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Research and Development in the EU

Research, development, innovation and competitiveness in Europe

Lecture 12

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Lecture 12

In this lecture you will learn about:

- The concept of countries' competitiveness
- The role of R&D&I in competitiveness
- R&D&I and competitiveness in Europe

The concept of countries' competitiveness – a brief introduction

The concept of countries' competitiveness is based on **Ricardo's** *theory of comparative advantages* from the early 19th century and then, in the 1920s and 30s, **Heckscher and Ohlin's** findings on the *importance of capital and labour endowment*. Nevertheless, these older theories were considering mainly trade and specialisation, and not many more aspects.

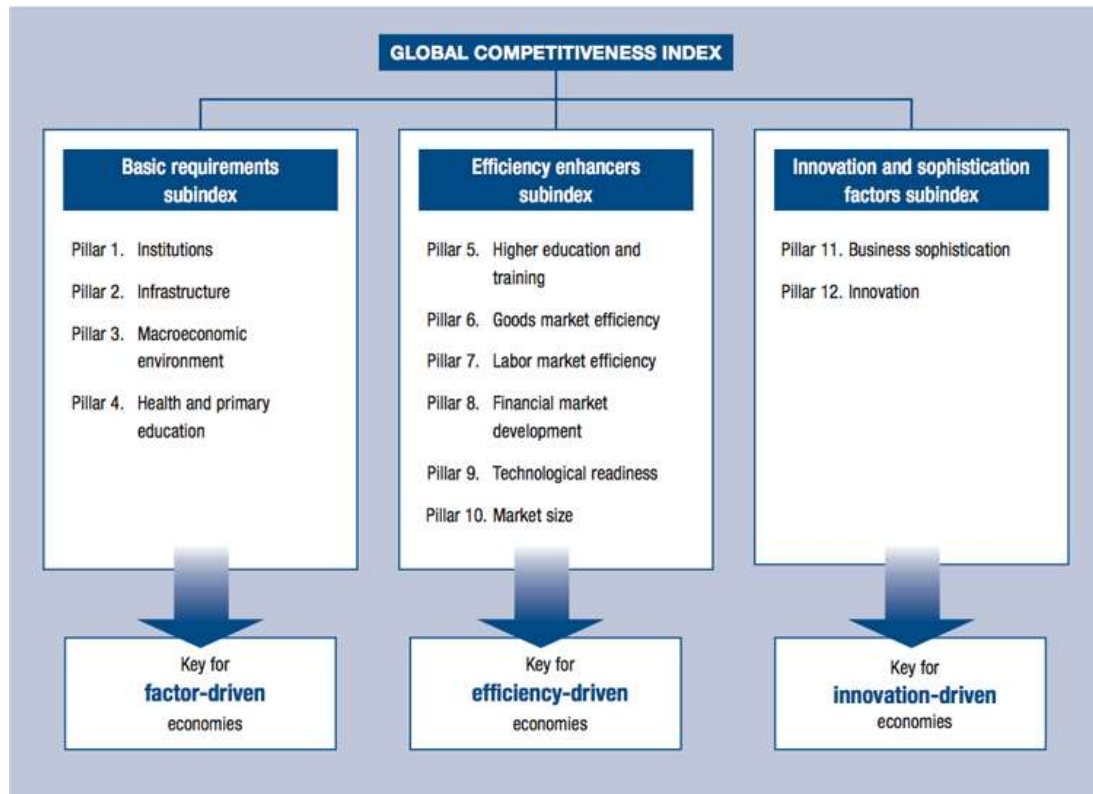


According to the definition of **Sala-i-Martin** (2010: 1), also used by the World Economic Forum (WEF) at the composition of the Global Competitiveness Index (GCI), “**competitiveness is the set of institutions, policies and factors that determine the level of productivity of a country**”. Productivity then determines prosperity, the return realisable on investments and thus, indirectly, growth potential.



Institutions and **policies** thus influence what factors are created (education, business environment) or attracted (foreign investments, labour mobility) into the given country.

