Central and Eastern European countries way towards the Lisbon Targets – ICT as driver for economic and social development

Study

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A. Management summary

Management Summary

The **study investigates** the **contribution of technology** to the **economic, social-political** and **regulatory development** in Central and Eastern European countries (CEE)**, taking relevant parts of the Lisbon goals as a basis. Results** are:

- Technology has a positive effect on a country's **economic** situation in terms of economic wealth[1)] and in terms of an advanced market development
- Technological development significantly improves the **social-political** dimensions, such as social stability, level of education, political freedom and, as a consequence, the number of innovations[2)]
- There is no clear influence of a **regulatory** framework on the technologization of a country – countries with the same or similar regulation show deviations in their technological development

From these results, the following **recommendations** for **the involved parties** – operators, regulators and governments – **are derived**:

- **Governments** should recognize technologization as primary acting area, taking a lead role in actively fostering it
- **Regulators** should give the appropriate level of freedom to invest and to implement technology, e.g. avoid overprotection of local operators at the expense of consumers as well as of other industries. A well designed regulatory framework has proven to attract investments and to foster growth
- **Operators**, the main drivers of technologization, should invest as chances of pay back are high due to the positive effect of technologization on a country's economic wealth

1) Measured in GDP per capita 2) Innovations per capita

B. Relevance and key questions

The study investigates the contribution of technology to the "CEE" countryies development, based on the Lisbon goals (1)

Lisbon goals		Measures and recommendations: Who?	What?
Growth	Ensure open and competitive markets	Governments	• Create legal framework to change market situation • Analyze and abandon barriers of market entry and other rules implying inflexibility • Avoid distortion of competition by interference of the state in specific markets
	Improve regulation	Regulators	• Apply the framework in a beneficial and consistent way • Check in each case whether and which regulation is necessary (wrong regulation implies extra costs) to avoid unnecessary regulation blocking investment • Move from formally open markets to real competition in energy, telecoms and railways • Create a regulatory regime to fit with the European markets, not with the small national market
	Expand/improve infrastructure	Operators	• Take concrete opportunities to invest • Move into public private partnerships to seek opportunities for infrastructure improvement
		Governments	• Set policy priorities and exactly define goals to be achieved in order to help operators focus correctly • Assess importance of infrastructure for development of national economy

… directly related to the contribution of ICT to a country's economic, social and regulatory development

The study investigates the contribution of technology to the "CEE" countryies development, based on the Lisbon goals (2)

Lisbon goals		Measures and recommendations: Who?	What?
Growth [1]	Attract investments	Governments	• Create incentives for investment • Conduct impact assessment of various kinds of policies to improve selection of concrete policy • Support investments by co-financing joint projects
		Operators	• Utilize chances to invest
	Facilitate innovation and take up ICT	Governments	• Provide financial resources via state aid to small and medium sized companies for R&D and technology research • Seek tax optimization options for R&D investment • Support private demand for broadband communication (e.g. by tax policy)
	Foster knowledge and innovation	Governments	• Improve education and innovation-friendly environment • Create basis for exchange of knowledge (e.g. business parks, collaboration with universities)
Employ-ment [2]	Invest in education and human capital	Governments	• Improve quality of education • Offer an incentive for mobility of labor for having people work abroad and attracting foreign workers

1) Further "growth" goals are: Extend/deepen single market; increase R&D invest; contribute to strong industrial base
2) Further "employment" goals are: Modernize social protection systems; increase flexibility of labor markets and adaptability of workers

… directly related to the contribution of ICT to a country's economic, social and regulatory development

The study was set up to investigate the contribution of technology to a country's economic, social and regulatory development

- Concerning economic growth, **CEE** countries have **outperformed Western European** countries in recent years (average: + 7.0% in CEE; + 3.4% in Western Europe)[1)]
- **Individual economic power** strongly **varies** across CEE countries (e.g. Bosnia and Herzegovina: USD 2,036 GDP/capita vs. Slovenia: USD 14,015 GDP/capita)[2)]
- In some countries, **political freedom and economical development** are still at a **low level** (e.g. Bosnia and Herzegovina: 6.6 weighted BTI[3)] vs. Slovenia: 9.5 weighted BTI)

Key questions

- Does technology contribute to the **economic power** and/or **social political strength** in the CEE countries?
- If so, to which **components of economic/social strength** is the contribution made to?
- What have the **involved parties** (operators, regulators, governments) to do in order to foster such a technological contribution?

1) GDP growth CAGR 2000-2005
2) GDP per capita expressed in PPP (= purchasing power parity)
3) Weighted BTI = Weighted average of Bertelsmann Index for economical development and political freedom (0 = Lowest development; 10 = Highest development)

