



Funding Science, Technology and Innovation in the European Union

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Introduction

The innovation policy blend that the European Union (EU) has undertaken in the last five to 10 years has been two-fold (Reillion, 2016). First, the EU has implemented education, industrial, research and development (R&D) and regional policies that targets key actors involved in the processes of generating innovations. Second, they facilitated and shaped the interplay of human and financial capital, and knowledge between those actors. What resulted is an innovation framework that sought to revamp Europe's industries and provide support for small and medium sized enterprises (SME), make available financial capital for promising innovations, attempt to harmonize all the intellectual property rights (IPR) structures within Europe into a single framework, cultivate a culture of innovation, and encourage partnerships between the public and private sectors (Raillion, 2016). Although Europe itself is already an important source of innovation in the world, they are however lagging behind their primary competitors, chiefly, the United States, Japan and Korea, and with countries like Canada, Australia and China not far behind (European Commission, 2013). Therefore, if the EU wants to meet their goals of making their economies more competitive, Europe must transform itself into a world-class science and technology hub (European Commission, 2017). Additionally, the EU needs to take a stronger role in facilitating new innovation by approaching science, technology and innovation not only as a way to gain new knowledge but also concentrating on sectors with high instrumental application potential to solve challenges that hinder economic performance and generate growth. This means that funding policies should focus strategically on specific sectors that have the greatest possibility of addressing concerns while also promoting certain ideas and concepts that are necessary for living in a 21st century world.



Funding Concepts

The EU should implement a science, technology and innovation (STI) policy that will not only create a population that is highly skilled and trained for the processes of daily economic life but also one where citizens are more informed about their mental, social and physical world. An important condition of having a strong, innovative and competitive economy is to have a population and workforce that understands the world in which they live in (European Commission, 2017). For that reason, funds should be made available to educate Europeans about three important concepts - **confirmation bias**, **comparative advantage** and **the second law of thermodynamics**. These initiatives should be allocated 40% of the budget, with each concept receiving an equal share.

With much of our lives interwoven with the digital and internet landscape more than ever before, the world's' knowledge and information are just a click away. While this is seen as a positive development for most people there are some hidden dangers that we as citizens should be aware of, mainly the idea of *confirmation bias*. Easy access to information online encourages those with strong beliefs, opinion or ideas find confirmation regardless of its accuracy or legitimacy (Eno, 2017). Educating Europeans about confirmation bias will aid in recognizing their own personal biases and at the same time having the cognizance to acknowledge inaccurate or false information online.

The second concept that needs more widespread attention is the economic idea of *comparative advantage*. As economic agents within a globalized world, this concept can aid us in discovering our strengths and weaknesses, thereby letting us focus on and exploit those strengths. Essentially, actors such as people, firms and countries need to exploit activities in which they are efficient and have an advantage in, in order to maximize gains and utility (Kurzan, 2017). Recognizing this is key to maintaining Europe's position as a global leader.

The last concept that should be more widely taught is the *second law of thermodynamics*. This may seem largely a purely scientific term, the concept does give important insights to everyday life. According to Steven Pinker, "The Second Law of Thermodynamics states that in an isolated system, entropy never decreases" (2017, p.1). Moreover, a system that is closed will eventually stagnate and be less able to create, organize, and achieve new and favorable outcomes. The second law helps us understand and appreciate the true nature of our lives and reality; that its natural state is heading towards disorder and it is with our efforts, singular or collective that strives to place order and create purpose for ourselves. Put more simply, social problems cannot be solved without the conscious effort and energy of its citizens.

These three concepts can equip Europeans the cognitive skills necessary for living in the 21st century world. Where anything and everything is just a button click away, we need citizens to take an active and informed role in the way they shape their own world.

Funding Technology

In funding basic research and sectors deemed strategic and important, the EU should implement a technology policy that is aimed at uncovering new applications from research (Lundcall & Borrás, 2004). Targeting sectors such as in the field of **human regeneration, agriculture and food**, and **artificial intelligence** (AI) will potentially prove instrumental in addressing emerging issues and challenges that Europe is facing. Furthermore, with regards to the allocation of budget, all three fields should be deemed equally important and therefore be given an equal distribution. The research into human regeneration, agriculture and food, and artificial intelligence should each be allocated 20% of the STI research budget.

