

The Role of FDI in Quality-based Competitiveness

Anna Kaderabkova
Centre for Economic Studies, Prague



www.cesvsem.cz

Warsaw, 22. 6. 2007

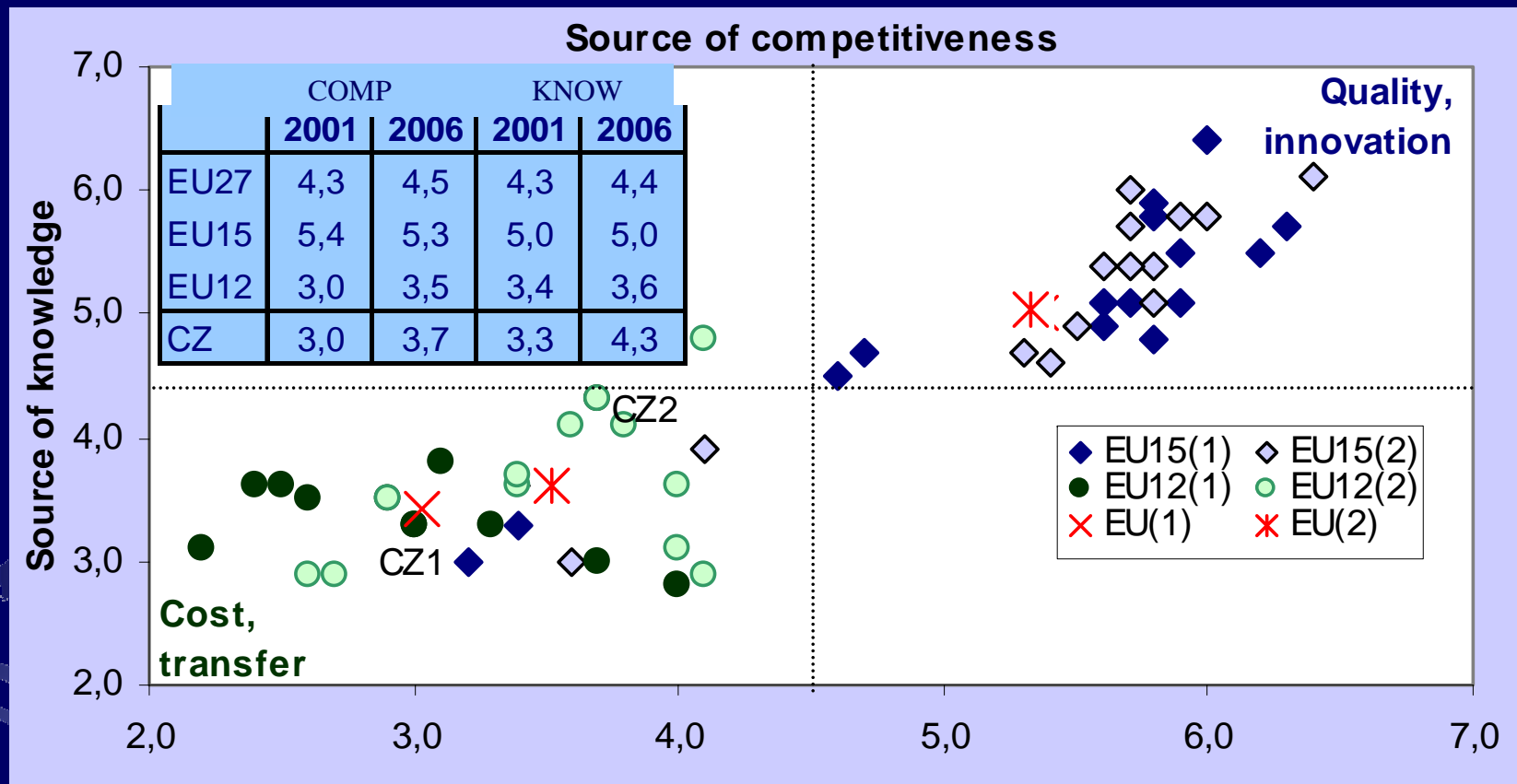
Competitiveness Yearbook

- Growth performance and well-being
- Institutional quality
- Quality based competitiveness (innovation, ICT, human resource quality)



