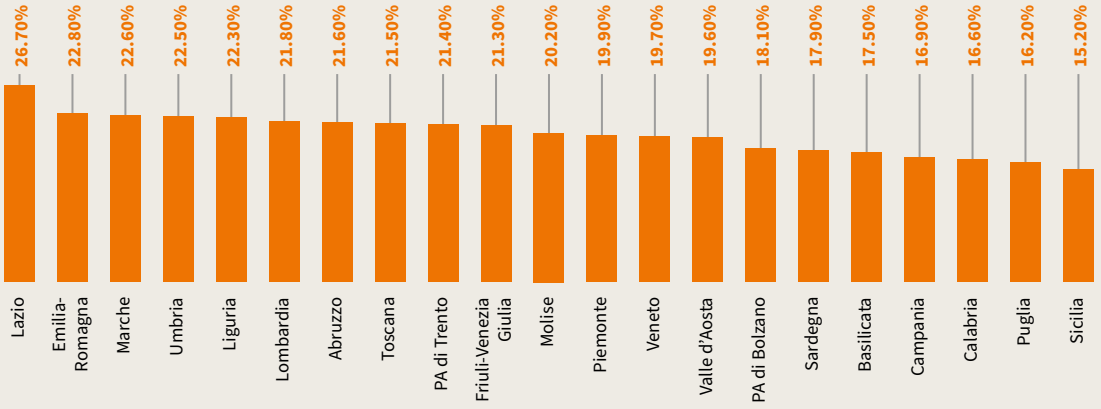


FIGURE 11.
Population that attained a tertiary education degree as a percentage of the total regional population (Percentage value), 2022.
Source: The European House – Ambrosetti elaboration, 2024.

In the evaluation of the percentage of people age between 25-64 that do participate in educational and training programs, Sweden stands out remarkably, claiming the top eight positions in the ranking. The leading regions include *Stockholm* (38.1%), *Västsverige* (36.8%) and *Sydsverige* (35.8%), showcasing Sweden effective commitment in lifelong education.

For the index TEHA-RII 2024, that is built upon the average of data from 2021 and 2022, the highest Italian region is *Provincia Autonoma di Trento* that ranks at the 51st position in Europe, with a participation rate of 14%, followed by *Emilia-Romagna* and *Friuli Venezia Giulia,* respectively at the 81st and 83rd positions with 11.90% and 11.80% rate of participation. However, it's worth noting that some regions, which were initially penalized by the index considering data from both 2021 and 2022, have shown significant improvement in terms of participation rates. Notably, *Provincia Autonoma di Bolzano*, which ranked 8th according to the TEHA-RII 2024, recorded a participation rate of 14.60% in 2022, marking an increase of +6.50 percentage points from 2021. Similarly, the region of *Sardegna*, though ranking 4th according to the index, emerged as the third highest in Italy in 2022 with a rate of 12.20%, indicating an increase of +1.10 percentage points.

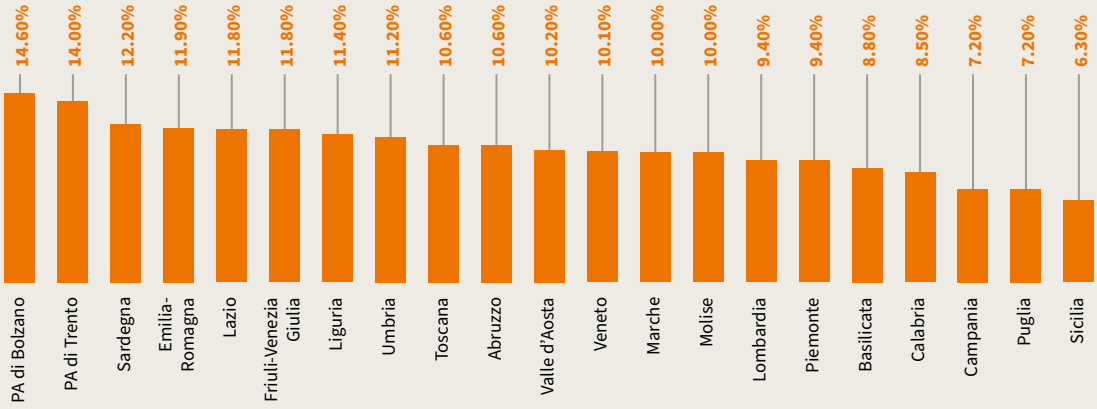


FIGURE 12.

Percentage of workers who participated in training courses in the last month (Percentage Value), 2022.

Source: The European House – Ambrosetti elaboration, 2024.

Sweden's Lifelong Learning Strategy

Swedish regions distinguished themselves from other European regions for their high participation rates in educational and training programs, underscoring the nation's commitment to lifelong learning. The findings of the analysis align with Sweden's established reputation for educational excellence.

The educational system in Sweden is designed to lay the groundwork for lifelong learning by ensuring equal opportunities for all individuals, thereby mitigating the impact of different social backgrounds. Furthermore, the established opportunities in terms of adult education plays a further pivotal role in addressing existing educational disparities and mitigating the risk of individuals being excluded from lifelong learning opportunities.

Moreover, government policies in Sweden prioritize the support of adult learning initiatives and the establishment of frameworks facilitating collaboration among diverse stakeholders. The principles of lifelong learning were first described in the document "*The Swedish strategy for lifelong learning. A summary of principles and orientations*" in 2007 and are still relevant today.

Moreover, Sweden has aligned its educational qualifications with international standards. In 2015, the country introduced a national Qualifications Framework in accordance with the European Parliament's recommendation on a European Qualifications framework for lifelong learning, enabling individuals to comprehend and compare qualifications conferred by different countries and educational systems.

Source: The European House – Ambrosetti elaboration on various sources, 2024.

