

INVESTMENT IN INNOVATION AND EDUCATION: AN EFFICIENCY BENCHMARKING ANALYSIS IN EUROPE

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Abstract

As technical efficiency enhancement becomes an increasingly important issue within Europe and worldwide, policy planning should draw attention towards a wide range of production ideas, component technologies and complementary socio-economic capabilities. Within this framework, it is rather difficult for any single economy to incorporate and take advantage of the relevant technological advances in economy, as well as the underlying conditions in innovation and education investments. This means that the actions of policy planning involve the targeted development of specialized knowledge assets, which are integrated from a wider range of investment areas. This paper analyses, through a benchmarking approach, investment in innovation and education in Europe, creating a spectrum of policy implications.

Keywords: Productive Efficiency, Innovation, Education, Investments

JEL classification: F13, F47, F15, R15

1. Efficiency in Innovation and Education Investments

Sustainable development is a key concept within the Innovation and Education Investment policy of the European Union. The key elements for the sustainable development policy concern the efficient use of resources encouraging the development of new productive technologies, extending the use of productivity and efficiency enhancement schemes and encouraging both innovative and productive activities. Within this context, the main role of Innovation and Education Investment policy in the European Union is to provide the appropriate framework conditions and to make the European Union an attractive place for Innovation and Education Investment development (Korres and Kokkinou, 2011, Kokkinou, 2010).

One of the core targets of Innovation and Education Investment policy is to influence the volume and composition of the European Union output, primarily the Innovation and Education Investment output, aiming to increase the volume of production and/or employment (Baldwin and Martin, 2006). More specifically, Innovation and Education Investment policy refers to structural policies designed to strengthen the efficiency, scale and international competitiveness of industrial sectors within a country, bringing about economic growth and development (Soete, 2007).

In Europe, public research, technology and innovation policies are no longer exclusively in the hands of national authorities: increasingly, national initiatives are supplemented by, or even competing with, regional innovation policies or transnational programmes, in particular the activities of the European Union. At the same time, industrial innovation increasingly occurs within international networks (Kuhlmann and Edler, 2003).

On the other hand, education investment policy is essential for European Union productive efficiency and an important driver in enabling European Union to enhance competitiveness, increased efficiency and growth and consequently to compete on a global scale. However, policy-makers also underlined the need for interaction between innovation policy and other policy areas to improve the environment for innovative enterprises.

2. Innovation and Education Investment in European Union

After the Second World War, and increasingly since the 1970s, with the acceleration of high technologies, the industrialised countries developed a broad spectrum of technology policy intervention measures. However, neither industrial policy nor innovation policy was among the areas covered in the 1957 Treaty of Rome. By the early 1980s, however, both had found a place among the European Commission's directorates. The first research and technology development (RTD) programmes were designed and implemented in the early 1980s. This included broad programmes such as the European Strategic Programme for Research and Development on Information Technologies (ESPRIT) whose main goals were: i) to promote intra-European industrial cooperation through pre-competitive R&D; ii) to thereby furnish European industry with the basic technologies that it needed to bolster its competitiveness through the 1990s; and iii) to develop European standards and the Basic Research in Industrial Technologies (BRITE) programme designed to help the European manufacturing industry to become more competitive (Mytelka and Smith, 2001). Since the 1980s the Community was trying to foster the creation of strategic industries, in line with the individual member states' efforts to promote national champions. In fact, the objective was to foster cooperation, innovation and commercialization processes, where the role of Community institutions was mainly to enable and coordinate policies rather than dictate their contents (Belyakova et al., 2017).