Competitive advantage matrix

- Sources of competitive advantage and technology knowledge (level of innovation capacity/performance)



Structure

1. Structural characteristics of globalization

- FDI specificities

2. International division of labour

- Structure and competitiveness of foreign trade
- Quality of trade structure
- Technology intensity of trade

3. Internationalization of R&D activities

- Fragmentation of multinational value chain
- Foreign investment in knowledge-intensive activities
- Knowledge/intensive activities of foreign companies

1. Structural characteristics of globalization

- increasing mobility of quality-intensive production factors, increasing competition for their attraction
- emerging markets moving to higher value added segments, both strong domestic investment (development of local knowledge base) and strong attraction for R&D and other innovation (high-skill) oriented FDI



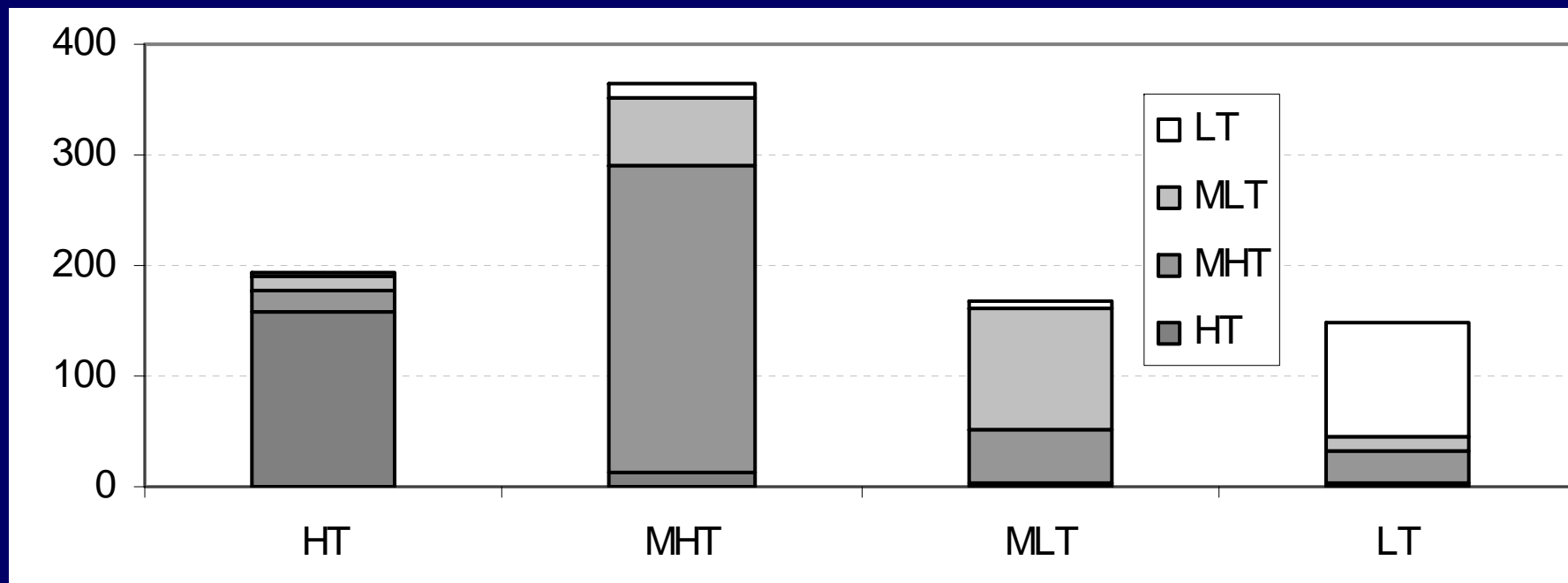
2. International division of labour

- Trade, FDI, and R&D with the emerging markets have the potential to cover a whole range of products, including skill/technology-intensive products, not just in low value added segments of goods and services.
