



Technical  
article

# Resilient and adaptive: industrial production in the “new normal”

Everywhere, opportunities are currently being sought to create the “new normal.” But what happens when a vaccine is found or a treatment becomes available? Will we then return to the previous business as usual? No – says German futurologist Matthias Horx vehemently. The “new normal,” according to Horx, does not consist of glass dividers and protective masks, but of a reconfiguration of social systems at all levels of human coexistence – including the economy. As a result, some familiar knowledge needs to be adapted.

What does production look like in the “new normal”? Different from today – because the crisis ensures that the previous maximization of efficiency must be supplemented with resilient and adaptive production systems. A significant contribution is made by the digital transformation.



The “new normal” does not only consist of protective masks, but also of a reconfiguration of the social systems.

### **Efficiency at all costs?**

The classic competitive paradigm applied to companies during business as usual: in order to be successful in the market, a company must either realize a structural cost advantage (be able to offer its products less expensively than comparable competitive products) or it must deliver a better product for the same price. In both cases, it is paramount for companies to keep an eye on their efficiency because even the better performing product must always be in relation to the price. Every user would certainly want a day-long battery life for smart phones – but if this unique selling point costs USD 10,000, the group of buyers will be extremely small. Efficiency gains arise, among other things, from the so-called experience curve effect. This model states that unit cost decreases significantly with increasing production volume. According to the model, doubling the accumulated output leads to a cost reduction of 20 to 30% per unit.

The production systems, configured from technologies and organizational patterns, follow this strategic criterion of maximum efficiency. For this reason, the assembly line production was introduced over 100 years ago; from the 1990s, the production was increasingly outsourced to low-wage countries as an extended workbench; followed by the implementation of just-in-time as a logistics concept and the deployment of ever

more efficient (i.e., ultimately more cost-effective) technologies. Growth is also a decisive factor, as only in this way can cost reductions from the experience curve effect be realized faster than by competitors – and only through the implementation speed can competitive advantages be developed.

### **Maximum efficiency makes companies vulnerable**

However, the coronavirus crisis has shown how vulnerable and fragile systems maximized for efficiency can be, says Matthias Horx. Just-in-time only works as long as transport routes and national borders are open. The reduction in the in-house vertical range of manufacture and the elimination of a “second source” in favor of lower costs require a supplier not affected by virus-induced plant closures, etc. To be able to react better to crises, a healthier balance between efficiency (i.e., cost minimization) and effectiveness (what actually comes out in the end) is thus needed. For some goods, the classic competitive paradigm was completely irrelevant during the first phase of the pandemic – it was simply about being able to deliver at all. But the coronavirus is only a proxy for crises of all kinds – global challenges such as sea pollution, depletion of natural resources, and climate change also fundamentally question the previous notion of “more and more, always cheaper.”

## New skills for companies

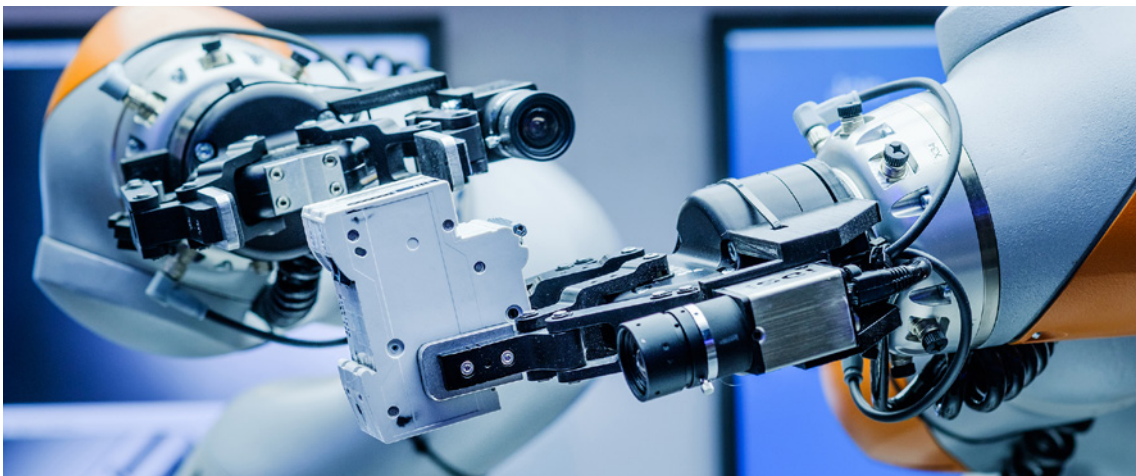
Companies must therefore develop two skills that supplement the pursuit of efficiency: resilience and adaptivity. Resilience describes the resistance to crisis events, adaptivity the adaptability to the increasing volatility in the markets. Resilient companies continue to produce and deliver even when there are significant supply chain disruptions; adaptive companies quickly adapt to changing demand structures, for example, when a coronavirus results in the demand explosion for headsets and hair clippers practically overnight – or a famous influencer hypes a product on YouTube, resulting in a rush of buyers. This adaptivity means something else than the often required flexibility. The latter aims to expand the production program to include more and more variants so that the product range can be tailored more and more finely to the demand – but without losing the economies of scale.