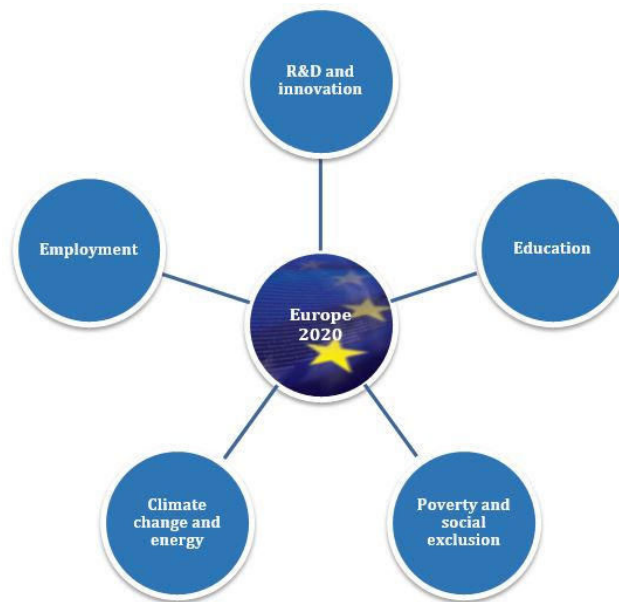
Until the middle of the 1980s the Community had a research and technology policy of its own that more or less complemented national policymaking with a transnational dimension, in order to create a European Research Area. The rationale behind this approach is that European economic integration, in combination with the opportunities associated with the enlargement of the European Union and the challenges of economic and technological globalisation, functionally leads to an integrated innovation policy approach in European Union. On top of the national and regional efforts and in parallel with Europe's economic and political integration, the emergence of a European innovation policy-making system can be traced (Almeida et al., 2017). The system of innovation approach lays emphasis on the interactive process in which enterprises in interaction with each other and supported by institutions and organisations – such as industry associations, R&D, innovation and productivity centres, standard setting bodies, university and vocational training centres, information gathering and analysis services and banking and other financing mechanisms – play a key role in bringing new products, new processes and new forms of organisation into economic use.

Into the 1990s, Community innovation RTD programmes sought to promote technology transfer across industries and regions in Europe, aiming at achieving competitiveness and productive efficiency. A few years later enhancing innovation became a cornerstone of the strategy to meet the target agreed by the European Council in Lisbon in March 2000 of the Union becoming the most competitive and dynamic knowledge-based economy in the world by the end of the decade, drawing attention to the interfaces between industries and financial markets, R&D and training institutions, advisory services and technological markets (Nilsson, 2004). The Lisbon European Council (2000) was an important milestone for the Community's approach to innovation policy. The so-called Lisbon strategy required the Union to become, by 2010, “the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion”.

In 2002, the Barcelona European Council set a twofold objective requiring the Union to reach, by 2010, a level of R&D expenditure equal to 3% of European GDP (compared with 1.9% recorded in 2000), within which the level of private funding should increase up to two thirds of community R&D investments.

The Europe 2020 strategy (European Commission, 2010) was adopted as the successor of the Lisbon strategy. It emphasizes smart, sustainable and inclusive growth as a way of strengthening the EU economy and preparing its structure for the challenges of the next decade.

Figure 1: Europe 2020 strategy thematic areas



Source: (YERUN Office, 2018)

The Europe 2020 strategy puts forward three mutually reinforcing priorities to make Europe a smarter, more sustainable and more inclusive place to live:

- Smart growth, through the development of an economy based on knowledge, research and innovation.
- Sustainable growth, through the promotion of resource efficient, green and competitive markets.
- Inclusive growth, through policies aimed at fostering job creation and poverty reduction.

In a rapidly changing world, these priorities are deemed essential for making the European economy fit for the future and for delivering higher employment, productivity and social cohesion (European Commission, 2010). Under the three key priorities, the EU adopted eight targets:

- Smart growth: covered by the target on R&D and two targets on education
- Sustainable growth: covered by three targets on climate change and energy
- Inclusive growth: covered by the targets on employment and on poverty and social exclusion.

Figure 2. The Europe 2020 strategy's key priorities, targets and flagship initiatives

	Targets	Flagship initiatives
Smart growth	<ul style="list-style-type: none"> — Increasing combined public and private investment in R&D to 3 % of GDP — Reducing school drop-out rates to less than 10 % — Increasing the share of the population aged 30–34 having completed tertiary education to at least 40 % 	<ul style="list-style-type: none"> — Innovation Union — Youth on the move (ended in December 2014) — A digital agenda for Europe
Sustainable growth	<ul style="list-style-type: none"> — Reducing greenhouse gas emissions by at least 20 % compared to 1990 levels — Increasing the share of renewable energy in final energy consumption to 20 % — Moving towards a 20% increase in energy efficiency 	<ul style="list-style-type: none"> — Resource efficient Europe — An industrial policy for the globalisation era
Inclusive growth	<ul style="list-style-type: none"> — Increasing the employment rate of the population aged 20–64 to at least 75 % — Lifting at least 20 million people out of the risk of poverty and social exclusion 	<ul style="list-style-type: none"> — An agenda for new skills and jobs — European platform against poverty and social exclusion