- Emerging markets share of total FDI will continue to increase while the composition of trade and FDI will see emerging markets attracting a higher share of FDI in high value added manufacture, services, and R&D.
- Advances in technology, particularly ICT, the relative rise of the service sector and change of business models have ensured that cross border flows are increasingly composed of services, R&D, financial capital and human capital, and not just physical goods.

2. International division of labour

- Structure and competitiveness of foreign trade
 - intra- vs. inter-industry trade, relocation of the EU low-skill segments
- Quality of trade structure
 - CEEs moving to „medium-high technology“ trade in FDI segments
 - strong internationalization of production (export share, import penetration)
- Technology intensity of trade
 - technology intensity of imports vs. exports (share of value added in production)
 - direct vs. indirect trade (high in „high tech“ exports)

Technology intensity of trade: Imports by technology intensity in the CR (2003, in mld. CZK)



Note: HT = high-technology intensity, MHT = medium-high-tech, MLT = medium-low tech, LT = low-tech.
Source: CZSO, Database of foreign trade (1.10.2006), own calculations.

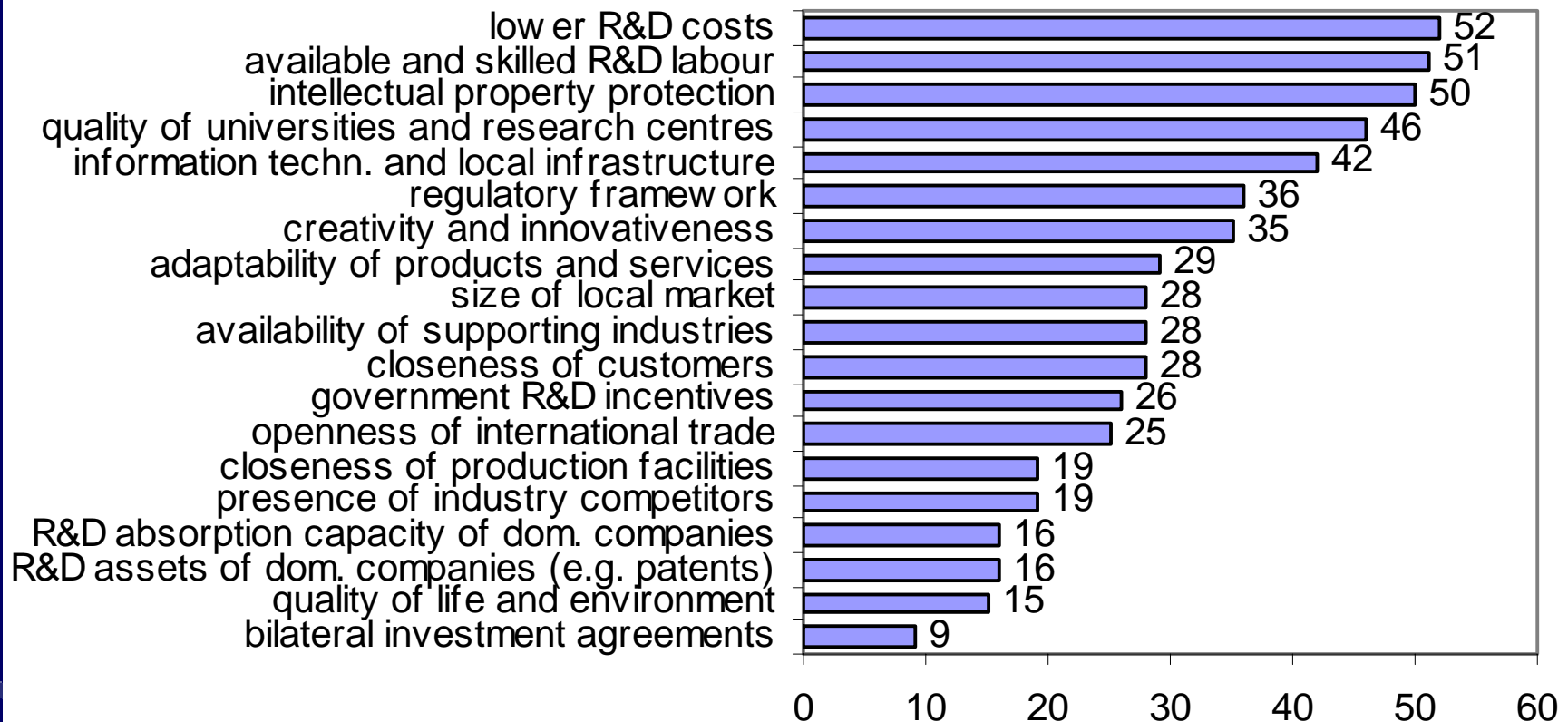
3. Internationalization of R&D activities