Lithuania's Focus on Accessible Higher Education

Lithuania leading position in terms of tertiary education attained among the population could be seen as the result of the important steps that the country has taken in the last couple of years in terms of improving accessibility to higher education for all its citizens. In particular, the amendments that were introduced in 2022 played a pivotal role, as they targeted improvement in access, completion rates and competencies for underrepresented groups.

The measures included the provision of financial assistance to individuals from low socio-economic backgrounds and the support of students with disabilities, provided through the adaptation of study content and environment to their needs. Additionally support measures were put into place to make higher education more accessible to older applicants, recognizing the growing importance of lifelong learning through the provision of flexible study options.

Looking ahead, the Agreement on National Education Policy outlines further steps to enhance accessibility and fairness in higher education admission. Starting from 2024, equal minimum requirements will be enforced for all applicants, regardless of their funding source. This initiative seeks to ensure that admission to higher education is based solely on merit and qualifications.

By implementing these measures, Lithuania aims to broaden the social inclusivity of higher education and create a system where everyone has the opportunity to attain an education, regardless of their background or circumstances.

Source: The European House – Ambrosetti elaboration on various sources, 2024.

2.2.3 Talent for Innovation

The "Talent for Innovation" category aims to capture the landscape of available talent within a region, focusing on individuals that are engaged in research, employed in science and technology sectors, and those working in high-tech industries. In this area, Italy finds itself significantly behind the top ten European countries, with a gap of approximately 4 points across all three KPI that define this category.

In the first indicator focusing on the percentage of labour force employed as researchers, the leading regions are the province of *Brabant Wallon* in Belgium, that takes the leading position with 4.51%, followed closely by *Budapest* in Hungary and *Praha* in the Czech Republic, ranking second and third with rates of 3.07% and 2.59% respectively.

In comparison, Italy's highest-ranking region in this aspect is the *Provincia Autonoma di Trento*, which places 55th with a rate of 1.09%. This is followed by *Lazio* at 66th with 0.97% and *Emilia-Romagna* at 73rd with 0.94%.

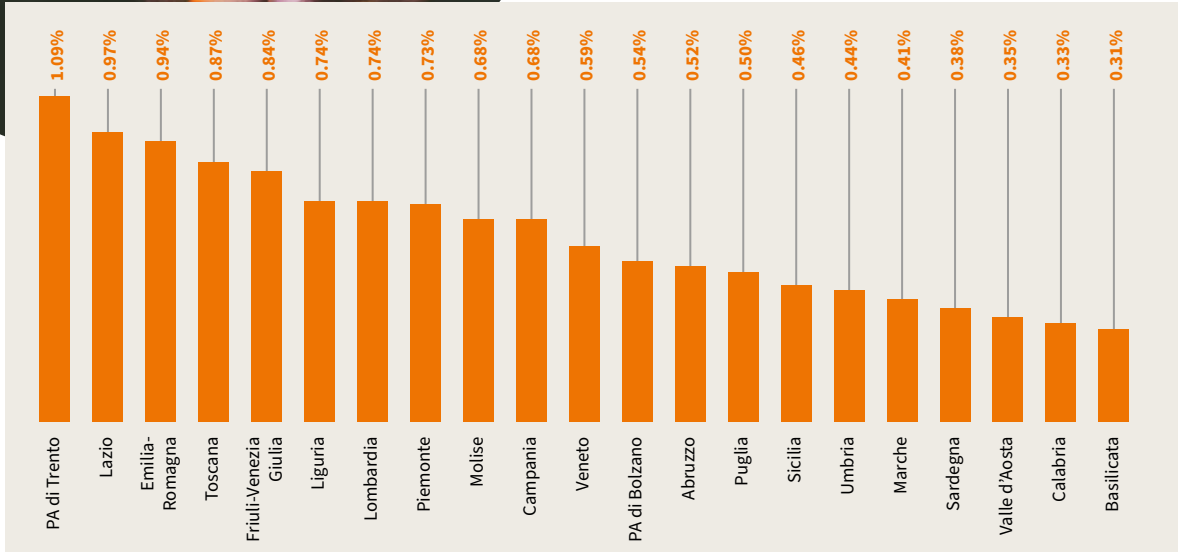


FIGURE 13.
Share of workers employed in R&D as a percentage of the total workforce (Percentage value), 2021.
Source: The European House – Ambrosetti elaboration, 2024.

In the evaluation of the indicator for the percentage of human resources employed in science and technology sectors, Italian regions predominantly rank in the lower half of the classification. Notably, *Lazio* is the only exception, positioning itself in the upper half but only at the 118th position with a rate of 33.8%. At the forefront of Europe in terms of HRST are regions like *Praha* with a rate of 56.1%, *Luxembourg* (56.9%) and *Budapest* (56.3%).

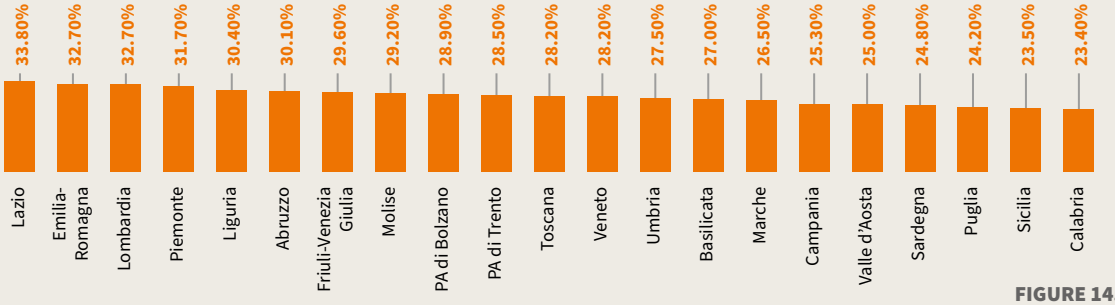


FIGURE 14.
Personnel with scientific and/or technological training (HRST) as a percentage of total employment (Percentage value), 2022.
Source: The European House – Ambrosetti elaboration, 2024.

