Advanced Technologies for Industry

Monitoring Advanced Technologies for Industry: European Countries in the global competitive landscape

Online workshop

31 March 2021, 15:00 – 17:00, Webex

Organised on behalf of:
European Commission DG GROW
European Innovation Council and Small and Medium-Sized Enterprises Executive Agency, EISMEA
by Technopolis Group

The workshop on 'Monitoring Advanced Technologies for Industry: European Countries in the global competitive landscape' was part of a series of seminars organised within the Advanced Technologies for Industry (ATI) project (https://ati.ec.europa.eu) commissioned by the European Innovation Council and Small and Medium-Sized Enterprises Executive Agency (EISMEA) and the European Commission DG GROW.

In the quest for resilience through increasing its strategic capacity, the EU needs to take more actions to defend its industrial competitiveness and also to emerge stronger from the Covid-19 pandemic. Globally, all economies today are ruled by the extremely fast development of advanced technologies. Europe's industry has a global competitive advantage in high value-added products and services and has strong innovation capacity. In this context, the ATI project investigated the performance of the EU and its industries in sixteen advanced technologies and compared it to the one of its international competitors such as the USA and China. The policy webinar discussed the results of this analysis.

Agenda

15:00 – 15:10	Welcome and introduction Evangelos Meles, European Commission DG GROW
15:10 – 15:30	Generation and uptake of Advanced Technologies in Europe: Insights from the ATI Project Kincsö Izsak, Technopolis Group and Giorgio Micheletti, IDC
15:30 – 16:10	Presentation of the international outlook: USA and China • Prof. Pierre Alexandre Balland, Utrecht University & Artificial and natural Intelligence Toulouse Institute – Focus on USA • Dr. habil. Henning Kroll, Fraunhofer ISI – Focus on China
10:40 – 12:15	Roundtable discussion • Leena Sarvarante, Director European Affairs, VTT Finalnd • Prof. Pierre Alexandre Balland, Utrecht University & Artificial and natural Intelligence Toulouse Institute • Dr. habil. Henning Kroll, Fraunhofer ISI
17:00	Closing Evangelos Meles, European Commission DG GROW

Key points from presentations:

1. **Welcome**

The European Commission welcomed the participants and presented briefly the **Advanced Technology for Industry (ATI) project**. The policy context of this project is given by the European New Industrial Strategy, the communication on Shaping Europe's Digital Future and the European Green Deal. The recovery from the pandemic has created an opportunity to take further steps towards a more sustainable economic model, enabled by a broader diffusion and uptake of advanced technologies.

2. **Generation and uptake of Advanced Technologies in Europe: Insights from the ATI Project**

Generation of Advanced Technologies in Europe

The **data dashboard of the ATI website** offers, among other, country information of the production and use of advanced technologies including information about enabling conditions such as skills, investment or entrepreneurship.

The **ATI general findings report** has assessed the trends in the generation and uptake of advanced technologies, the related entrepreneurial activities and venture capital investment, the supply of and demand for skills and also assessed the digital opportunities for Europe in a global context.

The analysis shows that when it comes to the production of advanced technologies (as captured by patent analysis) the EU27 is leading in three technologies notably Advanced Manufacturing, the Internet of Things and Mobility but in the rest of the technological fields it is in the middle of the group.

Looking more into detail to the share of global patent applications across the EU in all advanced technologies, Germany is leading with almost 10% of the total share, France ranks second and the Netherlands third. The country performance from technology to technology is very diverse, showing the strengths of each country.

The venture capital and private equity invested in firms with advanced technologies is different in terms of volume in Europe than in the US, although in both global economies Mobility and Biotechnology have been the fields attracting most investment in 2020. Private equity and VC investment has been concentrated in EU countries such as Germany and France but has been also high in Sweden, the Netherlands, Ireland and Italy.

In terms of the availability of professionals with advanced technology skills, the EU27 has higher relative share of professionals with skills in Advanced manufacturing technologies, Advanced materials, Industrial biotechnology and Nanotechnology, but it lags behind the US in particular in Cloud technologies, in Big data, Artificial Intelligence and Cybersecurity. EU Member States that had the highest number of advanced technology skilled professionals employed in industry, weighted against a list of representativeness criteria and size of the economy, include Finland, Sweden, Luxembourg, Ireland and Denmark.

Uptake of Advanced Technologies in Europe

With regard to the uptake of technologies more than 60% of organisations surveyed have adopted Connectivity, Cloud, Cybersecurity and Advanced Manufacturing as concluded by the ATI business survey conducted in autumn 2020. The uptake of the rest of the technologies is below 30%. 78% of the companies adopted between 2 and 5 technologies. The technologies that are more likely to be implemented together are Cloud and Security solutions representing the technology backbone often in synergy with IoT, AI and Big Data.

The extent to which technologies are already implemented also varies from technology to technology, and the uptake also differs between types of organisations and sectors.

Industries are not on the same level in terms of the 'Covid-19 return to growth' curve. Although one of the most hit sectors, Manufacturing was able to preserve the resiliency of the supply chain and its production, sectors such as Healthcare are already returning to the path of growth and are getting ready for the new normal. Telecom & Media is another sector that is showing an above-average percentage of firms who were able to keep their business running or are back to growth and stabilising towards the new normal.