- Fragmentation of multinational value chain
 - effects to the sources and direction of competitive advantage
 - industry-based technology/skill classification becoming misleading
 - assembly operations (biases of FDI incentives?) vs. development of internal innovation capacities (new focus of incentives?)
- Foreign investment in knowledge-intensive activities
 - determinants of FDI vs. qualities of national innovation system(s)
- Knowledge/intensive activities of foreign companies
 - FDI structured in terms of „technology intensity“
 - FDI role in (manufacturing) R&D dominant and increasing
 - FDI businesses more innovative than domestic ones
 - R&D intensity of value added remains low

Determinants of foreign investment in R&D

(2005, % of respondents)



Position of the Czech Republic and the key determinants of its innovation system



| | R&D activities | CR | EU-25 |
|--------------------------|---|-------|-------|
| R&D expenditure | R&D expenditure in % of GDP | 1.3 | 1.9 |
| | Business sector | 51.4 | 55.3 |
| | Government sector | 41.8 | 34 |
| | Higher education sector | 2.2 | 2 |
| Human resources for R&D | Number of researchers in % of employees | 0.73 | 0.92 |
| | Business sector | 0.26 | 0.36 |
| | Government sector | 0.17 | 0.1 |
| | Higher education sector | 0.3 | 0.45 |
| | Ph.D. graduates of science and technology fields* | 0.5 | 1.2 |
| Intersectoral linkages | Business R&D financed by government | 12.0 | 10.6 |
| | University R&D financed by businesses | 1.0 | 6.6 |
| | Government R&D financed by businesses | 7.8 | 5.5 |
| Scientific output | Scientific publications per 1000 inhabitants | 0.505 | 0.789 |
| Innovation output | Share of innovative companies | 25.9 | 36.2 |
| | Number of EPO applications per mil. inhabitants | 10.9 | 133.6 |
| Venture cap. in % of GDP | Start-up stage | 0.008 | 0.049 |
| | Expansion stage | 0.048 | 0.093 |
| Environment | Intellectual property protection | 3.52 | 3.95 |

Note: *Per 1,000 inhabitants aged 25-34. Data for the latest available year.

Source: EUROSTAT – Science and Technology Database, 1.8.2006, Kaderabkova et al. (2005).

*Structure of manufacturing FDI
 (as at December 31, 2004) and the role of foreign
 companies in the Czech Republic in terms of
 technology intensity, 2002 (% of the business sector)*

| | High | Medium-high | Medium-low | Low |
|-------------------|------|-------------|------------|------|
| Manufacturing FDI | 14.5 | 33.2 | 32.4 | 19.9 |
| Export | 91.3 | 77.7 | 56.9 | 49.3 |
| Import | 88.0 | 84.5 | 48.5 | 64.1 |
| Employment | 47.0 | 41.3 | 26.0 | 20.9 |
| Value added | 48.8 | 52.3 | 35.8 | 42.3 |

Source: CNB, FDI Statistics, OECD – AFA Database 2005, 1.11. 2006.