Finally, in the specific area of employment within high technology sectors, encompassing both manufacture and services, *Budapest* leads with a rate of 13.50%, closely followed by *Praha* at 11.20%.

Italy shows promising signs in this domain, with three regions ranking among the top 100 in Europe. *Lazio* stands out at the 21st position with a rate of 8.10%. *Lombardia* follows at the 61st position with a 5.20% rate, and *Piemonte* is at the 91st with 4.40%.

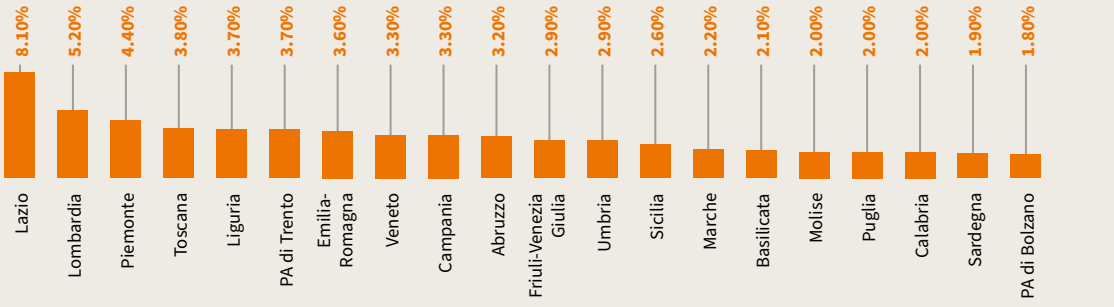
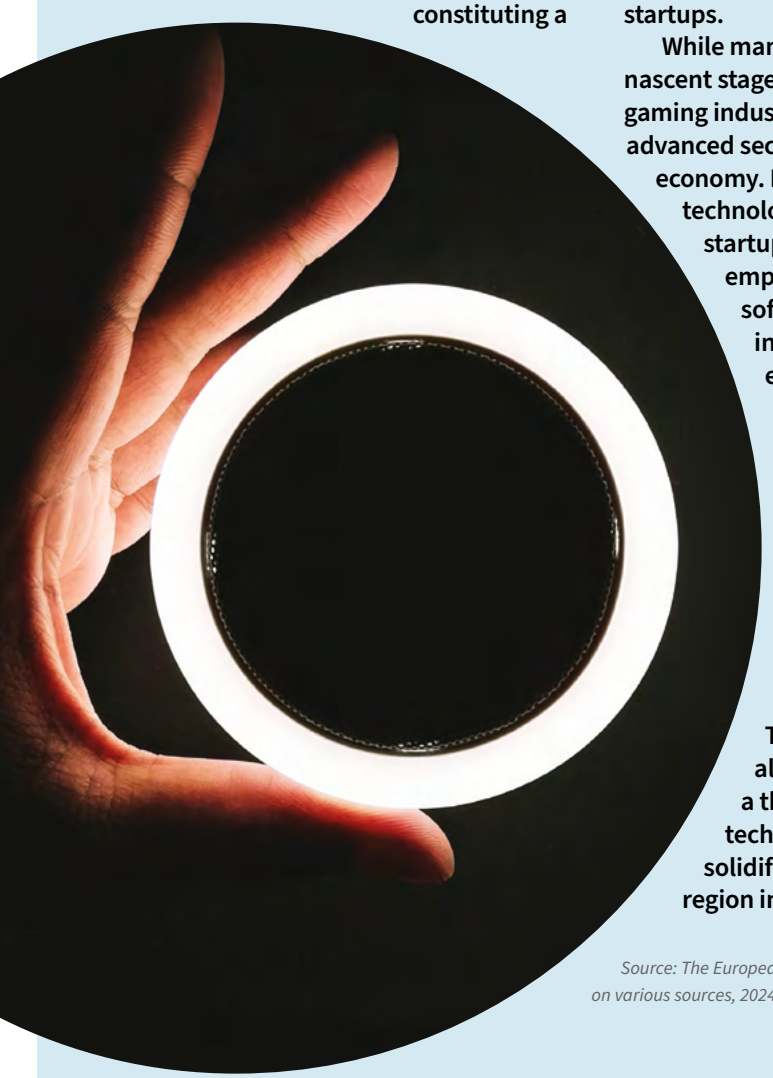


FIGURE 15.
Personnel employed in High-technology sectors as a percentage of total employment, *data not available for Valle d'Aosta* (Percentage value), 2022.
Source: The European House – Ambrosetti elaboration, 2024.

Prague's Leading Role in High-Tech Industries and Research

Prague emerges as a leading region in Europe in terms of individuals engaged in research, employment in science and technology sectors and working in high-tech industries, owing it to several factors.

Firstly, Prague serves as the epicentre of Czech startups and technology companies, constituting a significant portion of the nation's innovative landscape. The attractiveness of the Region is attributed to the relatively low cost of living, favourable tax rates and strategic positioning within Europe. These factors collectively create an environment optimal for the growth and flourishing of startups.



While many projects are in their nascent stages, Prague's high-tech and gaming industries stand out as relatively advanced sectors within the Czech economy. Notably, the information technology sector dominates the startup landscape, with a strong emphasis on cybersecurity, software development, scientific instruments, hardware, and electronics.

Furthermore, strengthening the overall position of Prague is the innovation strategy outlined by the Czech government for the period 2019-2030 that encompasses various initiatives aimed at fostering innovation across different sectors of the economy. This comprehensive strategy aligns with Prague's status as a thriving centre for science, technology, and research, further solidifying its position as a leading region in Europe in these domains.

Source: The European House – Ambrosetti elaboration on various sources, 2024.

2.2.4 Digital Infrastructures and Technologies

In the "Digital Infrastructures and Technologies" category, Italy demonstrates a more competitive stance compared to the leading ten regions in Europe.

