



Industrial structures in transition

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In the years and decades ahead, the emerging processes of digitalization will transform industrial structures all over the world. This revolutionary change is often described by the term “disruption” to highlight the destruction and replacement of traditional techniques and structures. As digital technologies, such as the internet of things, cloud computing, and machine learning become more and more widespread, business models and corporate strategies will have to change, leading to the traditional manufacturing and service sectors becoming more interlaced with the IT sectors. This will lead to ever intensifying global competition. Germany, which has traditionally held a strong position in the manufacturing industry, is challenged by the growing importance of software development expertise. In this field, however, US and Chinese companies are leading the way, both in terms of technology and in the competition for jobs and revenue.

The auto industry is a key example. Autonomous driving and the development of internet-based mobility platforms have been identified as the technologies of the future. This trend promises a future in which clients use an app to buy mobility, making individual car ownership increasingly less important. In this future market, traditional car manufacturers face very non-traditional competition from tech companies like Google and Uber. This competition goes be-

yond the traditional industrialized countries, as a number of IT companies from China (such as the search engine operator Baidu) are now involved in the auto and mobility industry. These new challengers have a head start over industrial companies when it comes to mastering technologies like networks, data analysis, and artificial intelligence, as well as being more equipped to design data-based business models.

The competition between the “new” and the “old” economy in the auto industry is about leadership in the development of new technologies, control over value creation, and changes in employment structures. Similar trends can be observed in the machine building industry, where networking technologies, data-based process management and optimization have become more and more important. Again, traditional machine building companies are competing directly with IT companies in an unfamiliar dance. Government programs have been launched to help companies adjust to the changing conditions of competition, including “Industrie 4.0” in Germany, “Made in China 2025,” or, on a smaller scale, “Industrie du Futur” in France and the “Advanced Manufacturing Initiative” in the United States.

From the point of view of the German economy, this development raises questions concerning the essence of innovation, industrial, and labor market policy in the decades ahead making it of major relevance to the WZB. The first question centers upon the new expertise required to drive innovation in industries such as car manufacturing and machine building. German companies strive to build in-house expertise in software development by recruiting thousands of computer scientists and data analysts, and by designing their own training formats. Some of this takes place within established company structures, but companies also launch spin-offs in new fields and organizations to enable completely new forms of corporate culture and agile work organization. This is the beginning of an industrial and organizational transformation that will have radical consequences in the long term and result in new challenges for all actors involved. It will have impact upon unions and alter the principle of worker participation.

We will also see the emergence of new forms of cooperation that go beyond established industry boundaries, which will necessitate the development of new forms of governance. When developing new technologies and business models, traditional car makers and machine building companies collaborate with IT companies and newly emerging start-ups. It's a difficult collaborative process under conditions of competition – a concept known as “coopetition” – in which companies competing in the market place develop shared standards for technologies like autonomous driving and automation solutions.

These standards require the creation of new forms of governance capable of addressing questions of data security and utilization: Who owns the data produced during the manufacturing processes or and derived from the end user experience? How can the interests of various actors in analyzing this data be balanced and regulated?

Finally, new challenges have emerged for the labor market and training policies. Building new expertise and organizational structures often means the devaluation of older expertise, the destruction of established forms of work and organization, and a change in employment structures. We must prevent certain groups from being left behind and not allow digitalization to exacerbate existing inequalities. In this endeavor, action is required from lawmakers and industrial actors alike.

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