The topic of *human regeneration* is becoming increasingly important with the demographic transition of the EU favoring low birth rates in the last several decades (Eurostat, 2018) and with a larger proportion of the population becoming older, health issues will undoubtedly be a prominent challenge for the continent as a whole. With replacement rates of the aging workforce being the primary concern for many economist, the impact on health care and quality of living will be something that Europe's health care systems will need to address. Hence, funding policy should concentrate on biotechnology and more specifically in the field of human regeneration. Advancements in this this sector can propel the EU to become a world leader in new novel innovations such as bioprinted replacement organs or the creation of synthetic blood to meet domestic and global demand (World Science Festival, 2017a).

Second, the EU should also turn their attention towards *agriculture and food*. One of the greatest problems our world is facing is how to feed a growing population that is expected to increase to over 10 billion people by 2050 (World Science Festival, 2017b). Currently, the EU is leading the research in developing new, more advanced agricultural products that include high-yield crops that are also resistant to pests and diseases (European Commission, 2018b). Funding this sector will help the EU maintain its position as a leading source of innovation in agricultural products and create a secure and reliable source of food for the world.



Finally, with the increasing complexity of computer systems and algorithms, the emerging field of machine learning or *artificial intelligence* will prove to be an important source of innovation with the potential to transform the workplace and the economy as a whole (Brynjolfsson & McAfee, 2018). Using machine learning to imitate and model human behaviors and thought patterns, innovations stemming from AI will be innumerable.

Table 1: Overview of the funding allocation and short reasoning

#	Concept/ Technology	Funding %	Reasoning
1	Confirmation Bias	13.3%	Educating Europeans about confirmation bias will aid in recognizing their own personal biases while having the cognizance to acknowledge inaccurate or false information online.
2	Comparative Advantage	13.3%	Understanding weaknesses and strengths as the key towards building competitive advantage of the EU in the globalized world of high competition is the important to sustain a long term-leadership and edge of the EU in global industries.
3	Second law of thermodynamics	13.3%	The natural state of our world is disorder and that there are no default purpose in life. Realizing this can help spur citizens into action to tackle scientific and social problems.
4	Artificial Intelligence	20%	With the increasing complexity of computer systems and algorithms, the emerging field of machine learning or artificial intelligence will prove to be an important source of innovation with the potential to transform the workplace and the economy as a whole (Brynjolfsson & McAfee, 2018). Using machine learning to imitate and model human behaviors and thought patterns, innovations stemming from AI will be innumerable.
5	Human Regeneration	20%	The topic of <i>human regeneration</i> is becoming increasingly important with the demographic transition of the EU favouring lower birth rates for the last several decades and a larger proportion of the population becoming older, health issues will undoubtedly be a prominent challenge for the continent as a whole. While replacement rates of the aging workforce is indeed the primary concern for many economist, the impact on health care and quality of living will be something that the health care systems of many European countries need to address.
6	Food 2.0	20%	One of the greatest problems our world is facing is how to feed a growing population that is expected to increase to over 10 billion people by 2050. Currently, the EU is leading the research in developing new, more advanced agricultural products that include high-yield crops that are also resistant to pests and diseases. Funding this sector will help the EU maintain its position as a leading source of innovation in agricultural products and create a secure and reliable source of food for the world.



Conclusion

The European Union had set out for itself the goal of elevating Europe as a world class science performer and a leader in innovation and technology. Funding needs to facilitate the creation of a more capable and skilled workforce and a focus on specific sectors with an aim to creating a high-tech competitive advantage for the EU able to compete in a continually changing globalized economy. Prioritizing research towards technological advancements in human regeneration, agriculture and food, and artificial intelligence with the policy of educating Europeans about the concept of confirmation bias, comparative advantage and the second law of thermodynamics, will help Europe maintain its position as a technology and innovation leader in line with the goals of the Europe 2020 strategy.



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