In the context of fixed broadband connectivity, *Provincia Autonoma di Trento* leads among Italian regions, ranking 42nd in Europe, with a connectivity rate of 97.16%. *Lombardia* follows, ranking 73rd with a rate of 94.26%. These figures reflect Italy's robust infrastructure in providing widespread access to fixed broadband, indicating a solid foundation for digital engagement and technological growth.

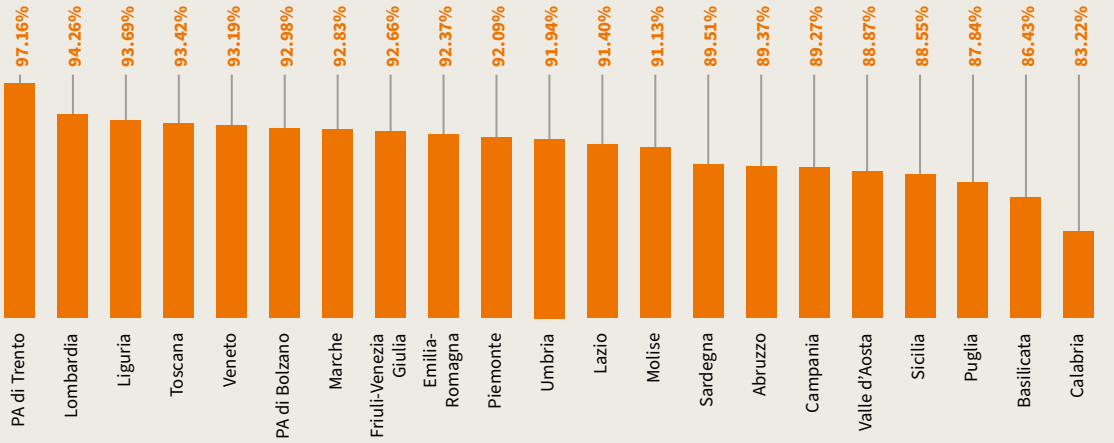


FIGURE 16.

Percentage of households that have internet access at home (Percentage value), 2022.

Source: The European House – Ambrosetti elaboration, 2024.

3

THE NEW TEHA BAROMETER ON INNOVATION AND THE PROPOSALS FOR ITALY

Every year, the InnoTech Community draws up guidelines to encourage the choices of policy makers through the elaboration of timely proposals aimed at supporting the Italian innovation ecosystem. The main novelty of this edition of the Report consists in the introduction of a new barometer of the innovation strategies of enterprises in Italy, through a proprietary survey involving 88 enterprises belonging to the TEHA Club[1] (44 large enterprises, 32 medium enterprises, 12 small enterprises).

78.4% of the responding companies are Italian companies, while the remaining 21.6% are foreign companies (a definition that also includes Italian headquarters or branches of foreign multinationals).

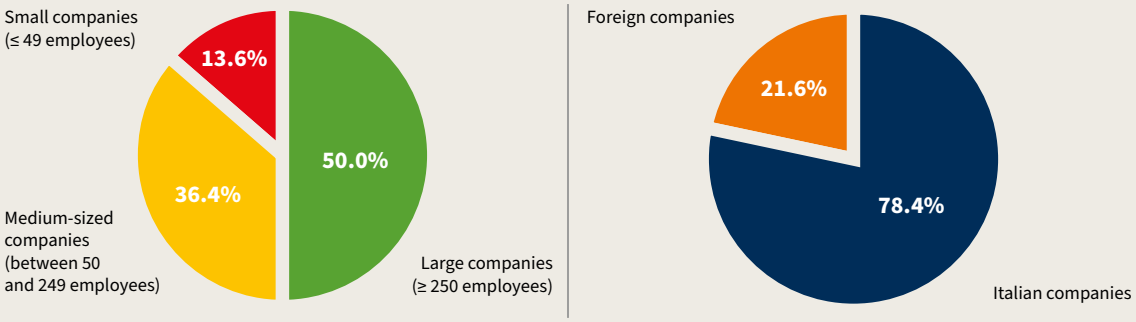


FIGURE 1.
Distribution of respondent companies by size class (left figure) and by origin (right figure).
Source: The European House - Ambrosetti elaboration on proprietary data, 2024.

As far as the product sector is concerned, using ISTAT's ATECO classification, more than half of the responding enterprises have manufacturing as their object of activity (54.5%), followed by enterprises active in information and communication services (10.2%) and those in finance and insurance (8.0%).

1 TEHA Club is a permanent platform through which top management can offer insights and promote concrete changes in the country and its institutions under the banner of a pro-business, pro-industry and pro-innovation culture. Set up in 1999, TEHA Club is strictly reserved for the top management of national and multinational groups and companies operating in Italy. It currently has over 400 members.

According to the NACE classification (Statistical Classification of Economic Activities in the European Community), manufacturing includes the substantial alteration, renovation or reconstruction of goods in different areas such as food products, textiles, paper, pharmaceuticals, etc.

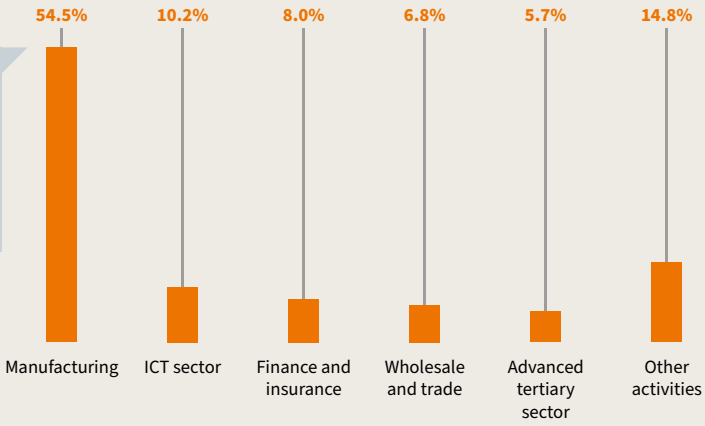


FIGURE 2.
Distribution of respondent companies by activity.
Source: The European House - Ambrosetti elaboration on proprietary data, 2024.