The World Economic Forum's Global Competitiveness Index framework



Source: WEF website



As regards **productivity** and **factors**, classical economics defines three basic factors of production: capital (K), labour (L) and the land/area (A) where economic activities take place. However, in modern economies two new factors are also to be considered: human capital (knowledge and skills) and technology that is eventually codified-automated knowledge.

In fact it was **Solow** (1957) who pointed out first, fairly early, that something outside capital and labour was influencing the production function. Similarly, **Romer**, one of the awardees of the 2018 Nobel Memorial Prize in Economics, claimed already in 1986 that the endogenous accumulation of knowledge resulted in economic growth.





A further Nobel Memorial Prize-winner economist, **Shultz** (1961) also highlighted the role of human capital in economic performance – just a few years following Solow’s influential article – and, accordingly, recommended that knowledge and skills should be considered as capital that needs investment. Therefore, in order to achieve competitiveness, the knowledge stock of the economy has to be sustained and continuously developed as good-quality human resource is capable of creating higher value added and thus realising higher income for the society.

The role of R&D&I in competitiveness

As discussed in relation to the emergence of the knowledge-based economy in Europe, *knowledge has become an ever-more important input to economic value creation*. The prior instrument to produce knowledge is *education*. However, **the application of knowledge in economic utilisation is achieved in the research and development and innovation process**.

The WEF’s GCI, a composite indicator to measure countries’ competitiveness, used until 2018, obviously included aspects of research and development and innovation.

First and foremost, *of its 12 pillars*, the **9th** one was measuring ‘**Technological readiness**’ while the **12th** pillar was called ‘**Innovation**’. These pillars were concentrating on these very aspects of competitiveness.

Outside that, R&D&I-related indicators appear under **5th pillar (Higher education and training)**, e.g. the quality of the education system, of math and science education, of management schools, or internet access at schools.

Sub-indicators of the Technological readiness (9th) pillar of the GCI

No.	Name	Unit
9.01	Availability of latest technologies	1-7 scale
9.02	Firm-level technology absorption	1-7 scale
9.03	FDI and technology transfer	1-7 scale
9.04	Internet users	% of population
9.05	Fixed-broadband Internet subscriptions	/ 100 population
9.06	Internet bandwidth	kb/s/user
9.07	Mobile-broadband subscriptions	/ 100 population

Source: WEF

Sub-indicators of the Innovation pillar of the GCI

No.	Name	Unit
12.01	Capacity for innovation	1-7 scale
12.02	Quality of scientific research institutions	1-7 scale
12.03	Company spending on R&D	1-7 scale
12.04	University-industry collaboration in R&D	1-7 scale
12.05	Gov't procurement of advanced technology products	1-7 scale
12.06	Availability of scientists and engineers	1-7 scale
12.07	PCT patents	applications/million pop.