Source: (YERUN Office, 2018)

The targets are monitored using a set of nine headline indicators and additional sub-indicators related to various dimensions of the data (such as the multidimensional concept of poverty and social exclusion).

The eight targets belong to five thematic areas: employment, education, poverty and social exclusion, climate change and energy, and R&D and innovation. These five areas are strongly interlinked. For example, higher educational levels are associated with improved employability and increasing the employment rate helps to reduce poverty. A greater capacity for R&D and innovation across all sectors of the economy, combined with increased resource efficiency, would improve competitiveness and foster job creation. Investing in cleaner, low-carbon technologies would help the environment, contribute to the fight against climate change and create new business and employment opportunities (European Commission, 2010).

The EU targets have been translated into national targets. These reflect each Member State's situation and the level of ambition they are able to reach as part of the EU-wide effort for implementing the Europe 2020 strategy. However, not in all cases are the national targets sufficiently ambitious to cumulatively reach the EU-level targets. For instance, the fulfilment of all national targets in the area of employment would bring the overall EU-28 employment rate up to 74 %, which would still be one percentage point below the Europe 2020 target of 75 %. Similarly, even if all Member States met their national targets on R&D expenditure, the EU would still fall short of its target of 3 % R&D intensity, reaching only 2.6 % by 2020 (European Commission, 2014).

Currently, a doubling of the budget of the 9th EU Framework Programme (FP9) for Research & Innovation to 160 billion euro, also requested by the Lamy Group, would create an estimated 650.000 jobs by 2040 and add around 0.46% to GDP over the same period. As the European Commission has stated in its Communication on the next MFF, this doubling would enable the EU to emerge as a global leader in areas like future-energy batteries, smart and clean buildings and vehicles, infectious diseases, and the circular economy. At the same time it would stimulate more inclusive and resilient societies, increase sustainable growth and reduce inequality in Europe (YERUN Office, 2018).

Although Horizon 2020 is the largest framework programme for research and innovation to date, it is, with less than 80 billion euro for 7 years, underfunded. In some parts of Horizon 2020, the current budget supports less than 1 out of 5 high quality proposals. Equally, even though the success of Erasmus + is outstanding in fostering mobility and employability, at 5% European student mobility is far below the 20% Bologna Process target.

However, doubling the FP budget cannot be a substitute for strong support for, and investment in, research, innovation and education at national level. Sufficient national investment in research (to the level of 3% of GDP as agreed by the Member States) and education, together with EU funding, is crucial for Europe's competitiveness and for a sustainable European society (in line with the UN Sustainable Development Goals). We also urge the European institutions to encourage Member States more forcefully to meet their commitments in the framework of the European Research Area (ERA) and the European Higher Education Area (EHEA) (YERUN Office, 2018).

Investment in research and education not only brings the highest European added value, it is also the most effective long-term, future-oriented commitment that the EU can make towards its citizens (Tarrach, 2018).

This kind of spending on research, innovation and education means, first and foremost, investing in people - in particular, Europe's youth. It is the sine qua non condition to fulfil the ambition of turning the European Union into a world leader in innovation-driven growth and competitiveness.

What we do, ultimately, when investing together, is empower our societies to tackle common challenges and reach shared objectives regarding competitive innovation, societal growth, job creation, environmental protection and social inclusion.

It is also about efficiency. Research and innovation are a European public good. Investing in them creates synergies, economies of scale and a very high return. We know that every euro invested in research and innovation generates on average €13 in value added for business (Tarrach, 2018).

Furthermore, investing in research and education reinforces European awareness and identity through transnational collaboration and mobility. The EU's Horizon 2020 and Erasmus+ are unique in this respect and even more funding should go to the next generation of programmes.