The survey first probed which areas of innovation are likely to have the greatest transformative impact within each business context, asking respondents to rank on a scale of 1 (greatest transformative impact) to 5 (least transformative impact) the different response options.

In first place, the area of greatest transformative potential according to the 88 responding companies is product innovation (27.3%), followed closely by innovation in business processes (23.9%). These first two positions highlight the extent to which the perception of top executives is focused on the transformative impact in activities that represent the company's core business, regardless of the reference technology used. Another aspect that is becoming increasingly important is sustainability: in third place, in fact, for 20.5% of respondents it is the development or use of sustainability technologies that is the area with the greatest transformative impact for the company. Not far behind, in fourth place (19.3%) is innovation in customer relationship channels, understood as the area in which technologies enable the company to improve the relationship with the customer base and the quality of the customer experience. In last place, finally, is the development or use of new materials (9.1%), an area where the transformative impact of new technologies is still little explored.

Responses to the question
"Rank the following areas of innovation according to the transformative impact they could have within your company (From 1 = greatest transformative impact to 5 = least transformative impact)"
(percentage values)

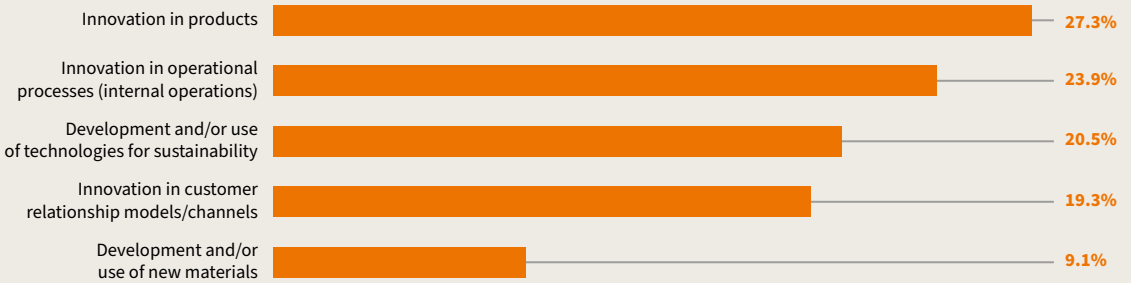
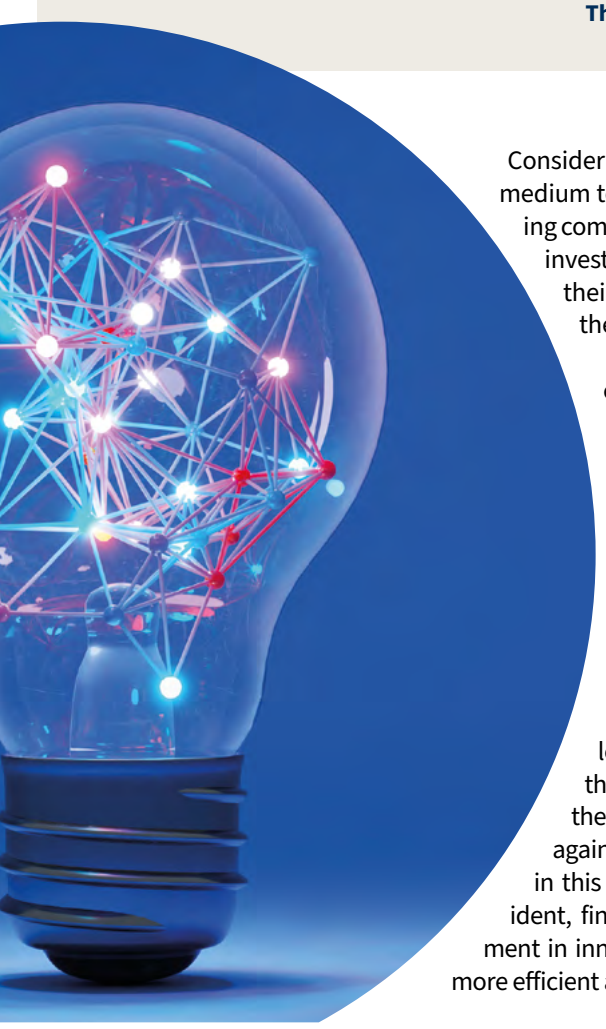


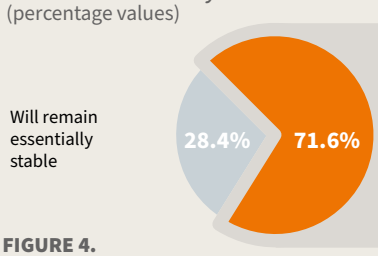
FIGURE 3.
The key findings of the survey to the TEHA Club network.
Source: The European House - Ambrosetti elaboration on proprietary data.



Considering also the outlook for future investments in the medium to short term (next 3 years), 71.6% of the responding companies stated that they would like to increase their investments in research and development in relation to their turnover. On the contrary, 28.4% indicated that these investments will remain substantially stable.

Looking more deeply into the reasons why companies will increase their investments in innovation, it emerges that 40.9% believe that this is essential to improve the quality of products or services on the market, or to launch new ones thanks to digitisation and technology. Next, 20.5% of the companies that said they would increase investment would do so to improve corporate sustainability and thus respond to market demands. As emphasised above, this again shows the extent to which innovation is perceived as a solution to sustainability challenges. Closing the podium is the need to improve the cost competitiveness of products and services on the market (15.9%), while at a close distance is once again the focus on improving sustainability challenges, in this case to meet investor demands (12.5%). Less evident, finally, is the correlation between increased investment in innovation and the need to make business activities more efficient and effective (6.8%).