C. Study methodology – Area of research

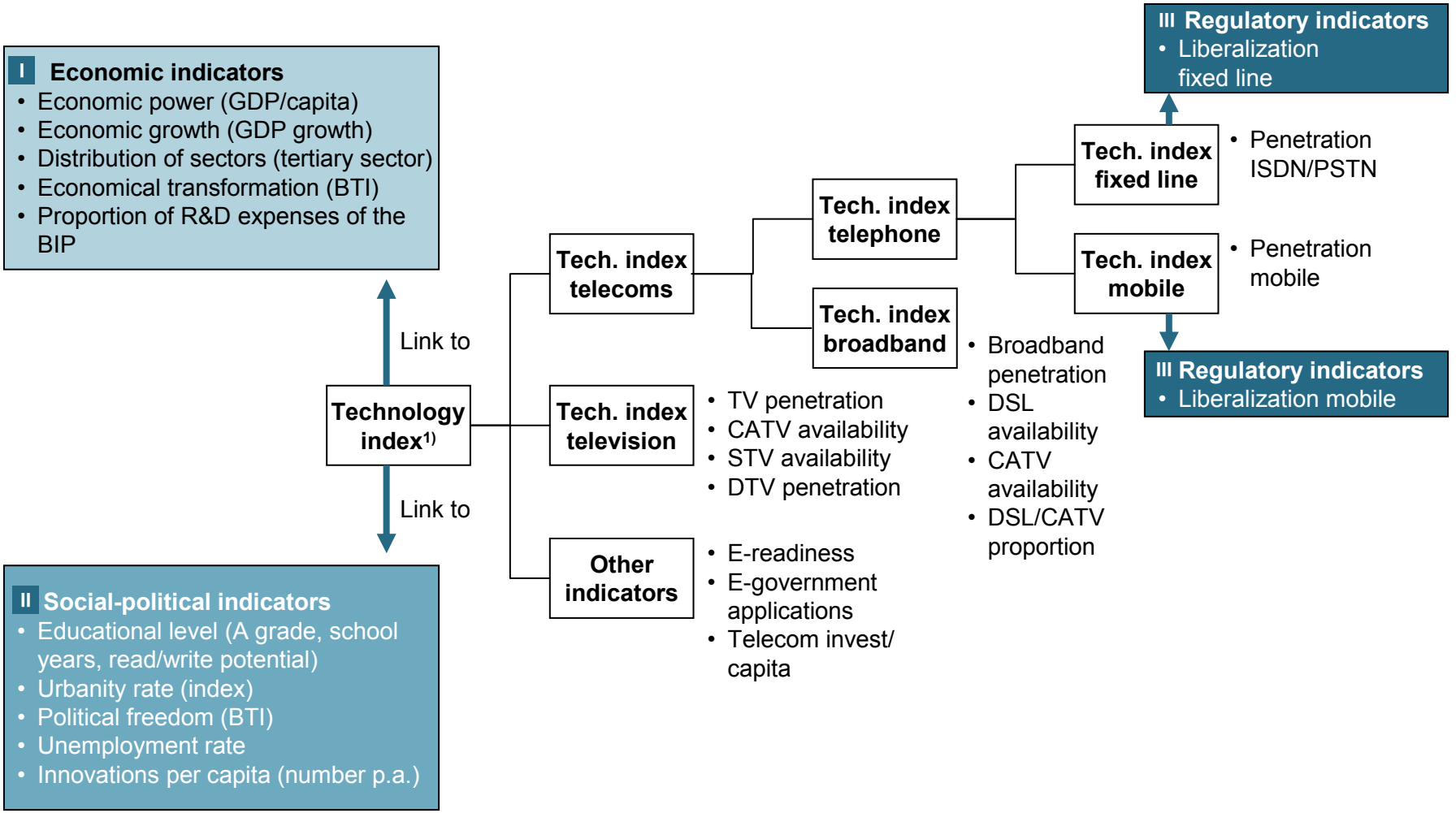
15 CEE countries were investigated in the study – Key economic data

Country data according to GDP/capita

Country	GDP/ capita[1)] [USD]	Inhabit-ants [m]	Tertiary sector share [%]	Unem-ploy-ment rate [%]	Inflation rate [%]
Slovenia (SVN)	14,015	2	61	9.6	4.0
Hungary (HUN)	10,683	10	60	7.1	3.7
Czech Republic (CZR)	8,787	10.2	57	8.3	2.8
Croatia (HRO)	8,308	4.5	65	17.2	3.3
Estonia (EST)	6,727	1.4	62	9.2	3
Slovakia (SVK)	6,044	5.4	55	18.2	7.4
Poland (POL)	5,436	38.6	46	18.8	3.5
Latvia (LVA)	5,280	3.5	59	11.2	1.1
Lithuania (LTU)	4,835	2.3	71	9.8	6.2
Romania (ROU)	3,550	22.3	53	6.1	9.0
Bulgaria (BGR)	3,771	7.4	58	9.6	5.5
Serbia & Montenegro (SCG)	2,355	8.2	61	31.6	17.3
Macedonia (MKD)	3,038	2	43	36	0.5
Bosnia & Herzegovina (BiH)	2,036	4.5	55	45.5	7.6
Ukraine (UKR)	1,668	46.7	44	8.5	10.3
Germany (GER)	29,156	82.4	67	9.2	2
Austria (AUT)	30,896	8.2	67	4.5	2

1) GDP/capita as of 2005

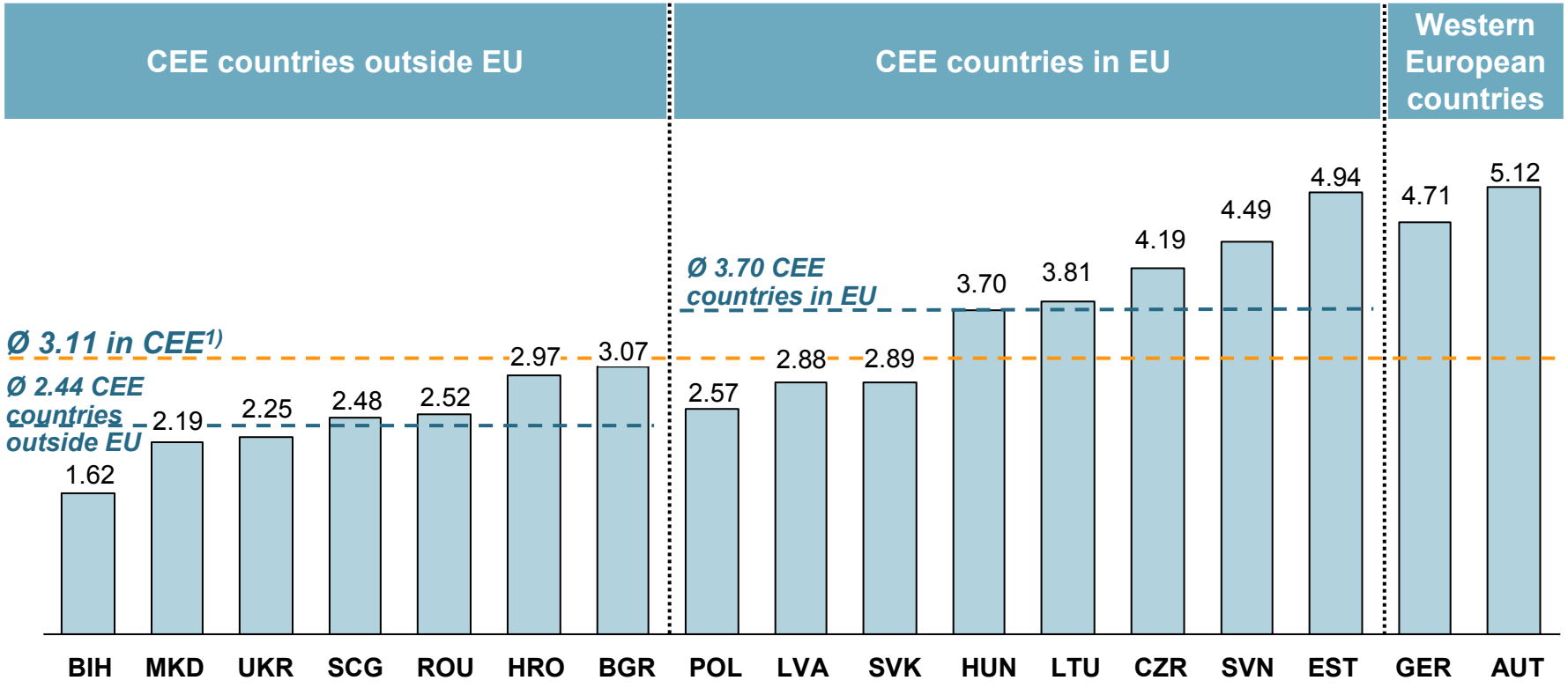
The Technology Index is calculated using weighted technology drivers – Link to economic, social and regulatory indicators



1) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)

Technology index among CEE countries is very heterogeneous – Average is still behind Western European countries

Countries according to technology index



1) 15 CEE countries investigated

D. Study results

Technology has a positive impact on a country's economic and social-political development – No direct link to regulatory means

I Economic

- A **high technologization** of a country **strongly contributes** to
  - The **economic wealth** in terms of **GDP/capita** of a country
  - The degree of **transfor-mation of an economy,**
  - The **proportion of R&D expenses of the BIP**

II Social-political

- Technology **strongly contributes** to **social-political** factors such as
  - **Social stability**
  - **High level** of **education**
  - **Political freedom**
- Technologization serves as **fertile ground** for **innovations**

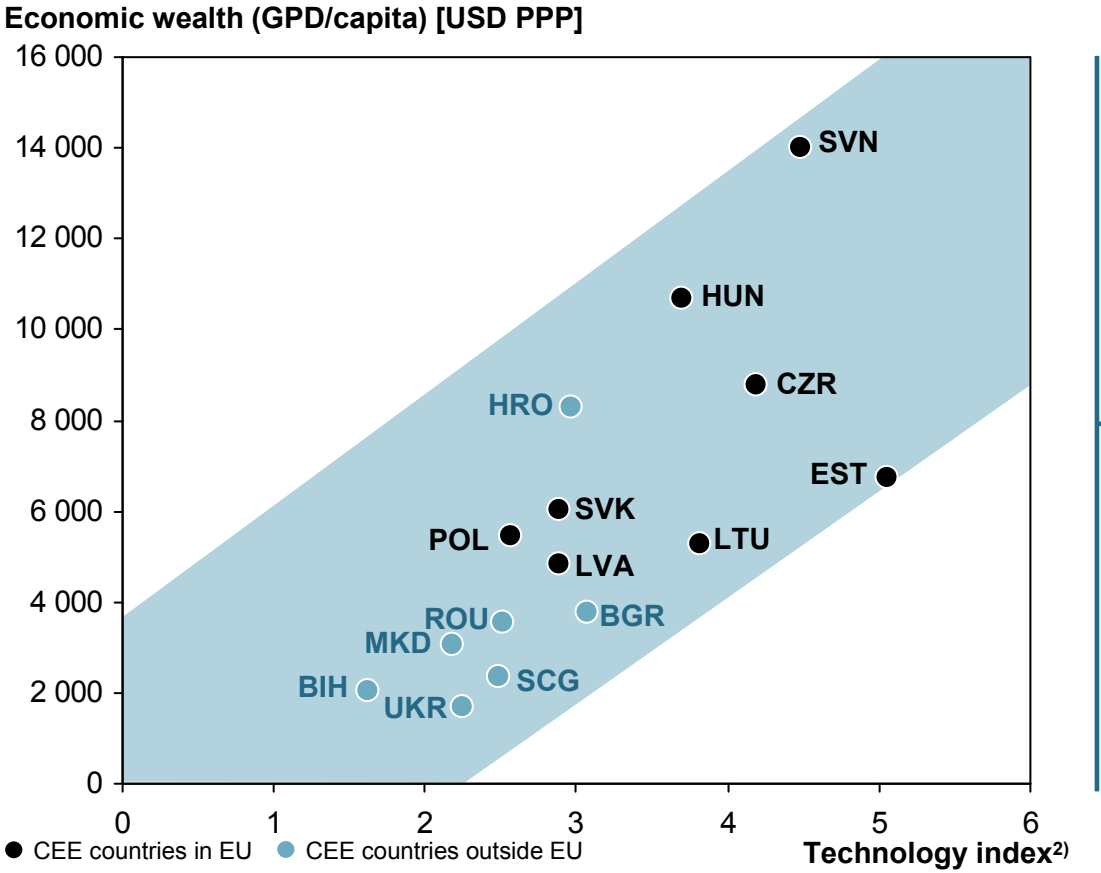
III Regulatory

- **Liberalization status** and regulatory framework in fixed and mobile telecommunications have a very **heterogeneous influence** on the pace of **technologization** in a country and vice versa

1. **Technology has an immediate positive effect on a country's economic situation in terms of economic wealth and of transformation into a more developed market**
2. **Technological development significantly improves social-political dimensions, such as social stability and level of education**
3. **Technological development cannot be directly linked to regulatory means – Regulatory conditions need to be adopted on a case-to-case basis for each country**

Technologization seems to be a significant driver of the economic wealth of a country's citizens

Technology index vs. economic wealth [GDP/capita]



1) Correlation coefficient of 0.74 (0 = No correlation; 1 = Strongest correlation)
2) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)

