Rev.1

The Emergence of Industrial Research Management in Europe

An Eye-Witness Account

Involvement of Klaus-Heinrich Standke in EIRMA activities [1]

Compiled on the eve of EIRMA's 55th Annual Conference 19/20 May 2021

Chapter III.) The global scenary of R&D seen 50 years *plus* after the founding of EIRMA

The affiliation of Klaus-Heinrich Standke with EIRMA in his younger years constitutes an important part of his lifetime occupation with Science and Technology Policy issues and with Research and Innovation Management:

- 1966 Counsellor in the Directorate for Scientific Affairs of the OECD, Paris;
- 1969 Secretary-General of EIRMA, Paris;
- 1974 Director, Office for Science and Technology, United Nations, New York;
- 1980 Principal Director, Science Sector of UNESCO and subsequently Assistant-Director General and Special Advisor to the Director-General of UNESCO, Paris;
- 1990 Founding President, The Academy for East-West Economic Cooperation (OWWA), Berlin.

During the course of his professional itinerary he was fortunate having been exposed to all vectors of the Windrose in international scientific and technology cooperation:

- to the West-West dimension: OECD and EIRMA both in Paris,
- to the North-South issues: through UN, New York and UNESCO, Paris
- to the East-West cooperation: UNESCO, the Council of Europe, Strasbourg and the East/West Academy, Berlin.

In hindsight it can be said that the 1968 Third OECD Ministerial Meeting on Science became a decisive turning point. No other Ministerial Meeting has had such a long-term impact on the national science and technology setting of Member States as the Conference in 1968 in Paris.

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At the first of the series of such OECD conferences in 1962 most Ministers present were in charge of Education policy. At the Second Conference in 1965 a significant number of countries were already represented by Ministers for Science and Technology. At the 1968 ministerial gathering – with exception of the US which continued to be represented by the Secretary of Commerce – practically all OECD countries had created Ministries for Science and Technology.

In the light of experience gained through the preparations of the 1968 conference, for the first time governments in Europe have realised that Research & Development (R&D) is indeed a – if not ‚the' - major driver of innovation. R&D expenditure and intensity are two of the key indicators used to monitor resources devoted to science and technology. Thus, since then, Science and Technology Policy became institutionalised instruments of governmental Policy. On an international scale, for governments, companies and academic institutions, the percentage of the budget spent on the funding for research and development has become one of the key indicators of measurement in their endeavour to remain competitive in sectors shaped by technology.

On the organisational level, the OECD itself had followed suit: The Directorate for Scientific Affairs (to which, for a period of time the author belonged as a staff member), became the Directorate for Science and Technology and subsequently was named Directorate for Science, Technology and Industry. The intergovernmental OECD Committee which is serviced by the Directorate has changed its name accordingly.

EIRMA, being a sort of brainchild of the OECD, while having changed its Logo three times in the same period of time has kept its original name.

EIRMA - European Industrial Research Management Association

In contrast, IRI, whilst keeping the original initials, has changed its name in 2018 from **“Industrial Research Institute”**:

Into: **“Innovation Research Interchange“**

Both I.R.I. and EIRMA have adapted their mode of operation in the passage of times. Both organisations have started as a sort of ‘closed club’ of the largest

industrial research-intensive firms representing the greater part of industrial research capacity in the US and in Europe. Member companies were represented by their top executives responsible for R&D.

In recent years the focus of activities is less on 'Industrial Research Management' but instead on 'Innovation Management' in the broadest sense of the term.

Both IRI and EIRMA seem continuing to suffer from a decrease in membership (companies) which is a logical progression of the trend away from central R&D. As companies decentralized and removed central R&D, there was not only less ‚R' and more ‚D', but less interest on the core missions of IRI and EIRMA. i.e. support for research on research.

In order to keep I.R.I. as an institution with its 80 plus years of competency in spite of the changing environnment attractive to new members, the Board changed the meaning of the name to create a bigger "tent" as the Innovation Research Interchange.

EIRMA is facing te same dilemma. In view of the dwindling membership one of the reasons why the Governing Board had decided to transfer the EIRMA headquarters after 40 years from Paris to Brussels, i.e.away from the OECD, was to move closer to the EU and its well oiled R&D support programmes. Nevertheless, it was a nice gesture, having celebrated EIRMA's 50th anniversary on 12-13 May 2016 "Getting ready for the 4th industrial revolution: Challenges and opportunities for the European R&D community"*back to the roots* at the OECD premises „Château de la Muette" in Paris.

The fast-changing contours in the ever-increasing global technological race are due to R&D becoming increasingly multipolar with the US as a traditional frontier pole, China as a fast-rising star, and Europe as a third major pole, especially quantitatively, but catching up qualitatively.

The debate within the OECD in the Sixties of the last century on the causes for the perceived 'gaps in technology' was exclusively focused on the disparities between the US and Western Europe. From today's standpoint it is of interest, to analyse in which position Europe finds itself half a century later.

In the Seventies, the transatlantic debate on technological gaps was followed by discussions on the causes for the rapid growing Japanese leadership in many technological fields.

