Press release

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Special analysis: How resilient were industrial companies in the Corona lockdown in Germany?

The Fraunhofer Institute for Systems and Innovation Research ISI asked more than 200 manufacturing companies in Germany about their resilience to crises following the Corona lockdown in spring 2020. A resulting study, which has now been published, shows how important Industry 4.0 technologies are for the resilience of companies – and which sectors proved to be more resilient than others.

Short-time work, disrupted supply chains, idle production lines: The Corona pandemic in spring 2020 also affected Germany as a production location. The restrictions meant the end for some companies, while others were able to recover from the shutdown, and some even sailed through the pandemic without any problems.

Resilience as a benchmark in business

The term “resilience”, which has its origins in psychology, is now also used in an economic context to refer to the ability to cope with unpredictable crises. The concept of resilience in manufacturing companies has two facets: Robustness, in other words, the preventive capacity to withstand a disruptive event directly; and the capacity for recovery, the ability to respond to, adapt and recover from negative impacts as quickly as possible. If a company proves to be either robust or capable of recovery, it is considered resilient.

In the wake of the Corona pandemic, the resilience of industry became a factor on which the survival of entire businesses could depend. Fraunhofer ISI explored why some companies showed greater resilience to Corona-related restrictions than others based on a special survey conducted as part of the German Manufacturing Survey.

In winter 2020, 237 companies from across all industries provided information about their situation during and after the Corona lockdown. The majority (61 percent) turned out to be vulnerable. These companies were neither sufficiently robust, nor sufficiently capable of recovery; at the end of 2020, they still had lower production volumes than before the lockdown. Around 20 percent of the surveyed companies proved to be robust; they neither registered short-time work nor were they severely affected by supply problems. Thanks to their capacity for regeneration, 19 percent were able to recover from the restrictions immediately after lockdown. Overall, resilient businesses accounted for 39% of companies.

There were major differences for different manufacturing sectors: Electronics, mechanical and automotive engineering and the metal industry were particularly badly hit by the lockdown. Four out of five businesses in these industries suffered tangible production losses that could not be overcome by the end of 2020. In contrast, especially companies in the process industries as well as manufacturers of consumer-related products such as food had a significantly lower share of vulnerable businesses.

The importance of company size and product complexity for resilience

Size proved to be the decisive criterion for the resilience of businesses. The fewer employees a company had, the more robust it was from the outset to the restrictions of the first Corona lockdown. In this crisis, smaller production systems
proved less susceptible to disruption than companies with larger or more complex systems.

The capacity for recovery of small and medium-sized enterprises (SME) was also greater than that of larger companies. In general, SMEs were significantly better than large enterprises in terms of resilience. According to the researchers at Fraunhofer ISI, this is due to the more manageable structures of SMEs and the greater flexibility and agility these allow.

In addition, major differences in resilience were also found in relation to production characteristics. Manufacturers of simple products proved robust and capable of recovery to an above-average extent compared to those with more complex products. Companies with large-scale production were more robust than those with small-batch or single-item production. However, it was not possible to identify an advantage in their capacity for recovery.

Among other things, the proximity to final customers was decisive for the recovery of companies: 37 percent of product manufacturers for final consumers were capable of recovery. On the other hand, only 13 percent of supplier companies managed this. “Proximity to consumers seems to make it easier to get back into production after the Corona lockdown, while suppliers faced a much rockier road out of the restrictions,” emphasizes Dr. Christian Lerch, head of the business unit “Industrial Change and New Business Models” at Fraunhofer ISI.

Complex effect of Industry 4.0 on the resilience of the manufacturing sector
In their study, the researchers also explored what role the use of Industry 4.0 technologies has on the resilience of companies. The surveyed companies were split into four groups based on their level of digitalization using the I4.0 Readiness Index developed by Fraunhofer ISI.

There were major differences between these groups concerning the degree of robustness and capacity for recovery: Companies that did not use any or used only a few digital technologies were much more robust than the companies in the advanced and leading I4.0 groups. In contrast, companies with more advanced use of I4.0 were significantly more capable of recovery than newcomers and non-users of digital technologies.

This leads to the conclusion that a company with high I4.0 orientation is on average more susceptible to external disruptive events, but at the same time is also much more likely to recover quickly from their negative effects. On the other hand, companies with more traditional production structures and largely analogue processes proved robust to external shocks to an above-average extent, but if they are severely affected by restrictions, they are much less likely to recover.

The basic conclusion is that a production system with increasing technical complexity is always going to be more susceptible, but is also more capable of recovery and regeneration. It was not possible to observe any general resilience-enhancing effect of I4.0 readiness technologies.

Analyses of differences in production organization, measured based on the degree of implementation of lean concepts, also resulted in similarly differentiated findings in terms of the resilience of businesses to the challenges of the Corona pandemic. Angela Jäger, project manager at Fraunhofer ISI, summarizes the results as follows: “Robustness and the capacity for recovery do not always go hand in hand and both are determined by structural characteristics as well as company behavior. Individual companies must ask themselves where the strengths of their own resilience lie, and how they could counter possible weak spots in their preventive or reactive potential.”

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