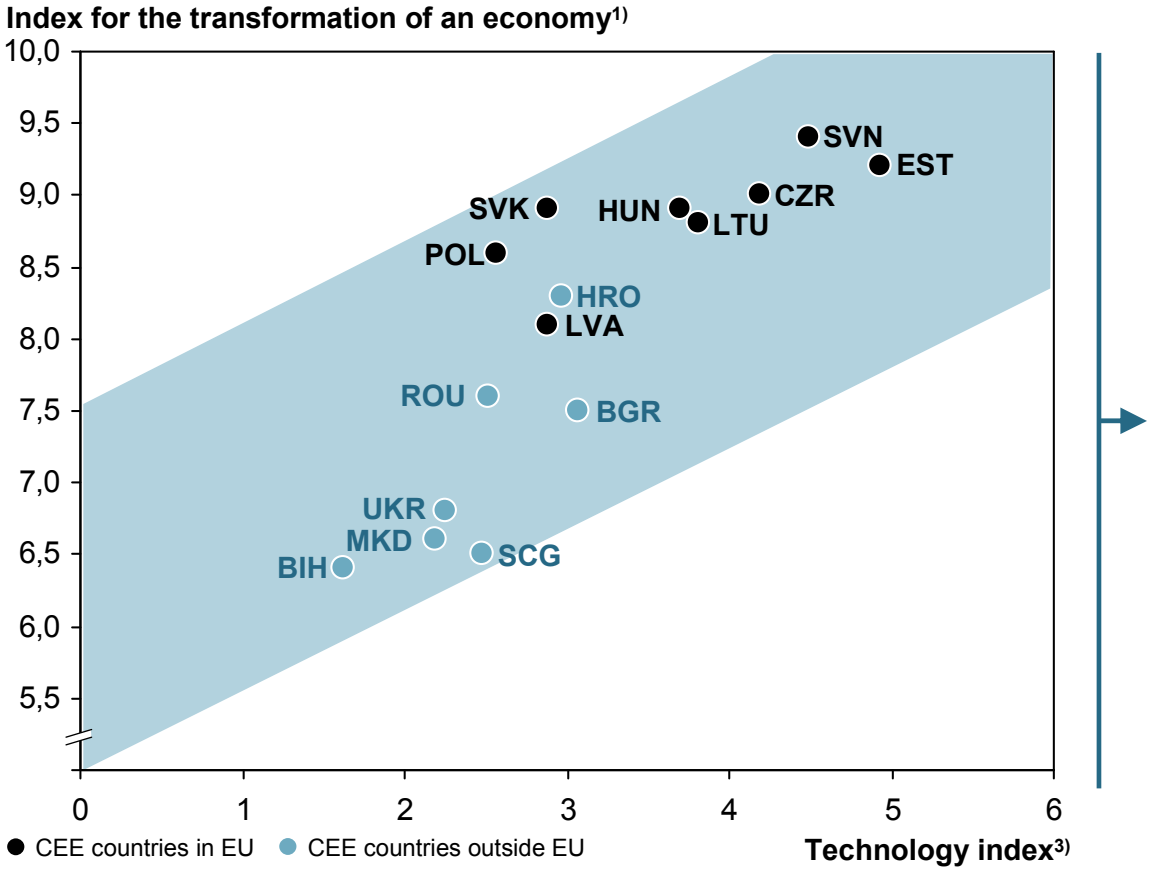
Source: Roland Berger, PSC AG

GDP per capita and **technologization show a strong correlation**[1] indicating that

- **Technology** has a **significant impact on** the **economic wealth of a country's citizens**
- **The increase** in **economic wealth** has been **realized within a short time period**
- **EU membership** seems to **improve** the **economic situation** and **boost technologization**, as most new EU member states have performed better than non-EU countries

Technologization is directly linked to economical indicators reflecting the transformation of an economy

Technology index vs. degree of development of an economy

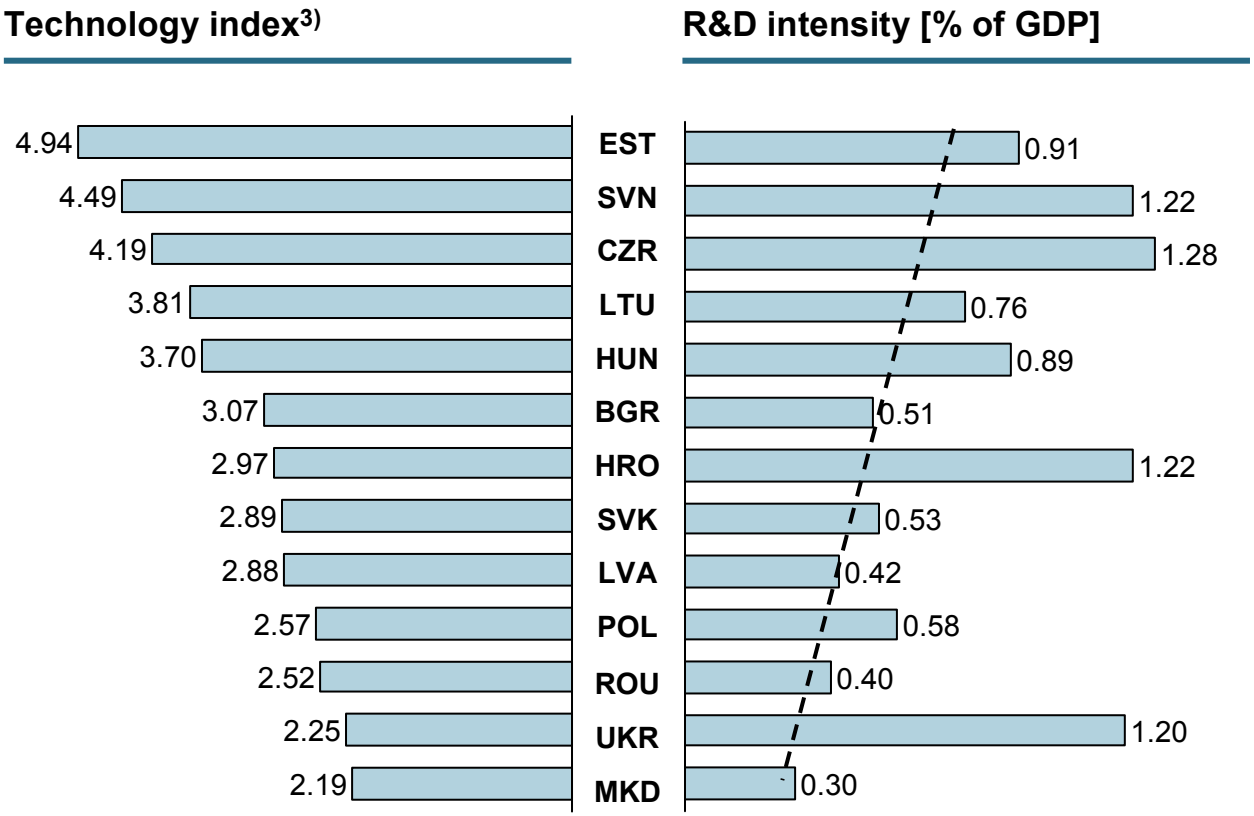


- **Technologization correlates** strongly[2)] with the **degree of trans-formation** of an economy
- The **higher** countries rank on the **technology index**, the **higher** are the **values for economical indicators** that reflect the transformation of an economy such as
  - Sustainability of the economy
  - Currency and price stability
  - Socio-ecological development level
  - Market liberalization and competition framework
  - Economic wealth