Responses to the question
"*In relation to revenue and R&D investments, do you expect innovation investments in your company to increase, decrease, or remain substantially stable over the next 3 years?*"
(percentage values)



Responses to the question
"*If you think they will increase, what is the main target?*"
(percentage values)

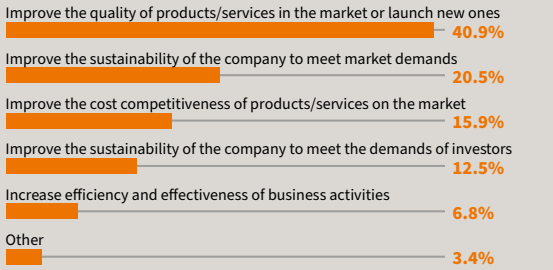
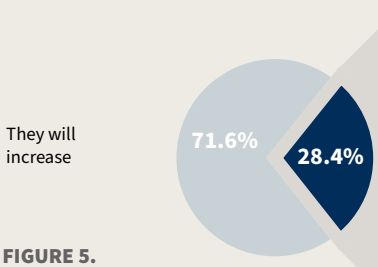


FIGURE 4.
The key findings of the survey to the TEHA Club network.
Source: The European House - Ambrosetti elaboration on proprietary data.

Finally, when analysing the reasons that lead 25 out of 88 companies not to increase their R&D investments in the next three years, a difficulty emerges first of all linked to the lack of public incentives, the main hindering factor for 44.0% of the respondents. On the other hand, 28.0% indicated that investments will remain substantially stable as they are already planned within the multi-year business plans as a defined percentage of turnover. For 12.0%, on the other hand, investments in innovation are not considered necessary for the company's positioning and growth strategies, and with the same percentage (12.0%) the companies that consider them simply already sufficient, without feeling the need to raise them further. Only 1 out of 25 companies (4.0%) stated organisational or cultural difficulties as an obstacle to increasing investments in innovation, while no company justified this choice by difficulties in access to credit or capital, nor by low market margins, which are therefore not considered determining factors.

Responses to the question
"*In relation to revenue and R&D investments, do you expect innovation investments in your company to increase, decrease, or remain substantially stable over the next 3 years?*"
(percentage values)



Responses to the question
"*If you think they will not increase, what is the main reason?*"
(percentage values)

FIGURE 5.
The key findings of the survey to the TEHA Club network.
Source: The European House - Ambrosetti elaboration on proprietary data.

The results of the survey provide an important view of the attention paid by the top management of companies operating in Italy to innovation processes, and outline a picture where attention emerges on the one hand towards the improvement of products and services, and on the other towards areas of sustainability. In both cases, in fact, companies consider it necessary to invest in innovation and new technologies, which act as real enabling factors to make them more competitive on the market, both in terms of their own value proposition and to meet sustainability challenges. On the other hand, the figure on the lack of public incentives as a hindering factor for increased R&D investments underlines the need to create more favourable conditions for private companies to innovate through targeted action by policy makers.

In light of these elements – and taking into account the proposals of the previous editions of this paper that are still unimplemented – four proposals for improving the Italian research and innovation ecosystem have been identified below.

PROPOSAL 1

To encourage investment in both public and private research and development in order to maximise the potential of innovation and the adoption of new technologies to enable Italy to compete with international top performers.

ASSUMPTION:

As reported by the Global Innosystem Index in the first chapter of this Report, Italy is a country that still devotes few resources to innovation (22nd place in the dimension related to financial resources to support innovation). R&D investments in Italy amount to 1.33% of GDP, a figure that places Italy 18th in EU, still behind all the benchmark countries (Germany 3.13%, France 2.18%, Spain 1.44%). Even the personnel dedicated to research and development activities is undersized compared to other global benchmark economies: with 333 thousand people dedicated, Italy has 163 thousand less than France and 420 thousand less than Germany, while stays ahead of Spain with 84 thousand more personnel. If we then consider the resources allocated by each country's government budget and, therefore, the specifically public share of R&D investment, government R&D expenditure amounts to 1.18% of the total public budget, in line with France (1.16%) but less than the government share in Spain (1.25%) and Germany (2.24%).[2]

RECOMMENDATIONS:

- Gradually increase the resources made available for innovation and R&D, aligning with EU targets (3.0%) and the spending levels of benchmark countries;
- Enhance funding and access to incentives for companies investing in innovation and technologies, particularly stimulating investments in intangible assets outlined in the Transition 4.0 plan;
- Finance and create long-term research programmes to make the national research system attractive in order to reduce brain drain.

2 Source: The European House - Ambrosetti elaboration on Eurostat data, 2024.

PROPOSAL 2

Improve technology transfer processes and make Italy a 'country for unicorns', more attractive to Venture Capital and Private Equity investments capable of supporting innovative entrepreneurship.

ASSUMPTION:

2023 has been a difficult year for private investments in early-stage and growing companies. Venture Capital and Private Equity investments have plummeted mainly due to the surge in interest rates and international geopolitical tensions that have slowed down the global innovation market. In Italy, this has translated into a decrease by almost a threefold of VC and PE investments, dropping from €23.7 billion the previous year to €8.2 billion in 2023. The decline of the Italian market closely mirrors that recorded in other European benchmark Countries (-48% in France, -49% in Germany, -51% in the UK) and in the US (-60%), but our domestic market is significantly smaller in size compared to international partners.[3] The delay in the development of the Italian market is also evidenced by the numbers related to the presence of unicorns – startups that have reached a market value of $1 billion. In our country, there are only 3 out of the 109 in the EU (2.8%), with an average market valuation of $1.52 billion (compared to the EU average of $2.53 billion).[4] Another factor that hinders the growth of the innovation ecosystem in our country is the undersizing of the Technology Transfer Offices (TTO). In many European countries, these offices are essential for bridging the gap between research and industry, supporting the valorisation of scientific results, and the capitalisation of intellectual property. In Italy, TTOs are still undersized with an average of 5.6 employees, five times fewer than the top TTOs in Europe.

