

# Challenges for Manufacturers when Customers are Locked Down - Is it Possible to be Prepared?

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## **Abstract**

*Small and medium-sized enterprises (SMEs) that are manufacturers are challenged during the coronavirus pandemic since their customers have been locking down their production due to different reasons. This is a disruptive and unpredicted situation for manufacturing SMEs and at the same time a lot of possibilities for manufacturing other types of products is shown. This paper will discuss challenges for SMEs in such a disruptive situation, and reflect if it is possible to be prepared? And if so or not, what can we learn for future and reducing the risks if or when next pandemic situation occurs.*

Keywords: SMEs, Manufacturing, Corona pandemic, Globalization, Regionalization

JEL Classification: P46, O14, F19, F60, L10

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## **1. Introduction**

As explored by Karabag (2020) the Corona crisis has shown the sensitivity in the global integration overall, from how its effects individuals, societies as well as industry and businesses. The automotive industry uses a global supply chain and a study based on German automotive manufacturers (Thun and Hoenig, 2011) identified that globalization was the most important driver of risks in a supply chain. The same study showed that if the production is centralized, it has lowest risks for vulnerability in a supply chain. The Swedish automotive industry made a lock down in mars 2020 – VolvoCars and VolvoTrucks closed the production of cars and trucks 23<sup>rd</sup> of March 2020 (NyTeknik, 2020) due to the Corona pandemic. The production started gradually again the 20<sup>th</sup> of April 2020 (NyTeknik, 2020). The SCANIA production in Europe closed the 26<sup>th</sup> of March 2020 and gradually started up again around the 21<sup>st</sup>-22<sup>nd</sup> of April 2020 (NyTeknik, 2020). This lock down laid off the workers during approximately 3-4 weeks completely, and thereafter it is planned to gradually let the workers come back and produce the automotive products.

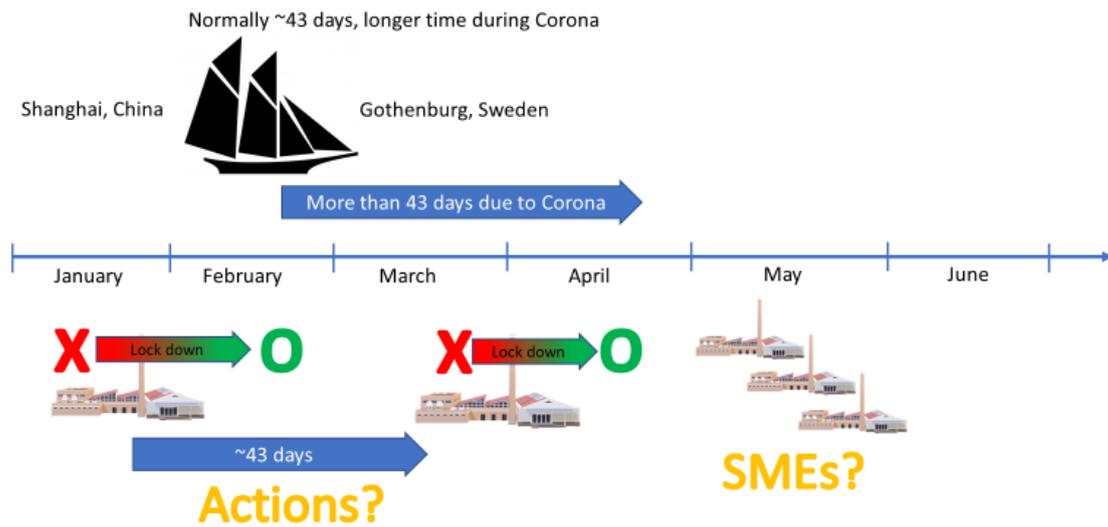
Today the supply chain related to automotive industry is lean and European automotive manufacturers are dependent on suppliers from Asia, especially Chinese suppliers, and utilize the shipping by boats as a storage to get components just in time. Manufacturing suppliers in China closed down in the beginning of 2020 (NyTeknik, 2020b), and if components and products where shipped by boat from China, the effects in European manufacturers were notable as early as in the beginning of February 2020. Shipping from China to Sweden takes approximately 32 days by boat from Shanghai (China) to Gothenburg (Sweden), and added to this time there is a need for up to 8 days in the shipping harbor and about 2-3 days in the arriving harbor – a total shipping lead time of about 43 days (ScandinAsian, 2020).