Source: WEF

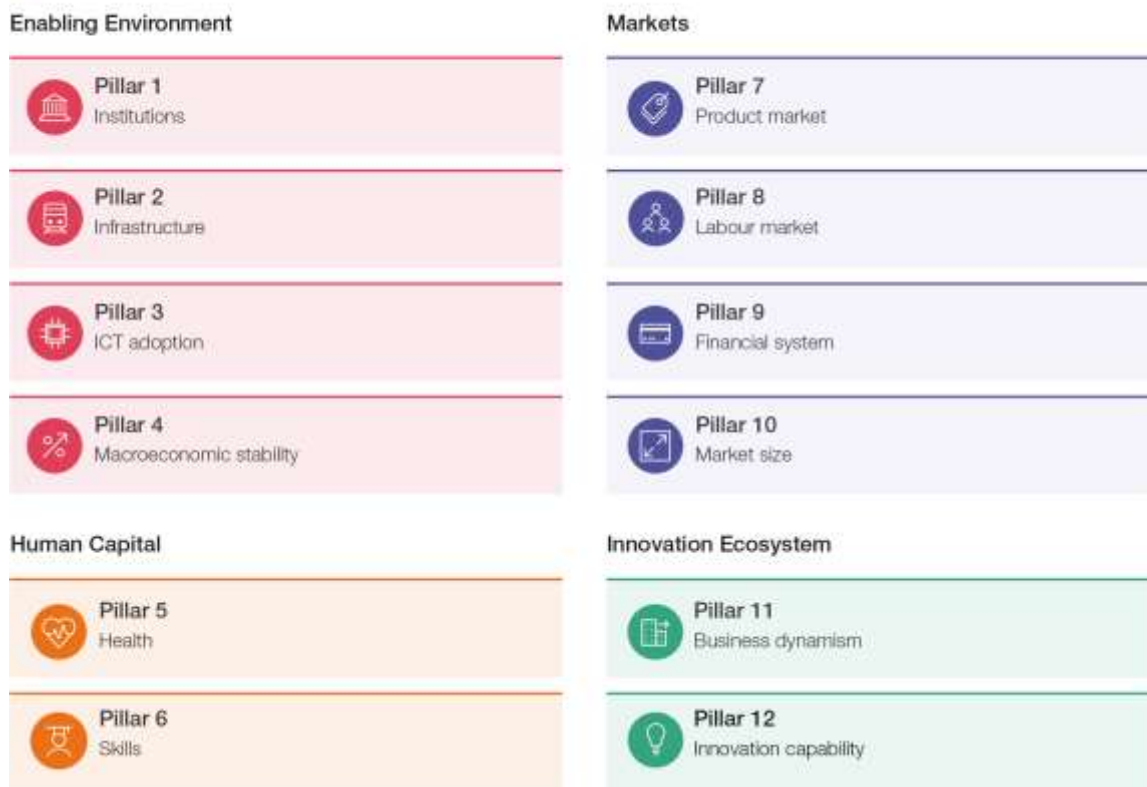
Then, in 2018, the **WEF** introduced an updated version of the GCI, called **GCI 4.0**, implying the **embracing of the Industry 4.0** (or fourth industrial revolution, abbreviated as 4IR) concept in its methodology of measuring countries' competitiveness.

According to the WEF,

"successful economies in the 4IR era need to:

- *Be **resilient**, building buffers and economic mechanisms to prevent financial crises or mass unemployment and to respond to external shocks.*
- *Be **agile**, embracing change rather than resisting it. Companies, public policy-makers and workers should be able to quickly adapt how they operate and to take advantage of the opportunities to produce goods or provide services in new ways.*
- *Build an **innovation ecosystem** where innovation is incentivized at all levels and all stakeholders contribute to create the best conditions for new ideas to emerge, to be financed and commercialized as new products and services.*
- *Adopt a **human-centric approach** to economic development. This means recognizing that human capital is essential for generating prosperity and that any policy that adversely affects human factors' potential will reduce economic growth in the long run. As a consequence, policy-making will have to ensure that the speed of change and the introduction of new technologies ultimately translate into better living conditions."*

Figure 1: The Global Competitiveness Index 4.0 2018



Source: WEF website

In the **WEF GCI4.0**, by elevating ‘**ICT adoption**’ to the level of a **basic (3rd) pillar** of the **Enabling Environment**, ‘**Skills**’ as one of the pillars (6th) of **Human Capital**, and **Innovation Ecosystem** as one of the four main areas, *R&D&I is now even more determining a country’s performance on the index – and thus, in international competitiveness.*