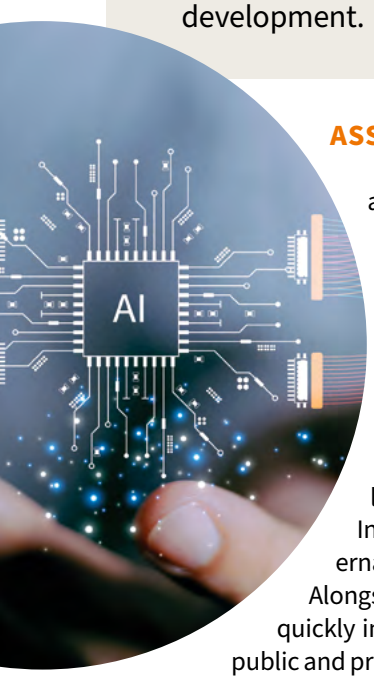
RECOMMENDATIONS:

- Stimulate the attractiveness of the Italian innovation ecosystem to VC and PE funds by introducing mechanisms that bridge the gap between research and industry to develop projects that meet market needs;
- Facilitate the establishment of startups and access to subsidised funding, supporting the revision of the 'Startup Act' approved 12 years ago;
- Strengthen TTOs by adopting internationally proven successful models and introducing specific training pathways for technology transfer operators.

3 Source: The European House - Ambrosetti elaboration on AIFI data, 2024.
4 Source: The European House - Ambrosetti elaboration on CB Insights data, 2024.

PROPOSAL 3

Support Italy's role in the G7 Presidency as a lead country for the development of Artificial Intelligence governance mechanisms, in order to support its safe and sustainable development.



ASSUMPTION:

Artificial Intelligence is now revolutionizing the global economy, and its impacts will shape the way people live, study, and work. For this reason, it has been increasingly urgent to create governance mechanisms that allow the development of an AI fully compatible with the principles and values of modern societies. The G7 countries have made the development of governance on the use of Artificial Intelligence a priority in the last two meetings in Hiroshima (2023) and Trento (2024), developing a series of proposals and guiding principles for establishing an international regulatory framework. On these aspects, despite not having technological leadership as indicated by the results of the TEHA Global Innosystem Index, Italy can still play a central role in the debate on shaping governance over AI platforms, leveraging its Presidency of the G7 this year. Alongside reflections on governance issues, however, there is a need to quickly implement a strategy that accelerates the adoption of AI both in the public and private sectors. From this perspective, despite mapping out 14 AI policy proposals, Italy still lags behind international competitors: Germany has developed 41 policies, France 35, and Spain 28.[5] These numbers on public interventions also reflect the levels of AI adoption in the business sector: Italy has only 5.0% of companies using AI technologies, compared to the 8.0% across all EU countries.[6]

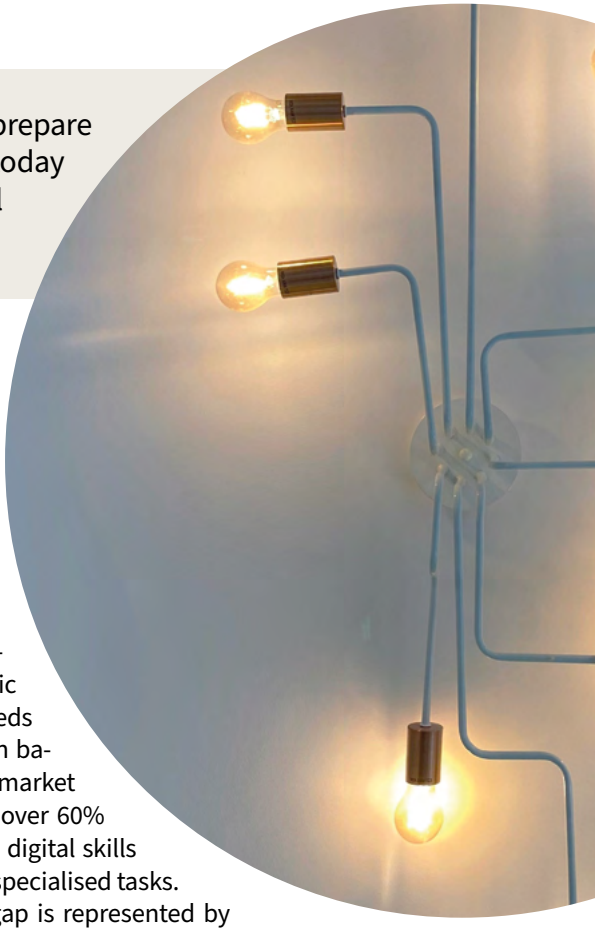
RECOMMENDATIONS:

- Supporting a global regulation of AI systems that respects the principles of trust, safety, and fairness, and is combined with a vision for the sustainable development of global economies;
- Enhance training pathways for skills related to AI, both through STEM education for new generations and through upskilling and reskilling of the current workforce;
- Supporting a wider adoption of Artificial Intelligence in Italian businesses, aligning with the European average and bridging the gap with benchmark countries.

5 Source: The European House - Ambrosetti elaboration on OECD data, 2024.
6 Source: The European House - Ambrosetti elaboration on Eurostat data, 2024.

PROPOSAL 4[7]

Launching a New Deal of skills to prepare Italian citizens and businesses of today and tomorrow to thrive in a digital and sustainable society.



ASSUMPTION:

The digitisation of society and the economy increases the need for skills to maintain Italy's international competitiveness. Digital skills are a weakness of our country: over half of Italian companies indeed struggle to find resources on the market with adequate digital skills. The shortage is not only of specialists with advanced digital skills but also of resources with basic knowledge: it is estimated that Italy needs to train over two million employees with basic digital skills by 2026 to keep up with market needs. What is more concerning is that over 60% of the population that needs to develop digital skills consists of personnel performing highly specialised tasks.