1) BTI index for economical transformation (0 = Lowest development; 10 = Highest development)
2) Correlation coefficient of 0.83 (0 = No correlation; 1 = Strongest correlation) 3) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)
Source: Roland Berger, PSC AG, Bertelsmann Stiftung

The more technologically developed a country, the larger is its portion of the GDP spent for R&D activities

Technology index vs. R&D intensity[1] [%]



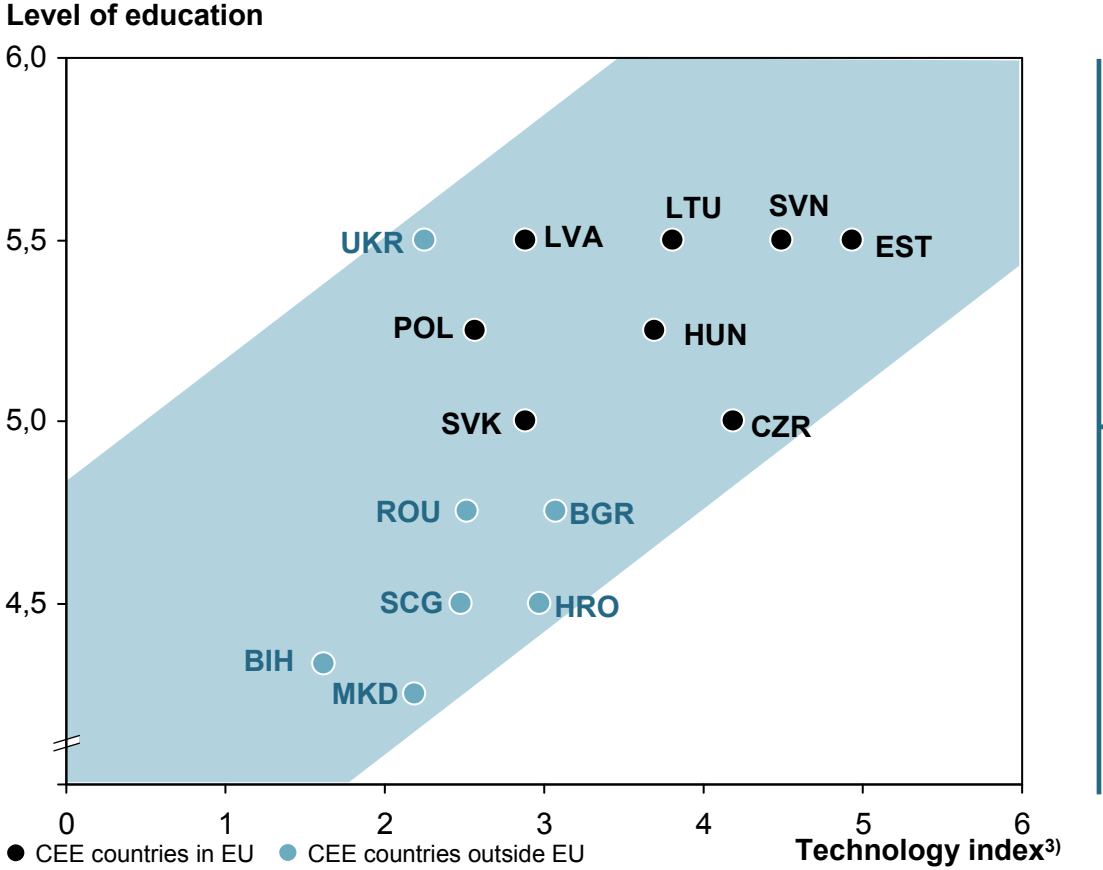
The intensity of R&D expenses of a country correlates[2] with its technology index

The more technologically developed a country is**, the more** – relative to its GDP – an economy is **investing in R&D** activities in order **to maintain** or **increase** its **technologization**

1) R&D expenses of a country [% of GDP]
2) Correlation coefficient of 0.51 (0 = No correlation; 1 = Strongest correlation) 3) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)
Source: Roland Berger, PSC AG

Technological development interacts with the literacy rate and the rate of people completing extended school education

Technology index vs. level of education[1)]



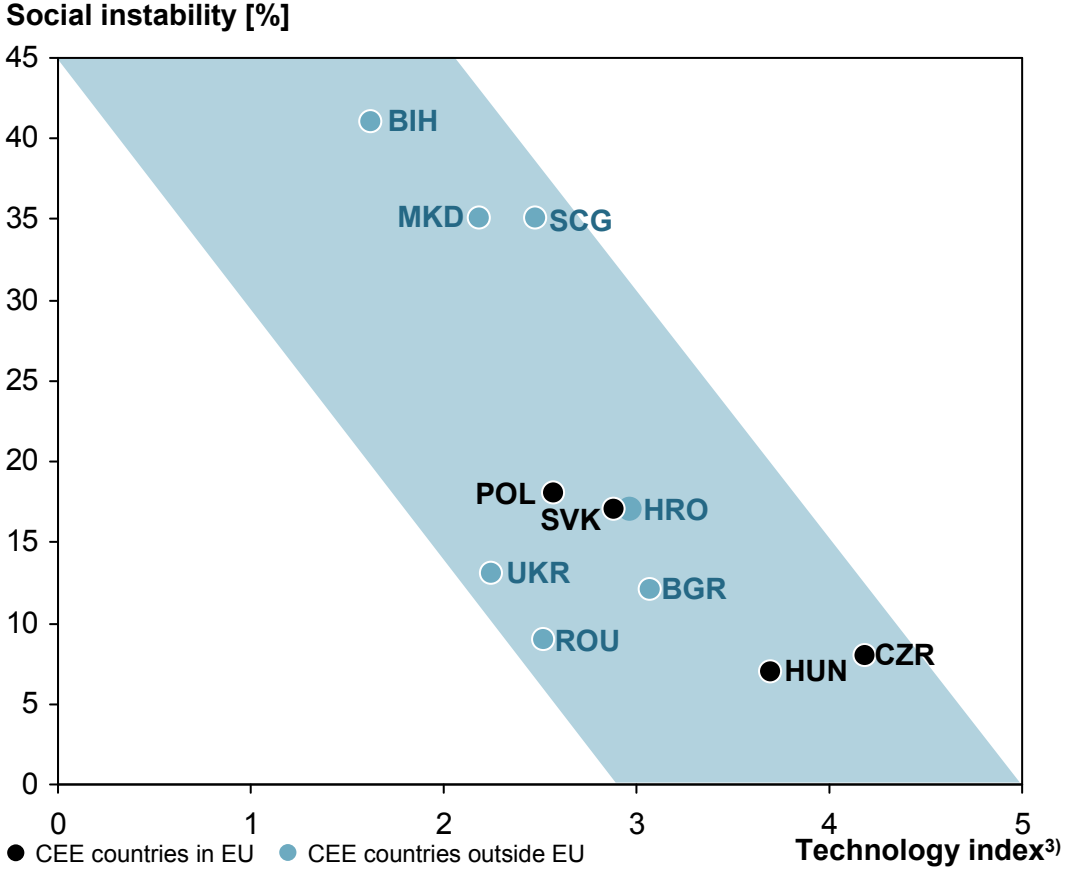
- **Technologization** has an **interdependency**[2)] with the **level of education** in a country
- The positive correlation indicates that **technological development** of a country **strongly interacts** with
  - The **literacy rate**
  - The rate of **people completing extended school education**
  - The **importance** of **longer compulsory school education** in a country