Finally, the number of firms that identified the need for a solid digital business strategy is 50% higher than the previous survey, showing the role of the pandemic as a digital transformation driver.

3. **Presentation of the International outlook: USA and China**

USA

Up until now the Unites States has led the first wave of the AI revolution, in a very clear dominating position in comparison to other countries. In the case of USA, the top 5 companies working on AI are also the biggest companies in the country and account for 25% of the S&P 500 on their own.

However, lately China has been catching up and nowadays accounts for almost a 30% share of the patent worldwide with USA ranking second with a 22.16% and Europe in the fourth position with a 17%. While China is improving its performance, the gap between USA and Europe has only grown these past years.

The American AI ecosystem is dominated by a very small group of very big players like Google, Microsoft or Intel, which shows the winner takes all effect in the AI ecosystem. A fundamental feature of the development and adoption of AI technologies is a winner-takes-all ecosystem arising from network effects. A small initial comparative advantage will compound into a monopoly in AI. Other big AI players include older organizations that were historically more involved in the production of hardware (Intel Corporation, IBM, the NEC Labs America research centre, Qualcomm)

Likewise, the AI unicorn scene is worth $61.5 billion. At this second AI wave, the core is the use of corporate data instead of internet data, and office automation and digital workers. The startups disrupting medical and healthcare, banking and finance sectors get the largest valuations.

Another cornerstone of the ecosystem is the American Universities. They are able to bring together the AI talent through their students and researchers, but also the capital required, either VC or endowments, and the entrepreneurial spirit to transform the ideas into start-ups.

Another reason that has allowed the United States to become a key world player is the access they have to a large set of internal data on the one hand, but also to global data through its companies. This is again linked with the "winner takes all" concept. In order to compete with the already established US AI ecosystem in the coming decade, other parts of the world will need to catch-up in terms of supporting AI technologies, private or public venture capital, risk-taking mindset, depth and breadth of internet and corporate data, and high-skilled migrant policy.

The main lessons for Europe are the following:

- Europe needs an integrated and ambitious AI strategy
- Overall public R&D spending needs to increase significantly
- Europe needs to retain and attract top AI talent

- European data should be used in priority by European AI companies

China

Over the last 10 years, China has increased its share and development of technological activities in comparison to other countries and is now on the top together with the USA. China is especially strong in AI, Robotics and Micro and nanoelectronics, whereas in IT for Mobility, Advanced Manufacturing or IoT, Europe is stronger.

Chinese startups working in the field of AI have received the highest share of funding rounds in the period 2015-2020 and have the largest number of active startups among all the advanced technologies, with biotechnology and manufacturing coming in second and third position respectively. There are also three main centres of development in China, in the Yangtze River Delta, in Jingjinji and in the Pearl River Delta.

The government has several ministries and authorities that work on Artificial Intelligence and Big Data. Since 2015 they have published plans to boost these two technologies. Major companies have been established since the early 2000s, and Alibaba founded in 2007 is now a global player.

The country has also established several pilot zones for the development of AI technologies, with the city of Guiyang being the most known. However, other pilot zones have been established in Beijing, Shanghai, Hangzhou, or Hefei among others. AI plans are developed at the level of provinces and even municipalities.

In the case of Advanced Manufacturing and Robotics, the government has created several authorities and national initiatives that focus on these areas.

In relation to the digital maturity of the countries analysed (USA, China and Europe), China ranks first when it comes to low and middle revenue class, while ranks seconds in the high-revenue class that is led by the USA.

China also offers some lessons learned that can be applied to the EU:

- The EU needs to ascertain a broad availability of data to train and develop AI applications
- The EU should seek to actively promote and enable the diffusion of AI and Big Data
- Transnational clusters could strengthen European development in AI and Big Data
- The EU needs to work further towards a unified strategy for the development of Advanced Manufacturing and Robotics on an international level
- European clusters should facilitate and coordinate technological development across national borders to gain international visibility and relevance
- The digital maturity of European firms has to be increased on a broad basis
- The EU should seek to improve citizens / businesses openness for AI and Big Data as well as automation and robotics

4. Discussion

During the panel discussion, Leena Sarvarante mentioned how in 2010 and within the EU high-level group on Key Enabling Technologies they could see that USA was taking the lead, but there was no sense of urgency at the moment, so actions were not taken. In the case of Finland, the national strategy has always included the idea of education for all citizens, and that is the base of their excellence in science and education. It is important to identify the purpose of technological development instead of developing technologies for the sake of technologies. Investment into AI development should be clear about the expected results that will serve the benefit of our society and economy.

Pierre Alexandre Balland mentioned how it is important to pass the message of urgency to policymakers and governments. At the moment, there is too much focus on development of science and technology education, but it is also important to know how to bring to market the developments that are achieved. A failure of the education system is still that students do not identify ideas that could be developed into companies.

Henning Kroll also agreed that urgency needs to be conveyed before it is too late for Europe to be a relevant player in digital transformation. The Covid-19 pandemic has created a new reality, and thanks to digitalisation and advanced technologies new achievements can be accomplished if wisely invested. It is important to remain adaptive and competitive.

Finally, the European Commission (Yves Paindaveine, DG CNECT) in response to participants' questions briefly presented the ongoing activities around the AI Strategy, including the upcoming legislative proposal on AI.