One possible source to bridge this gap is represented by resources entering the labour market with their own developed set of digital skills, allowing them to immediately and independently use the most common basic computer tools. However, Italy would still have a significant gap to fill and would need to train approximately 1.25 million adults with basic digital skills by 2026.

Basic digital skills are not only a market problem related to the skills required to perform work and/or professional activities but also a matter of active citizenship in the era of twin transitions. For this reason, with the Digital Compass, the EU has set the goal of reaching at least 80% of the population with basic digital skills by 2030: a goal that for our country, with just 45.6% of adults having basic digital skills, is still far away. In absolute terms, indeed, over 20 million Italians will need to be trained in digital skills by the end of the decade.

7 This proposal, already contained in the last edition of the Report, has been taken up as still unimplemented.

RECOMMENDATIONS:

- Define new curricula for teaching digital skills throughout education: it is necessary to start teaching transversal digital and data skills already in the first years of school and to continue with their consolidation throughout the primary and secondary education years;
- Strengthen ad hoc digital courses in technical high schools (ITS) and in particular those that enable students to work with data, which are essential for specialisation in the data economy professions;
- To encourage growth in the number of students in Italian ITS, taking into account the fact that these institutes offer high levels of employability (84% of students according to OECD data), but are still attended by too few students (less than 20,000 compared to 800,000 in Germany);[8]
- Strengthen the system of professionalising degrees in universities also by providing new study paths (or an adaptation of existing paths) with elements linked to the digital and ecological transition and – in parallel – strengthen the role of PhDs/Doctorates as highly specialised profiles;
- Define mechanisms for the continuous updating of workers' skills based on lifelong learning, with learning pathways aimed at different groups of workers also in synergy with the training system (universities, ITS, etc.) and create support mechanisms for companies that invest in training resources.

8 Source: The European House - Ambrosetti elaboration on Eurostat data, 2024.

Italy

MILAN
Via F. Albani, 21
20149 Milano
Tel. +39 02 46753.1

BOLOGNA
Via Persicetana Vecchia, 26
40132 Bologna
Tel. +39 051 268078

ROME
Via Po, 22
00198 Roma
Tel. +39 06 8550951

Europe

BERLIN
GLC Glücksburg Consulting AG
Albrechtstraße 14 b
10117 Berlin
Tel. +49 30 8803 320
Mr. Martin Weigel
berlino@ambrosetti.eu

BRUSSELS
Ambrosetti Brussels Office
Tel. +32 476 79 10 89
Laura Basagni
laura.basagni@ambrosetti.eu

HAMBURG
GLC Glücksburg Consulting
AGBülowstraße 922763 Hamburg
Tel. +49 40 8540 060
Mr. Martin Weigel
amburgo@ambrosetti.eu

ISTANBUL
Consulta
Kore Şehitleri Caddesi Üsteğmen
Mehmet Gönenç Sorak No. 3
34394 Zincirlikuyu-ŞiŞli-Istanbul
Tel. +90 212 3473400
Mr. Tolga Acarli
istanbul@ambrosetti.eu

LONDON
Ambrosetti Group Ltd.
5 Merchant Square, Paddington
London W2 1AY
london@ambrosetti.eu

MADRID
Ambrosetti Consultores
Castelló nº 19
Madrid, 28001
Tel. +34 91 575 1954
Ms. Marta Ortiz
madrid@ambrosetti.eu

Asia

BANGKOK
Mahanakorn Partners Group Co., Ltd.
Kian Gwan House III, 9th Floor, 152
Wireless Rd., Lumpini,
Pathumwan, Bangkok, 10330, Thailand
Tel. +66 (0) 2651 5107
Mr. Luca Bernardinetti
bangkok@ambrosetti.eu

BEIJING
Ambrosetti (Beijing) Consulting Ltd.
No.762, 6th Floor, Block 15
Xinzhaojiayuan, Chaoyang District
Beijing, 100024
Tel. +86 10 5757 2521
Mr. Mattia Marino
beijing@ambrosetti.eu

SEOUL
HebronStar Strategy Consultants
4F, ilsin bldg., 27,Teheranlro37-gil,
Gangnam-gu, Seoul
Tel. +82 2 417 9322
Mr. Hyungjin Kim
seoul@ambrosetti.eu

SHANGHAI
Bai Shi Barbatelli & Partners Commercial Consulting Shanghai Company Ltd. (Shanghai)
No. 517 Suhe Mansion,
No.638 Hengfeng Road, Zhabei District
Shanghai, 200070
Tel. +86 21 62719197
Ms. Cristiana Barbatelli
shanghai-partner@ambrosetti.eu

SHANGHAI
Ambrosetti (Beijing) Consulting Ltd.
No. 1102 Suhe Mansion,
No.638 Hengfeng Road, Zhabei District
Shanghai, 200070
Tel. +86 21 5237 7151
Mr. Mattia Marino
shanghai@ambrosetti.eu

SINGAPORE
The European House - Ambrosetti (Singapore) Consulting Pte. Ltd.
1 Kay Siang Road #12-02
Singapore 248922
Tel. +65 90998391
Mr. Marco Bardelli
singapore@ambrosetti.eu

TOKYO
Corporate Directions, Inc. (CDI)
Tennoz First Tower 23F
2-2-4 Higashi Shinagawa, Shinagawa-ku
Tokyo, 140-0002
Tel. +81 3 5783 4640
Mr. Nobuo Takubo
tokyo@ambrosetti.eu

Middle East

DUBAI
The European House – Ambrosetti Middle East
Business Center Dubai World Central
P.O. Box: 390667 - Dubai - UAE
Mob. (UAE) +971.54.55.10003
Mob. (IT) +39.340.592.1349
Mr. Luca Miraglia
luca.miraglia@ambrosetti.eu

Africa

ROSEBANK - JOHANNESBURG
TEHA Africa Ltd
116 Oxford Road, Oxford & Glenhove,
Building 1
Rosebank
2196, Johannesburg
Tel. +27 76 487 8195
Mr. Nico De Kock
info@ambrosetti.za