Plus, investing in education, research and innovation is Europe's best foreign policy instrument. Beyond academic exchanges, what we have developed, and must further strengthen, is a reliable space for dialogue with partners around the world. Not only do we tackle global challenges, we create concrete ties enabling scientists, students and innovators to work across borders, embedded in the quest for excellence and personal development.

For all these reasons, it is time for the member states to significantly step up their commitment to European research and education. As the multiannual financial framework is being designed, the university sector suggests doubling investment to boost Europe's competitiveness and sustainability. Europe's leaders need to consider this and remember that universities have the potential to become a treasure chest of European added value (Tarrach, 2018).

The majority of public initiatives is still mainly developed in national policies, offered by national institutions. While for the last years member states increasingly tended to compete with each other in the field of innovation policy, strong industrial or financial capital actors have been appearing more frequently on the scene - multinational enterprises, international strategic alliances of national enterprises- who act globally and across the national innovation systems. In the member states of EU this policy initially took the form of initiatives for stimulating research, improving innovation financing and promoting technology absorption and innovation management.

Additional priorities like intensifying the cooperation between research, universities and universities, promoting 'clustering' and other forms of cooperation among enterprises and other organisations involved in the innovation process and encouraging the start-up of technology-based companies were added to the national innovation policy (Nilsson, 2004).

At the national level, governments could set up agencies funded by public bonds with the mission to provide venture capital, investment credits and R&D support to new activities in the above fields. Productive efficiency and competitiveness would be strengthened by:

- Pooling scarce resources to help to achieve critical mass in bringing innovation to the market; and by increasing cooperation in innovation to create large scale demonstration projects and pilot test facilities
- Reducing the fragmentation of innovation support systems, facilitating bringing innovative solutions to the market, and increasing the market focus of research projects.
- Developing support for innovative services based on measurable outcomes
- Facilitating the growth of manufacturing industries by ensuring that regulations do not pose obstacles to expansion; by favouring access to appropriate finance; and by providing support services for accessing new markets, and publicising these.

3. Conclusions and Policy Implications

Innovation policy seeks to help firms or industries to improve their capacity to innovate. This includes the provision of scientific infrastructure in research and education and direct and indirect support for research and technological development. It also includes a wide range of policies which aim to build networks, to make markets more conducive to innovation, to facilitate the transfer of technology, to help firms to acquire relevant capabilities, and to provide a supporting infrastructure in areas such as standards and intellectual property. Public innovation policy aims to strengthen the competitiveness of an economy or of selected industries, in order to increase societal welfare through economic success (Kuhlmann, 2001). Hence European Union has made innovation a top priority through several strategies, funding opportunities and assessments. The pressures of globalisation have brought innovation to the fore as a key element in increasing productivity along with technical efficiency and

underpinning industrial competitiveness, taking into consideration the under-investment in business R&D and other innovative activities, strongly linked to the fragmented condition of European markets.

A new generation of policies have to overcome the limitations and failures of past experiences, such as collusive practices between political and economic power, heavy bureaucracy, lack of accountability and entrepreneurship. They have to be creative and selective, with decision-making mechanisms that are more democratic and inclusive of different social interests. These new approaches to industrial and innovation policies could play a key role in pulling Europe out of the current crisis. The politics behind such a new departure has to be based on a wide social consensus over the distribution of the productivity and efficiency gains deriving from new technologies and economic activities.

Investment in education and innovation policy programmes and projects claim to contribute to technical efficiency. This implies that policies should concentrate on areas in which there is expansion and therefore good prospects for growth, community businesses are supposed to become more competitive, and scientific and technological progress is expected to offer a medium- or long-term potential for dissemination and exploitation. An open, efficient and competitive business environment is a crucial catalyst for growth in a global context. Rising to these challenges can improve the competitiveness of European manufacturing industries, and the Commission aims to help the member states to use their limited resources efficiently in order to increase the global competitiveness of their industries. Addressing these challenges will improve the growth prospects of industries. A competitive industry can lower costs and prices, create new products and improve quality, contributing thus decisively to wealth creation and productivity growth throughout the economy.

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