

China: Nanobots on the rise

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16/08/2016 The “fourth industrial revolution” could catapult the Middle Kingdom to the leading position among industrial nations — if opportunities and locational advantages are used wisely.

Western industrial nations are not the only ones to be interconnecting machines, gathering data, and rethinking business models. China, too, is making strong efforts to keep pace with these future-oriented developments. “The digitization of industry is booming. One reason for this is the rapid rise of wages, which is making it essential to invest in modern production systems,” says Professor Sebastian Heilmann, who directs the Berlin-based Mercator Institute for China Studies (MERICS) and holds the chair of Chinese Political Economy at the University of Trier. “As far as widespread applications go, it will take a while before Industry 4.0 takes hold in China,” he says. But the country’s leading technology companies are already experimenting in this field. Once their production systems are modernized, they will become considerably more competitive on an international scale.

At the moment China still lags well behind the established economic powers. As of early 2016, this gap

could be clearly seen in the automotive industry, for example. “China has only approximately 305 industrial robots per 10,000 employees in this sector, whereas Germany already has around 1,149,” says Heilmann. China’s main problem lies in the fact that its companies are not investing much in research and development. “Only a few firms understand innovation as the foundation of their business,” he says. “The old model of ‘low-priced mass production with the cheapest possible labor’ is still commonplace. The government is trying to change this by introducing major innovation programs. But innovation is not something you can impose from above.”

Heilmann: “The country is seeking to replace imports with domestic products”

Heilmann draws attention to the “Made in China 2025” program. “The Chinese government has assigned a very high spot on its agenda to the digitization of industry,” he notes. “It wants to turn the People’s Republic into an industrial superpower—at or above the level of the United States, Germany, Japan, and South Korea. The ‘Made in China’ label should no longer be synonymous with cheap mass-produced goods, but rather a sign of innovation, efficiency, and quality. The country is seeking to replace imports with domestic products, and to expand its sales abroad. This represents a clear challenge to the established industrial nations.”

And for China it’s a matter of all or nothing. “If it doesn’t manage to shift its business model in time to prevent a decline in economic performance, it will find it much more difficult to join the industrial nations. It faces the threat of becoming caught between the advanced industrial economies on the one hand and ambitious lower-cost industrial locations in Asia, Africa, and Latin America on the other.”

Heilmann warns against excessive openness

The greatest obstacle to making this leap into the future is the current lack of skilled workers. “Both the government and companies have thus far viewed Industry 4.0 solely as a 36 technological challenge. They don’t yet have a strategy for training the workers needed to meet the new demands of digitized industry,” says Heilmann. But he warns against the assumption that China’s relatively low level of technology at present means that the West is secure in its lead. “If it succeeds in putting the ‘Made in China 2025’ strategy into practice, this nation will pose a very serious challenge to Germany in top-level technology.”

And Heilmann sees the following danger: “New technologies and leaders in technology are capable of uprooting existing markets and driving out longtime leaders.” Given this possibility, he warns against excessive openness. “The German idea of Industry 4.0, with its emphasis on precision, quality, and reliability, serves as an example for China to emulate. German factory equipment, company software, and systems integration are very much in demand.” Due to the rapidly growing level of competition from China, Heilmann advises limiting cooperation in this area to an operational minimum. “Providing

targeted support for Chinese competitors in this key future-oriented field cannot lie in the interests of German leaders in technology. For if you look at it the other way around, China is increasingly closing its IT market to foreign competitors."

Professor Chuanqi He is optimistic

And how is the situation viewed in China itself? Professor Chuanqi He, a distinguished research scientist, as well as founder and director of the Center for Modernization Research in Beijing, is optimistic about the developments taking place in his country. "In some areas Chinese companies have already reached world-class levels in the quality of their products and processes," he says. "In telecommunications, for example, with the ZTE and Huawei providers. Or outstanding Internet companies like the Alibaba e-commerce platform and the Tencent media corporation. In other sectors such as the food industry, though, quality is still relatively low."

He and a research group have been publishing annual reports on China's advances in business and society since 2001. He is convinced that the "Made in China 2025" strategy is well suited to promote innovation and enterprise as long as it is consistently followed. "It has the potential to boost economic development," he says. There are already signs that innovative capacity is on the rise. "China is the leader worldwide in filing patents, well ahead of the USA and Germany. What we have to do is convert this lead more strongly into actual entrepreneurial innovation."

He anticipates groundbreaking innovations

But that is not going to happen overnight. "We expect it will be another 20 years or so before China's level of technical inventions reaches that of the leaders on the world market," says He. "And for modern technologies it could well take even longer." China finds itself in the unusual position of not yet being completely industrialized, yet of already tackling post-industrialization tasks such as sustainability and expanding its information technologies.

Of paramount importance are advances in the three key fields of IT, nanotechnology, and biotechnology. These three fields should also be interlinked in order to make truly dynamic advances in development and open up new areas of business. He, who is a biologist by training, anticipates groundbreaking innovations in areas such as transgenic crops, nanobots that destroy cancer cells, and cyborgs—entities that have both organic and biomechatronic components. Because there is far less social and political opposition to such innovations in China than in other countries, He sees good chances for Chinese companies to become global leaders in these technologies.

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Dr. Ing. h.c. F. Porsche Aktiengesellschaft
Porscheplatz 1
70435 Stuttgart