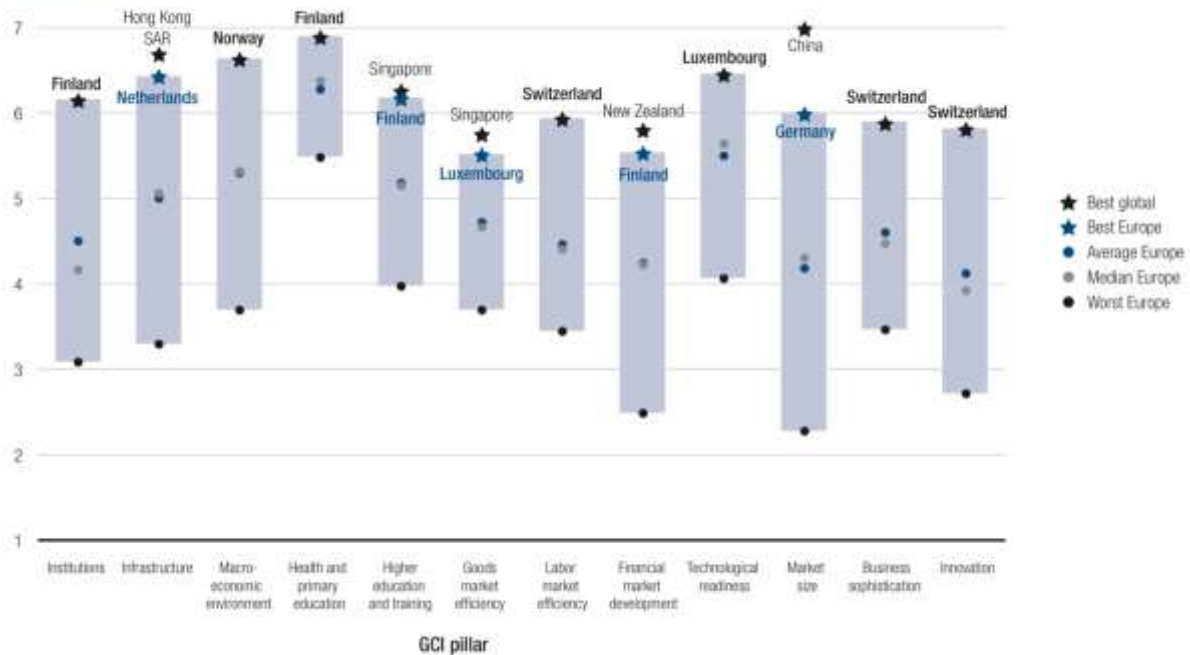
R&D&I and competitiveness in Europe

Firstly, with respect to **European competitiveness**, the *2017-2018 edition of the WEF Global Competitiveness Report* dedicated a special analysis to the situation of Europe in the world. Along the 12 pillars of the GCI, European countries tend to show fairly large disparity.¹ *Innovation is among the pillars with the largest European dispersion.*

¹ The WEF analysis does not distinguish between European countries that are members of the EU and that are not.

GCI in Europe across the 12 pillars, 2017-2018

Figure 1: GCI score range for Europe across the 12 pillars, 2017-2018 edition
Score (1-7)



Source: Calculations based on the results of the Global Competitiveness Index 2017-2018.

Note: The name of the best global economy is mentioned at the top; where the best European country does not coincide with the best global, the best European country is mentioned separately.

Source: WEF Global Competitiveness Report 2017-2018

In the 2010s, after the EU launching its Europe 2020 Strategy, *the WEF also started to investigate European competitiveness under a distinct project. Thus the WEF created its own Europe 2020 Competitiveness Index, based on the data it has been collecting for the GCI.*