Based on this the close down in Sweden could be foreseen to happen in March and that the lock down time was dependent on when the manufacturer started to produce again in China – which happen gradually from the mid of February 2020 (NyTeknik, 2020b) – see figure 1

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below. Naturally, it is possible to slowly starting the ordinary production again in Swedish automotive factories in the mid of April 2020.



**Figure 1: Timeline for lean supply chain during Corona with the two gaps for actions – the first for preparing (Actions?) and the second for managing financial and competence consequences (SMEs?)**

However, how does the global supply chain affect the regional manufacturing SMEs and their lack of components, material, and orders? Furthermore, some SMEs are automation suppliers, and how are these affected when some of their customers reduce investments in new equipment? Is it possible to be prepared as an SME for managing at least a month total lock down – see “Actions?” in figure 1 in order to reduce consequences in the phase “SMEs?” in figure 1? Can manufacturing SMEs use the same strategy as engineering consultant companies by having a diversification in competence areas which can relieve the effects when one branch is decreasing its needs (NyTeknik, 2020). This paper will explore some challenges and discuss the possibility to be prepared if or when the next pandemic situation or similar might occur.

## 2. Theoretical frame

Manufacturing SMEs collaborating with suppliers in a network of companies rely on each other’s capacity to deliver on time, which demands a trustful collaborative environment (Johansen, 2005). Based on Brown et al. (1984) and their expressed need for understanding different types of flexibility (machine, process, product, routing, volume, expansion, operation and production) in order to managing manufacturing responsiveness – the change-over time in a crisis like Corona is critical in order to utilize the flexibility. This in combination with the argumentation by Sethi and Sehti (1990), that it is of high importance to also reflect a flexibility to manage changes in material, program and market, is also challenging manufacturing SMEs in a disruptive situation like Corona. Zheng et al (2019) present a design approach for manufacturing SMEs that facilitate them to configure the manufacturing system designed for flexibility by integrating robots easily in order to fast change between products and customer needs.

Vulnerability in supply chains are found to be related to globalization and product variants as well as reduction of suppliers based on empirical studies in the German automotive industry (Thun and Hoenig, 2011). They also argue for that the outsourcing increase the number of interfaces and dependency within the overall supply network. Furthermore, they identify the increased vulnerability in the trend of offshoring which contributes to a more complex cross-national connected network (Thun and Hoenig, 2011). Their observations about the vulnerability is relevant in disruptive situations as Corona and highlights the need for reflecting to what degree should a company be prepared with different suppliers, second sources and spread the risks between several suppliers from different regions.

If you are involved as a company in an international manufacturing network (IMN), which the manufacturing SMEs are in the overall automotive industry, researchers has identified the challenge of the internationalization of manufacturing should be a starting point for future research (Cheng et al, 2015). Cheng et al (2015) further argue for the perspective to explore the interaction between IMN and other functional networks. One such a functional network, regional situated in Sweden, is a cluster of Automation Solution Providers (Johansen et al, 2018). Typically, an Automation Solution Provider develop a customized automated cell for a manufacturing company and their need or a production system, build it, perform a Factory Acceptance Test (FAT) before installation at the customer site, where a Site Acceptance Test (SAT) is validating the solution as the final step in the delivery.

### **3. Observations**

Some of the challenges for an Automation Solution Provider in this type of crisis (Corona pandemic) is to manage the risk of reduction of investment in production technology if the crisis is long as well as performing businesses in a new digitalized way. Several of these companies have changed their way of doing business during this pandemic and has experienced the strength of digital communication platforms for doing business, which saves travel time and improve productivity in the selling process. Furthermore, some of the companies in the studied regional network in Sweden (Johansen et al, 2018) also used this pandemic to internally educate the employees in different technologies or improved their machining skills.

Interview with representants for two different large OEMs situated in Sweden, not automotive industry, confirm this possibility to increase the usage of digitalized meetings, even though people are at site. Both interviewed indicates that this way of utilizing digital communication platforms most probably will stay as an extended routine even after Corona even if people are at the company. It saves time (especially travel time if large companies or to other companies) as well as it gives the possibility to not meet people if you feel unsecure about your or others health.