Nobody at that time had considered South Korea as a potential competitor and China has played no role whatsoever in the ever-increasing global technological race.

The Republic of Korea is an interesting case-example for the decisive role of Research and Development in the catching-up process of science and technology-based industry. In fact, South Korea is now spending with 4,6% the

largest share of GDP on research and development (R&D), even larger than the U.S. (3,1%) and Japan (3,2%), two of the global leaders in innovation based R&D intensity.

Compared with the most striking examples of Japan and Korea, the case of China has developed into a much larger geopolitical order of magnitude. China has been growing its R&D by nearly 10% annually and has tripled its scientific input over the past 15 years.

In 2019 China's R&D spending was about $514 billion, accounting for 2.2% of the country's GDP and representing 20% of total world R&D expenditure, with a rate of R&D investment growth significantly exceeding that of the U.S. and the EU. This tremendous effort reached in a short period of time was possible since China as a one-party country - unlike the democratic rivals in the US and in the EU – could concentrate all its political and economic might on one single target: China aims to become the world leader in science and innovation by 2050. "Made in China 2025" announced in 2015, outlines China's strategy to reach this goal in a number of high-tech industries, such as robotics, aerospace equipment, medical devices, and more.

The Chinese 'scientific and technological miracle' finds partly not only its explanation in the country unprecedented investment in higher education but also in the fact that Chinese people are first and foremost Chinese, even abroad. This cultural aspect is often overlooked. It is often claimed that some of the most efficient Research Centres and not in China but in California.
Furthermore, the Chinese strategic capacity for action of the state-directed orientation towards international competition is extraordinarily successful.

The US remains with an R&D investment of 612,7 Bill.$ in 2019 'Number 1' on a world scale, nevertheless the US is in an R&D decline in R&D intensity, but it's still the best "show in town". The Biden Administration plans to relaunch the US into a higher and more effective orbit in which R&D investment grows and leverages this into an innovation-based growth economy once again.

A comparison of Europe's ranking within the world's R&D competition is not very meaningful. Unlike its main competitors, the US, China, Japan, India, Korea, Europe is not a country, but an agglomeration of 27 sovereign Member States with 27 fragmented national R&D policies.

In 2019, the Member States of the European Union (EU) spent over €306 billion on R&D. The R&D intensity, i.e. R&D expenditure as a percentage of GDP, stood at 2.19% in 2019, Ten years earlier (2009), the EU R&D intensity was 1.97%.

The BREXIT means a considerable loss for the EU. The UK's exit from the EU is equivalent to the economic performance of 19 smaller EU countries.

In order to augment the national R&D efforts, the EU has launched a common Seven-Year Programme (2021-2027) „Horizon Europe" € 85 billion, i.e.

some 12 billion € p.a., for boosting research and innovation in Europe and hopes somehow to catch up with the US and with China.

R&D Expenditure in 2019 (Bill. US-$)

US	612,7
China	514,8
EU	306,1
India	210,5
Japan	172,6
Russia	38,5

In comparison with other major economies, the combined R&D intensity of the EU countries was in 2019 considerably lower than South Korea (4.5%), Japan (3.2% in 2019) and the United States (2.82%), whilst it was at about the same level as China (2.2%), higher than in the UK (1.76%) and much higher than Russia (1.03%). The case of Russia is indeed astonishing. In spite of the considerable Russian potential in military, space and nuclear technology, the Russian Federation is the only industrialised country that has in the last decade not increased its R&D efforts: In 2019 Russia has spent 38,5 Bill. US-$ on R&D i.e. 6,3% of the amount spent by the US.

The ranking top 2500 industrial players worldwide increased their R&D investment by 8.9% last year. EU companies accounted for 17 of the top 50 of corporate R&D investors. The growth in investment by EU-based companies is, however, outpaced by their US and Chinese counterparts: the former increased their R&D investment last year by 10.3%, the latter by 26.7%.

The above described changes in the world's R&D scenario are confirmed by a closer look at the *World Intellectual Property Indicators* published by the World Intellectual Property Organization (WIPO), providing a wide range of indicators covering the areas of intellectual property. It draws on data from national and regional IP offices, the WIPO, the World Bank, and UNESCO.

Patent grants for the top 10 offices, 2018

Rank	Country	Patent grants
1	China	432,147
2	U.S.	307,759
3	Japan	194,525
4	European Patent Office	127,603
5	South Korea	119,012
6	Russian Federation	35,774

Applicants from China and the Republic of Korea filed intensively for patents related to digital communication, while those from the U.S. filed most in the field of computer technology. For Japan, the top technology field was electrical machinery, and for Germany it was transport. Source: WIPO Statistics Database, February 2021.

For obvious reasons Patent Statistics - like any other attempts to reach conclusions on complex issues based on statistical data - must be used with caution. In any event, they are useful in highlighting middle and longterm trends.
The development of patents also depends very much on the branches of industry,
In the software sector, patents are often deliberately not registered at all.
A good example is the rise of Apple, Google or Amazon to become profitable innovative companies - with little to no R&D in the beginning, only very late and after years of considerable profits, they also engaged in R&D