*Business sector R&D expenditures (in CZK million),
the number of researches (FTE) and the share of
foreign affiliates (FDI) in the Czech Republic (%)*

| | Expenditure | | | | Researchers | | | |
|--------------------------|--------------|-------------|--------------|-------------|-------------|--------------|-------------|-------------|
| | 2003 | | 2004 | | 2003 | | 2004 | |
| | CZ | FDI | CZ | FDI | CZ | FDI | CZ | FDI |
| Manufacturing | 12513 | 59.0 | 13685 | 65.0 | 3440 | 43.50 | 3654 | 49.9 |
| High technology | 2251 | 36.6 | 2567 | 54.7 | 865 | 27.40 | 980 | 35.2 |
| Medium high technology | 8430 | 73.4 | 9114 | 76.5 | 2024 | 56.20 | 2169 | 60.9 |
| Medium low technology | 1409 | 19.1 | 1473 | 26.0 | 423 | 19.10 | 385 | 28.6 |
| Low technology | 423 | 25.1 | 531 | 27.1 | 128 | 32.00 | 120 | 38.3 |
| Services | 7055 | 24.9 | 8535 | 22.7 | 3088 | 16.10 | 3614 | 21.1 |
| Knowledge intensive | 6077 | 21.3 | 7634 | 20.7 | 2761 | 15.40 | 3317 | 20.5 |
| High technology | 4942 | 19.5 | 6163 | 18.5 | 2292 | 13.00 | 2744 | 19.9 |
| R&D | 3257 | 7.2 | 4215 | 8.6 | 1563 | 4.20 | 1674 | 4.8 |
| Business services | 697 | 45.9 | 762 | 34.6 | 267 | 46.10 | 282 | 35.8 |
| Financial services | 25 | 36.0 | 240 | 70.8 | 4 | 50.00 | 54 | 63.0 |
| Less knowledge intensive | 978 | 47.3 | 901 | 40.2 | 327 | 22.00 | 297 | 27.6 |

Source: Czech Statistical Office, R&D Statistics Database.

*Structure of manufacturing export
and the R&D intensity of value
added, the share of foreign affiliates
in value added and in R&D
expenditures in the CR (%)*

| Technology intensity | | Export 2003 | | R&D intensity 2002 | | Foreign affil. 2002 | |
|----------------------|-----------------------------|----------------|-------|-----------------------|-----|------------------------|------|
| | | CZ | EU | OECD | CZ | VA | R&D |
| High | Aerospace and aircraft | 0.4 | 3.2 | 27.5 | .. | .. | 1.5 |
| | Pharmaceuticals | 0.8 | 5.6 | 25.8 | 9.2 | .. | 46.1 |
| | Computers, office equipment | 6.6 | 4.0 | 15.1 | 0.1 | 79.7 | 0.0 |
| | Electronics-communication | 5.2 | 5.6 | 22.4 | 3.6 | 65.8 | 50.2 |
| | Precision instruments | 1.7 | 3.5 | 11.9 | 2.5 | 33.6 | 30.3 |
| Med-high | Electrical machinery | 9.2 | 4.3 | 6.7 | 1.3 | 48.8 | 34.7 |
| | Motor vehicles | 16.8 | 14.8 | 11.7 | 9.5 | 83.8 | 94.8 |
| | Chemicals excl. pharmaceut. | 4.7 | 10.5 | 7.1 | 2.2 | 38.8 | 41.0 |
| | Other transport equipment | 1.0 | 0.6 | 7.9 | 4.2 | 25.1 | 4.2 |
| | Machinery and equipment | 13.0 | 11.5 | 5.3 | 2.6 | 27.3 | 30.6 |
| Med-low | Petroleum refining | 1.1 | 2.6 | 2.7 | .. | .. | .. |
| | Rubber and plastics | 5.2 | 3.3 | 3.0 | 0.9 | 57.7 | 20.8 |
| | Non-metallic min. products | 4.3 | 1.8 | 1.3 | 1.1 | 47.8 | 23.9 |
| | Shipbuilding | 0.0 | 0.7 | 2.9 | .. | .. | .. |
| | Metal products | 12.2 | 7.5 | 1.4 | 0.5 | 21.5 | 11.6 |
| Low | Other manufactur. industry | 4.0 | 2.8 | 1.2 | 0.3 | 27.4 | 9.8 |
| | Paper and printing | 5.3 | 4.9 | 0.3 | 0.1 | 31.1 | 25.3 |
| | Food, beverages, tobacco | 2.9 | 7.1 | 1.0 | 0.1 | 43.9 | 39.3 |
| | Textiles, clothing, leather | 5.6 | 5.9 | 1.0 | 0.7 | 22.1 | 26.3 |
| Manufacturing | | 100.0 | 100.0 | 6.5 | 2.2 | 41.4 | 59.0 |