Another observation done during May 2020 is within the area of changing the production to meet new markets. One company has added one more business segment into their process of manufacturing textile for the automotive industry. This company utilize its machines for manufacturing protecting plastic clothes and similar products for caring companies. However, the factory cannot produce sterile approved products, but there is a market also for non-sterile protecting products. This switch to produce for a new market has also shown some challenges, since from dialogues with material companies, some indicates a challenge to reach the new customers in the caring or health segment. So even if some changeovers to production of new products have succeed, some manufacturers that has made the change-over have problem to sell or find the market for their capacity.

### **4. Discussion**

There was a time slot of about 40-50 days from the lock down at the suppliers in China for the Swedish automotive industry before the components in the storage on the boats from China was used. Based on this the industry could predict that it will be a stop in the production 6-8 weeks before it happened, and the SMEs in the regions around the larger automotive companies had therefore time to be prepared – rationally thinking. However, how easy is it to do a change-over in the existing production system to the new needs that was arising in the society – need for protection equipment as well as more advanced products such as respirators in the medical sector? Based on the research idea presented by Zheng et al (2019) developing a design approach suitable for SMEs to easily change their robots in an existing manufacturing system could be one way to be prepared for a change-over. On the other hand, there is a need to be able to change to new customer types / branches also, since in this situation the whole automotive industry where locked-downed for about a month and the start again will be managed as a ramp-up period, probably with low volumes to begin with. The observations confirm that it is possible

to complement the production of textile products for the automotive industry and at the same time utilize existing tools and machines for a complementary market – protecting clothes. During a ramp-up period, these two product segments seems to be possible to combine, since the machines and tools are the same.

The manufacturing SMEs need to reflect their production systems as a service they sell to different customers. The SMEs needs to reflect their manufacturing systems interface towards materials, geometries, and branches, so they identify the parts, i.e. molds, grippers or similar, that easily can be changed for new products. In a way reducing the change-over-time between drastically different types of product segments. But to manage this it is also a need for flexibility to interpret new markets as well as customers. This challenge the SMEs to have flexibility in competences in their organizations or be able to build new relations fast with new product owning companies. The observations confirm the importance to understand the market and how to interact with it, what standards that needs to be fulfill and if there is a need for specific rules that needs to be approved before you become a supplier in the health segment.

Lean, as it is implemented with storage on boats, gives the society and companies some weeks to prepare for a lock down, but it is also shown the vulnerability of relying on suppliers cross internationally as Thun and Hoenig (2011) argues for. From that perspective the future supply chain organization and selection of suppliers might be reconsidered – what flexibility is needed; how do we manage unpredicted crisis that is long with an invisible enemy like a virus? Are SMEs prepared to make a change-over in their manufacturing systems to new branches/products, and how can SMEs keep their critical mass of competence during a lock down and a slow ramp-up when the customers start to produce again? Here, the observations indicate a need for close dialogues with the developers of automated production systems. If manufacturing SMEs put flexibility requirements when they ask an automation solution provider to develop their new production solution, it is possible to increase flexibility.

## 5. Conclusion

The paper reflects on if it is possible to be prepared as a manufacturing SME when your customer lock down in a crisis. Manufacturing SMEs could benefit from preparing for upcoming crisis by consider improvements in their existing productions systems by reflecting on performing pre-studies regarding how to improve flexibility and at the same time invest in more automation. This might contribute to the possibility to improve the efficiency and therefor also increase the attractivity for the national automotive industries to increase the amount of regional and national suppliers in order to reduce the risk for a complete lock down next time a long crisis occur.

There seems to be possibilities to prepare for reducing the effects in a manufacturing SME when a global crisis comparable with Corona happen – however, it is related to a thoughtful strategy from the beginning that build upon different flexibilities and abilities to make fast changeovers in the production system. Based on the analysis related to the shipping time in the internationally global supply chain for about 6-8 weeks, there is a time slot for change-over if the production system is prepared and the competence or network is established to interact with a new market segment. This can be facilitated with an approach of designing a system that has more flexible automation solutions instead of dedicated cells, so the production system can be used as a service that can produce a larger number of variants. However, this indicates a need for analyzing the production system design from other perspectives than just for one kind of customers / market segment. Or a very manual production system utilizing standard machines, where the flexibility is in the human operator, typically in textile or some furniture industry. Furthermore, investing in competence as well as market sensitivity so it is possible to perform fast change-over to a new segment, such as in this case produce sterile, functional medical products, can be important in order to reduce the sensitivity as a manufacturing SME in a lock down situation at customers during a crisis.

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