1) Weighted average of the level of: 50% literacy, 25%school leavers; 25% compulsory school education (0 = min.; 6 = max.)
2) Correlation coefficient of 0.6 (0= No correlation; 1= Strongest correlation) 3) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)

Source: Roland Berger, PSC AG

The higher technologization in a country, the lower is its unemployment rate and the number of people living in poverty

Technology index vs. social instability[1] [%]

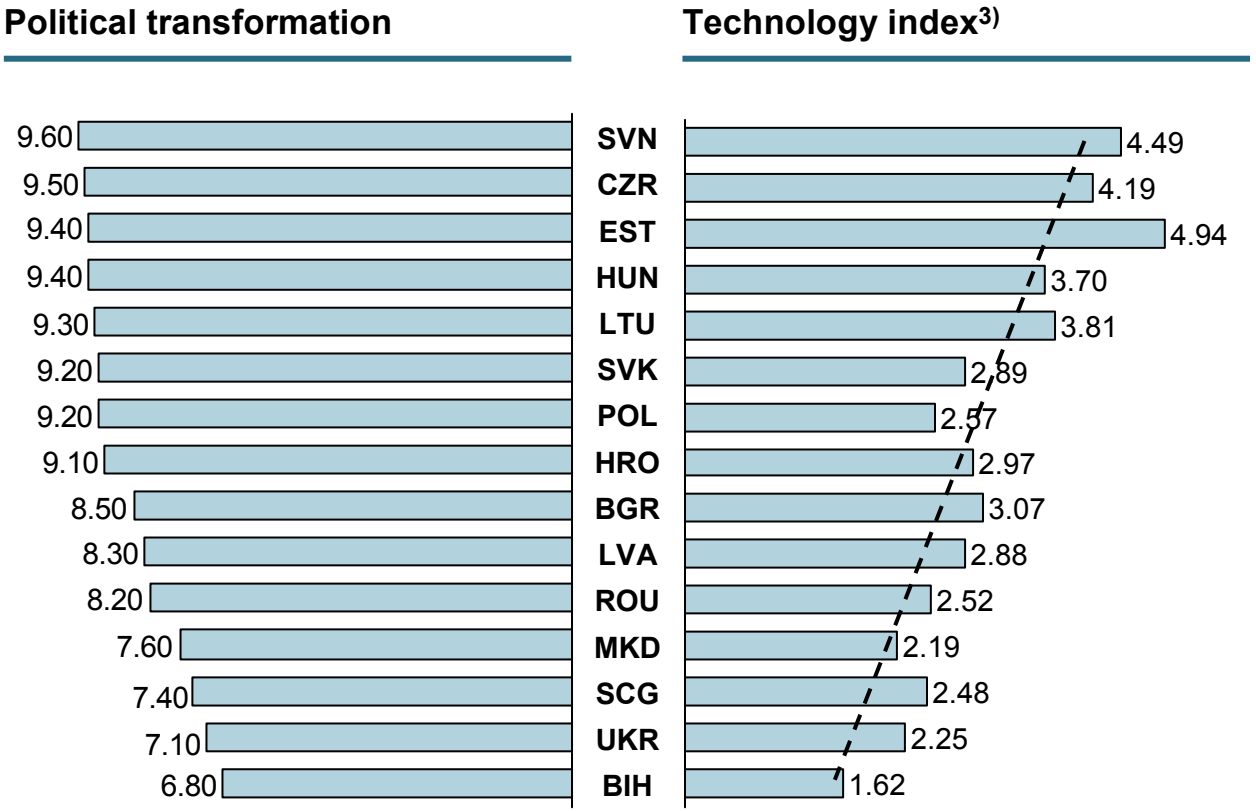


- Countries scoring **high** at the **technology index** show a better[2] **social economical attractiveness** in terms of **low unemployment rate** and **less** people living in **poverty**
- Thus **technologization** seems to positively **support the labor market** in terms of
  - **Increased number of jobs**, thus reducing unemployment in combination with
  - A certain **level of wages** protecting people from poverty

1) Weighted average of unemployment rate and people living in poverty
2) Correlation coefficient of -0.72 (0 = No correlation; 1 = Strongest correlation) 3) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)
Source: Roland Berger, PSC AG

Technological development supports an open information flow, and thereby the transformation and/or maintenance of democracies

Technology index vs. political transformation[1)]



Technologization strongly[2)] correlates **with** the **degree of political transformation** in a country