Notes: R&D intensity for OECD expressed by the median for 12 developed members in 1999.
 Source: OECD (2005), p. 182, 207-208, CZSO – Science and technology indicators (2004),
 p. 269 (updated at 1.8. 2006), OECD – AFA Database, 1.11.2006, modified.

Share of innovative companies (INNO) and innovation intensity (INT) in the CR, 2002-2003



| | Total | | Foreign affiliates | |
|---|-------------|------------|--------------------|------------|
| | INNO | INT | INNO | INT |
| Total | 25.9 | 1.6 | 41.1 | 1.7 |
| Manufacturing | 28.4 | 2.4 | 41.5 | 2.1 |
| Food, beverages, tobacco | 31.6 | 1.9 | 64.9 | 1.4 |
| Textiles, clothing, leather | 19.7 | 2.2 | 29.7 | 0.6 |
| Paper and printing | 21.5 | 3.1 | 28.5 | 3.2 |
| Petroleum refining, chemicals | 57.3 | 3.5 | 56.0 | 7.1 |
| Rubber and plastics | 27.7 | 1.8 | 52.0 | 1.6 |
| Metal productst | 25.8 | 1.4 | 24.9 | 0.9 |
| Machinery and equipment | 39.2 | 3.0 | 41.5 | 3.2 |
| Precision, optical and electrical instruments | 30.9 | 4.6 | 42.6 | 4.8 |
| Motor vehicles | 42.9 | 1.4 | 48.7 | 0.8 |
| Furniture, other manufacturing | 21.3 | 2.6 | 17.7 | 0.9 |
| Services | 22.8 | 0.8 | 41.3 | 0.8 |
| Wholesale and retail | 23.5 | 0.6 | 38.4 | 0.7 |
| Transport, telecommunications | 13.6 | 0.8 | 34.2 | 1.5 |
| Finance and insurance | 25.3 | 0.4 | 50.6 | 0.5 |
| Data processing and related activities | 55.1 | 8.6 | 66.0 | 10.1 |
| Research and development | 54.4 | 35.9 | 75.3 | 31.3 |

Source: Czech Statistical Office. Database of Technology Innovation.

Conclusions and implications

- efficiency-driven competitiveness, cost-based
- dependence on external technology knowledge, adoption to local needs, limited development of internal innovation capacity
- lower technology level, qualitatively less intensive activities/lower share of value added (inferior position in supra-national value chain), weak technology transfer, weaker sophistication of demand, non-specific support to innovation, weak intensity and low diversity of linkages and interactions
- remarkable differences between EU country groups in terms of sources and achievements of competitiveness, important role of foreign owned companies for competitiveness, technology intensity remains low and technology transfer limited
- country-specific policies necessary reflecting broader societal context/absorption capacity (national specificities)