Talking point

Industry 4.0: Huge potential for value creation waiting to be tapped

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Industry 4.0 (aka "integrated industry") will upgrade as an industrial location by bringing on the fourth industrial revolution. With trade flows becoming increasingly internationally interlinked, the Industry 4.0-related elements of increased automation and more flexible production structures will become more and more important. According to a recent study by Germany's Fraunhofer Institute this opens up the prospect of generating significantly higher added value across numerous sectors. Especially for Germany with its particularly favourable basic conditions, Industry 4.0 thus provides the major opportunity to consolidate the country's appeal in the international competition for investment – also relative to the fast-growing emerging markets.

Germany has been and will remain an industrial heavyweight and creates the lion's share – of around 33% – of the EU's industrial value added. A long way behind comes Italy with a share of 13%, then France with 10%, the UK with 10% and Spain with 7%. In the fourth industrial revolution, or Industry 4.0 for short, industry now has to adjust to fundamental change – and grasp the new opportunities with both hands.

Industry 4.0 (also known as integrated industry) is currently the subject of intense debate. Large companies, small and medium-sized enterprises and members of the public are interested in not only the new opportunities but also the risks associated with it. This interest has undoubtedly been amplified further by the focus on Industry 4.0 at Cebit, the Hanover Fair as well as the IT summit and the German government's support which has included EUR 200 million worth of subsidies.

Industry 4.0 is aimed at smart products, procedures and processes (smart production). A key element of Industry 4.0 is therefore the smart factory. The job of the smart factory is to control the increasing complexity while also significantly boosting production efficiency. In the smart factory there is direct communication between man, machine and resources. Smart products know their manufacturing process and future application. With this knowledge they actively support the production process and the documentation ("when was I made, which parameters am I to be given, where am I supposed to be delivered etc."). With its interfaces to smart mobility, smart logistics and smart grids the smart factory is an important element of future smart infrastructures.

Conventional value chains will thereby be refined and totally new business models will become established, so providers advertise Industry 4.0 offerings as completing automation and thus also enabling cost-effective adaptation of production to individual requirements.

The Industry 4.0 concept must therefore encompass not only value creation per se, but also work organisation, business models and downstream services. It does this by using information technology to link up production, marketing and logistics and thereby captures all resources, production facilities and warehousing systems. The reorganisation thus extends from the energy supply and smart power grids through to advanced mobility concepts (smart mobility, smart logistics). On the technical side the concept is based on integrating cyber-physical systems into production and logistics and the rigorous end-to-end implementation of the internet of things and services in industrial processes. In this smart environment the concept of the internet of things and services that was already devised a decade ago will actually now become a reality.

Huge economic potential is associated with the fundamental reorganisation of the value chain that Industry 4.0 represents. For instance, acatech (Germany's National Academy of Science and Engineering) has made a projection that firms could boost their productivity by 30% with the aid of Industry 4.0. Furthermore, a joint report by the Fraunhofer Institute and the industry association Bitkom calculated that thanks to Industry 4.0 German gross value added could well be boosted by a cumulative EUR 267 billion by 2025. The lion's share of this increase should come in the following six areas: mechanical and plant engineering (2013 – 2025: up by EUR 23 bn), motor vehicles and autoparts (up by EUR 15 bn), Information and communications technology (up by EUR 14
bn), electrical equipment, chemicals industry (each up by EUR 12 bn) as well as agriculture and forestry (up by EUR 3 bn).

This enticing potential has resulted in other countries also wanting to compete with Germany for pole position in Industry 4.0. Due largely to pressure from the Obama administration, the US allocated around EUR 1.6 bn last year alone to projects relating to production research. China plans to invest some EUR 1.2 tr in modernising and transforming its own industry over the next three years. The declared objective is for “Made in China” to soon be turned into “Created in China”.

All the same, state funding is not the one and only key to success. This means that even leaving aside this simple comparison of subsidies Germany certainly has a favourable platform from which to continue. As the “world’s factory outfitter” Germany has particular strengths in this interdisciplinary approach linking electrical engineering, mechanical engineering and IT. These strengths are based on its good general education system, the established development partnerships between equipment suppliers and users, its position as the leading innovator in automation and more flexible production methods, its strong small and medium-sized enterprises and its market leadership in plant and mechanical engineering – numerous hidden champions with their specialty solutions are among the world market leaders in their niche segments.

Finally, the huge economic potential of Industry 4.0 must be noted; this is highlighted very emphatically by the current findings of the Fraunhofer/Bitkom report. The topic will thus continue to attract more attention. Nevertheless, the offerings associated with the Industry 4.0 buzzword are definitely suffering from the excessive marketing-driven expectations and the lack of a clear definition of what it means in the expansive terrain occupied by cloud computing, cyber-physical systems, RFID, embedded systems, the internet of things and services, machine-to-machine communication, smart X and resource efficiency. It is therefore certainly possible that following the hype which typically surrounds such new ideas and the subsequent disillusionment there will be no one talking about Industry 4.0 in a few years’ time. All in all, the idea behind the buzzword Industry 4.0 does, however, have good prospects, albeit not in the short term but rather in the coming decade. This will apply all the more if the currently still unresolved issues concerning control responsibility, security, confidentiality, standardisation, legal framework and infrastructure configuration (e.g. expansion of advanced power grids and communications networks) are addressed constructively. As long as the worlds of business, research and politics remain committed, Germany has a good chance of being the world leader in Industry 4.0 – and thus also being able to set globally accepted standards at an early stage.

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