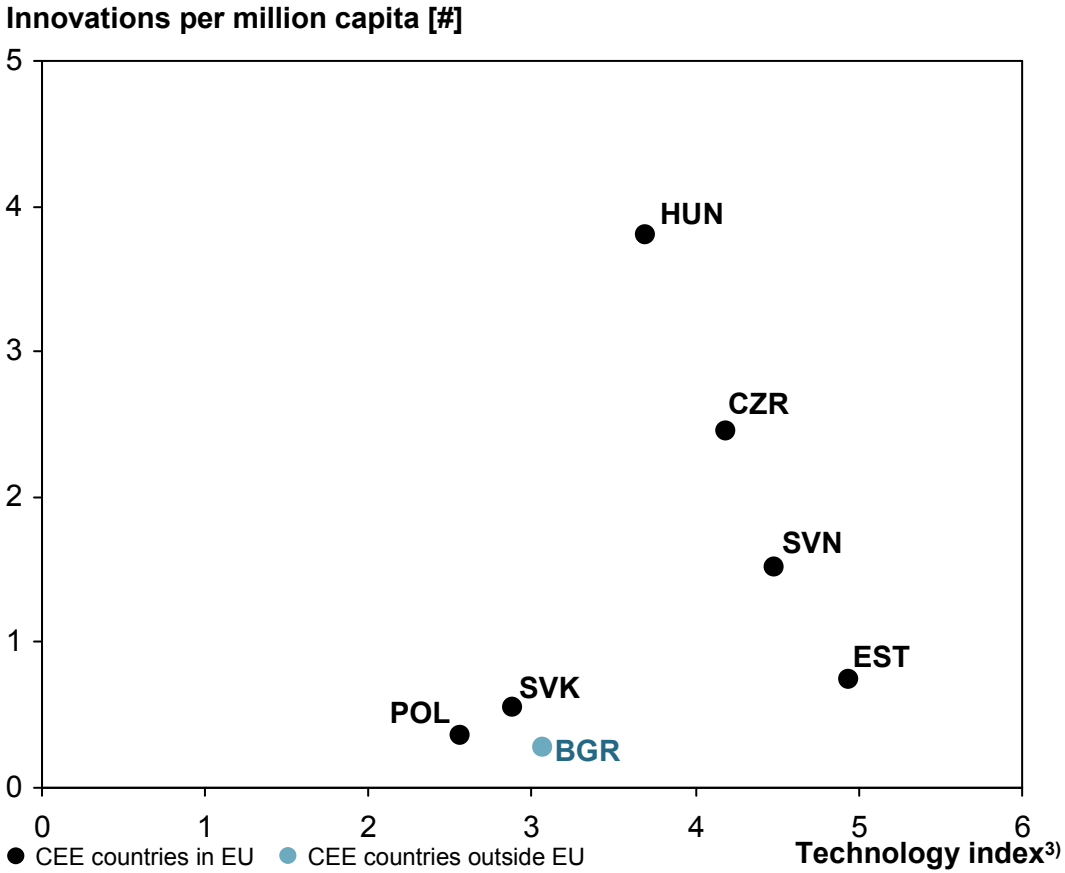
Technologization, as main **driver** behind **public and free information,** seems to **back up** the main **instruments of democratization** in a country such as

- Political participation
- Constitutional legality
- Democratic stability
- Political and social integration

1) Political transformation is expressed in the BTI for political transformation (0 = No transformation; 10 = Strongest transformation)
2) Correlation coefficient of 0.8 (0 = No correlation; 1 = Strongest correlation) 3) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)
Source: Roland Berger, PSC AG, Bertelsmann Stiftung

Technologization can serve as an enabler for innovative ideas

Technology index vs. innovations per million capita[1)]

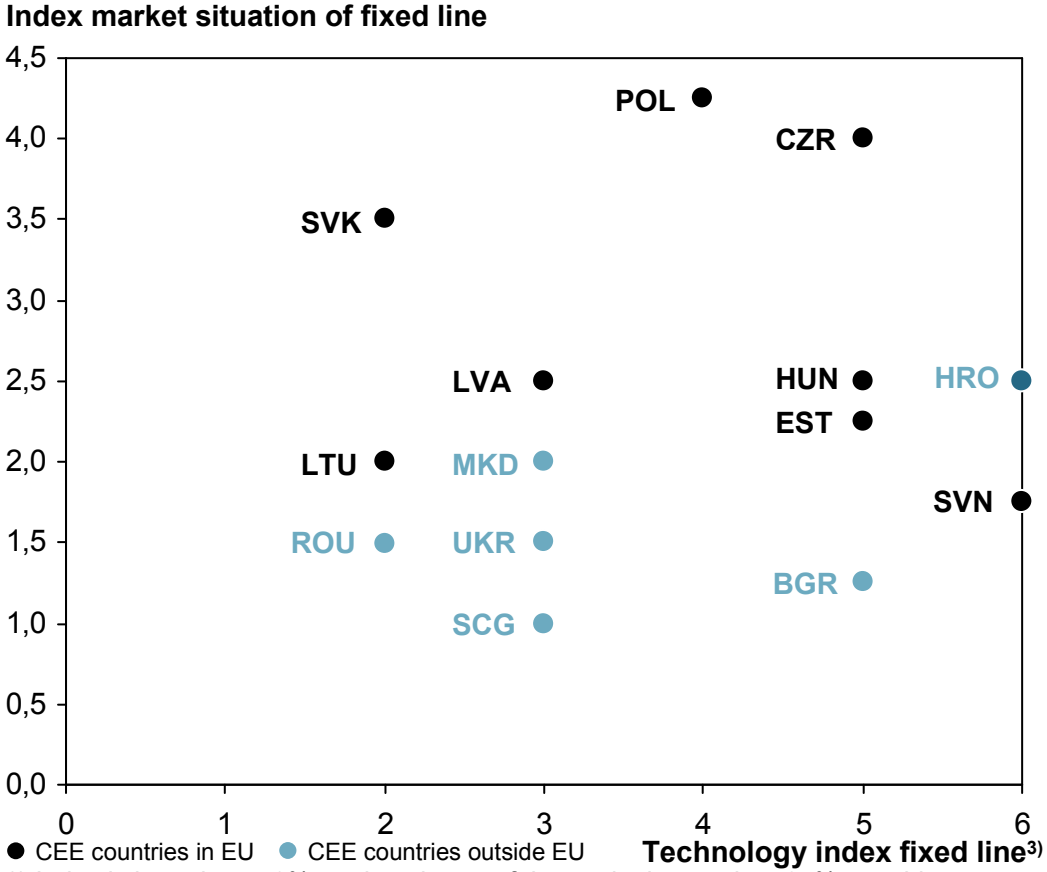


- Technologization shows a **weak correlation**[2)] to the per-capita number of innovations in a country
- Technologic development seems to serve as an **enabler of innovative ideas** that are developed and finally listed as patents

1) Measured in patents per million capita 2) Correlation coefficient of 0.36 (0= No correlation; 1= Strongest correlation)
3) Range of Technology Index is from 1 (Minimum) to 6 (Maximum)
Source: Roland Berger, PSC AG

Results of liberalization efforts are heterogeneous across the CEE countries

Technology index for fixed lines vs. index for market situation in fixed lines[1)]