Both must be holistically anchored in the company – as has been the goal of efficiency to date – and also change the necessary production system. From an organizational perspective, for example, these are redundant supplier structures that also take geographic distribution into account instead of just pure cost optimization – thus increasing the resilience of the supply chain.

## Digital transformation as driver for the “new normal”

Technologically, it is above all the digital transformation in the industry that helps companies gain resilience and adaptivity. If the task of automation was the high-precision, repetitive execution of defined tasks, digitalization enables the control of complex systems (such as a production) in “live operation” – even in situations that have not been previously coded in detail or for which all the information required is not available. The linking of all digital systems with each other and the automatic synchronization with the actual operating processes are therefore important in order to distribute the information obtained in almost real time to all relevant parties inside and outside the company – an architecture that can be described as digital connectivity. The resulting Industrial Internet of Things (IIoT) makes it possible to react more quickly to disruptions and demand fluctuations.

Three examples on this from Siemens: in an electronic Kanban system, the material removed is automatically recorded using an RFID reader and reported to the cloud or the supplier’s order system via a data connection. If the production program shifts, the supplier is automatically and immediately informed – no lengthy inventory taking, planning iterations, and manual orders.



An AI-based robot completes assembly tasks without prior teaching.

## Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept. For additional information on industrial security measures that may be implemented, please visit

<https://www.siemens.com/industrial-security>

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Second example: with the support of real-time locating systems (RTLs) and automated guided vehicles (AGVs), permanently installed conveyor technology can be replaced by a flexible and dynamic flow of goods that can react immediately to changing conditions in the factory – be it the blocking of areas for infection prevention reasons or the reinforcement of certain production sectors to meet increased demand. And the third example: Modern communication technologies and software systems allow numerous operating, maintenance, and adjustment tasks to be performed without personal presence from a safe home office – from control diagnostics and programming (TIA Portal, SINEMA Remote Connect) to virtual commissioning and simulation-based operator training (SIMIT) to complete plant operation with the web-based process control system SIMATIC PCS neo.

In addition to these existing possibilities, new technologies are needed as well. Supplementing automation systems with artificial intelligence (AI) will make even greater adaptivity possible. At the 2019 Hannover Messe, Siemens showed an AI-based robot that can mount a wide variety of devices to a top-hat rail without prior teaching – by simply transmitting the digital production order. Additive manufacturing technologies exhibit a similar potential as they allow a stronger decoupling of workpiece and machine configuration. As an IIoT communication technology, Industrial 5G is not far away – among other things, it will enable decentralized control algorithms for a large number of mobile robots and AGVs. Last but not least, a prospective business blockchain could provide for a new, likewise decentralized and resilient processing of transactions in the supply chain.

### Start with determination!

Regardless of which technology actually enables the necessary step towards greater resilience and adaptivity in specific cases, companies should now invest in their own digital transformation. The coronavirus crisis has shown with urgency that if you started digitalization in time, you now have a decisive competitive advantage.