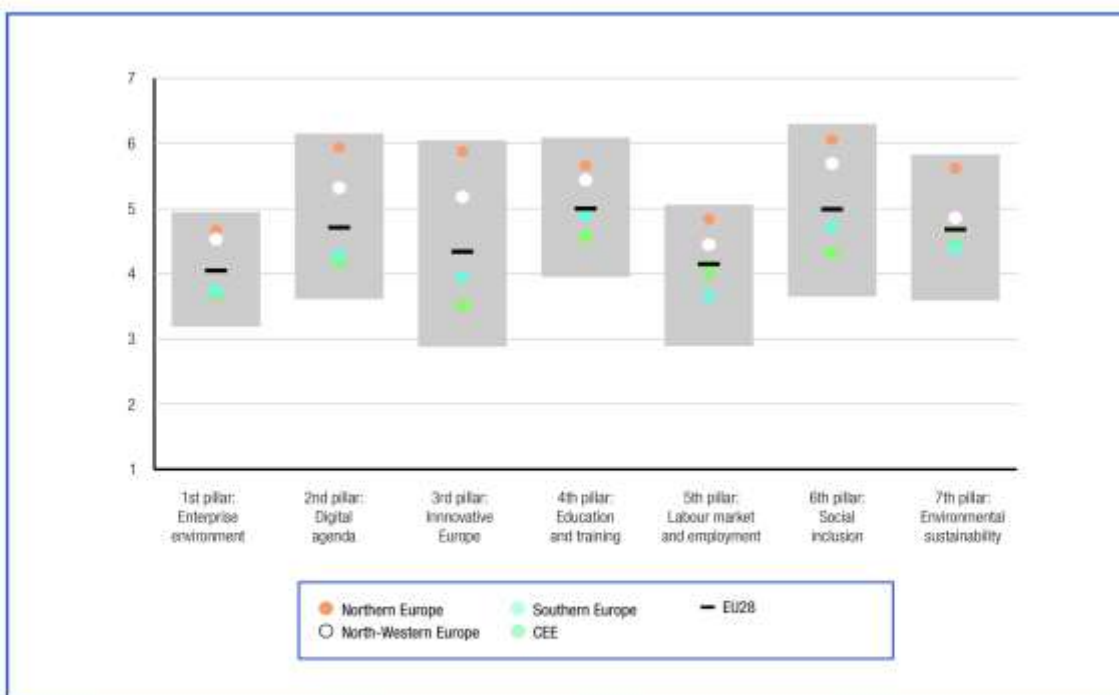
The WEF Europe 2020 Competitiveness Index



Source: World Economic Forum, 2014.

In its **Europe 2020 competitiveness reports**, the WEF has identified a large spread in the performance of the EU member states along the pillars of its own index, similarly to the countries' performance along the Europe 2020 Strategy indicators.

Figure 6: Europe 2020 Competitiveness Index—Score Dispersion among EU Countries and Regions, (Score 1–7)



Source: World Economic Forum, 2014.

Note: The length of each bar is determined by the score of the best and worst performing EU Member State. Northern Europe: Denmark, Finland, Sweden. North-Western Europe: Austria, Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, United Kingdom.

Southern Europe: Cyprus, Greece, Italy, Malta, Portugal, Spain.

Central and Eastern Europe: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia.

In 2014, the gap was the largest along the 3rd pillar of the index: Innovative Europe, by Northern and Western Europe outperforming Southern and Eastern EU member states, by far.

Another dimension in which the EU member states have exhibited large dispersion was *social inclusion* (the third priority of the Europe 2020 Strategy). In fact, competitiveness does not guarantee inclusive growth, neither are they in a trade-off relation, so it is possible to operate a social and economic model that is economically successful and socially equitable at the same time.

In order to analyse this issue more in depth, the **WEF** and the **European Investment Bank (EIB)** established a joint '**Europe Inclusive Growth and Competitiveness Lab**'.

The Lab's white paper published *in 2017 identified five areas* where Europe could improve in its response to the rapid technological change:

- **more open innovation systems** and increased efforts to **diffuse existing general-purpose technologies** more rapidly;
- to ensure a **successful transition for innovative enterprises** from the start-up to the scale-up phase;
- to create conditions that enable inclusion and competitiveness through **smarter infrastructure** (i.e. better-connected digital, transport, and energy networks)
- to equip people with the **best possible cognitive and digital skills** to enable them to benefit from technological progress;
- to provide **capital for innovative firms**, in ways that are tailored to their needs at different stages of the life cycle.

Questions for self-study

- How has the concept of countries' competitiveness evolved from Ricardo's theory of comparative advantages to the World Economic Forum's definition (based on the endogenous growth theory)?
- What patterns are identifiable in the relation between R&D&I and competitiveness in Europe according to the presented reports and analyses?

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