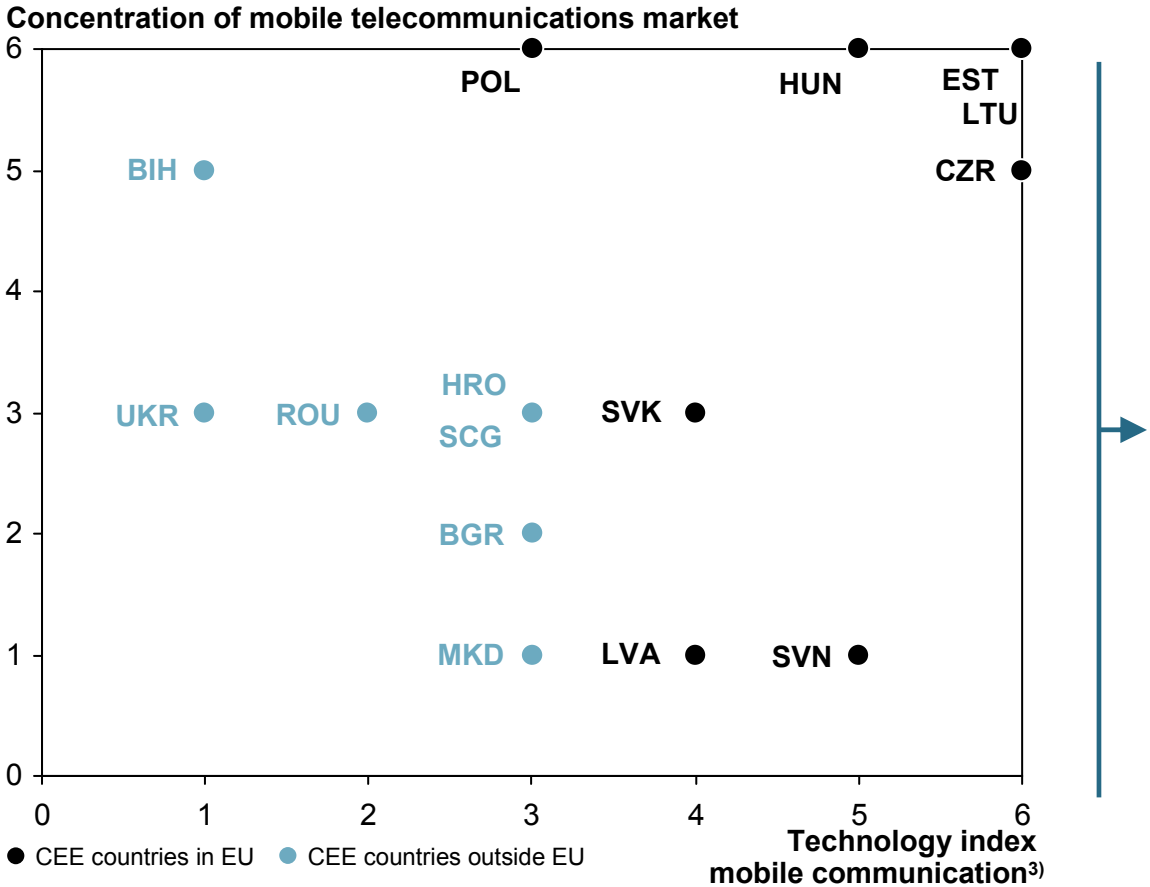
- **Technology index** of fixed lines shows almost no correlation[2)] with the **market situation** of **fixed lines**
- The **total market share** of fixed-line operators, **monthly cost** per fixed line and **cost per local call** of the investigated countries do not significantly influence the penetration rate of fixed lines
- Hence **liberalization** does **not necessarily** foster a **favorable fixed line market situation**
- **EU accession** has had a **positive impact** on the **market situation**

1) Index is based on: 50% market shares of the total telco market, 25% monthly cost per line, 25% cost per local call (0 = min.; 6 = max.)
2) Correlation coefficient is 0.11 (0 = No correlation; 1 = Strongest correlation) 3) Refers to the fixed-line penetration rate in a country.

Source: Roland Berger, PSC AG

There is no significant correlation between technologization and liberalization in the mobile sector of a country

Technology index for mobile communication vs. concentration of mobile communication[1)]



- **Technology index** of **mobile communication shows a weak correlation**[2)] with the **concentration** of **the mobile telecommunications market**
- **Hence liberalization** of the market **does not necessarily seem to drive** the **development of mobile telecommunications** in a country

1) Expressed in the HHI Index; high index indicates a very concentrated market (0 = min.; 6 = max.)
2) Correlation coefficient of 0.31 (0 = No correlation; 1 = Strongest correlation) 3) refers to mobile communication in a country.
Source: Roland Berger, PSC AG

E. Conclusions and Recommendations

Technologization improves the social and economical status of a national economy – heterogeneous impact from regulations

Conclusions

Operators

- Technologization is in the hands of the operators. They are the main drivers and **strongly contribute** to the **economic wealth, transformation of an economy, social development** and **high R&D expenses** – hence chances of investments to **pay back are high**

Regulators

- Liberalization does not always encourage favorable market conditions. Hence the **appropriate level of freedom** is the right choice – **local** operators should **not be overprotected** at the expense of consumers, as well as of other industries and their employees
- A **well designed regulatory framework** (comparable to the **EU** framework) has proven to attract investment and to foster growth

Governments

- **Technology** strongly drives social development and well-being. Thus it has to be recognized as a **primary acting area of a government**
- Hence, governments need to **actively foster technological development** by taking a **lead role** in **technologization** (e.g. e-government applications; integration of technology in education)

Recommendation – Actions for the three involved parties (1)

Operators

- Define a **clear set of expectations** and **requirements** for **investment**
- Create common goals and share risks by looking for **public private partnerships for investment projects**

Regulators

- Do not care about a micro-management of technology regulation but apply a stringent framework **balancing the freedom to invest and act** on the market with the required **openness of the market for competition**
- Analysis of the EU member states show that good regulatory practice (= the application of the EU framework) attracts more investment for electronic communication. So does higher GDP. Therefore, EU countries score higher in our study and thus the implementation of the EU framework seems to be favorable.
- Do not only implement frameworks ex-post but **pro-actively consider future framework elements in the policies**

Recommendation – Actions for the three involved parties (2)

Governments

- Offer an **incentive for industry and private households** to drive the use of technology, e.g. by **tax exempt rules** for broadband demand of private use
- On the macro level, care about a **workable framework** creating an open environment to **attract investments** without discouraging investors. In case of doubt a regulator has to be present when legislation is designed
- As policy measures have a differentiated impact, **analyze impact assessment in the phase of policy design** – this will help select the appropriate measures