

# Supply chain resilience led by DX

Hiroto Matsumoto, Senior Manager, 3rd Research Department

Amid growing threats such as large-scale disasters, accidents and international conflicts, the vulnerability of supply chains has been exposed in many cases. Hitachi Research Institute is conducting research on how to improve corporate value by strengthening supply chain resilience (SC resilience). What we emphasize in this research is the point that the establishment of SC resilience does not only lead to the handling of downside risks that reduce disaster losses in an emergency. It also leads to the handling of upside risks that minimize opportunity losses in the usual business. Digital transformation (DX) of the supply chain plays an important role in achieving that balance.

## 1. The required strengthening of supply chain resilience

Looking at the past one or two years, supply chains have been exposed to various threats, such as COVID-19, typhoons, factory fires, tanker grounding accidents and geopolitical conflict. Also, these threats have a significant impact on the management of the many companies that constitute the supply chain. For example, the fact that following the Great East Japan Earthquake “more than 90% of companies that went bankrupt did so due to indirect damage that extended beyond the affected areas” means that even if companies are not damaged directly by threats, they suffer serious blows due to indirect damage such as the disruption of supply chains.

So, what kinds of measures have to be taken to increase SC resilience? Measures that reinforce or replicate facilities and equipment will lead to greater resilience in times of crisis. However, it is difficult to say they are sustainable due to the burden of investment or maintenance costs, and it is not possible to respond to new risks with the strengthening of existing measures. Moreover, measures to strengthen SC resilience that lead to the improvement of corporate value require business management that can respond to various fluctuations and unexpected events, including times of usual business and times of crisis, and that can contribute to the expansion of sales or the improvement of efficiency. In addition to grasping damage quickly, suppressing losses and recovering at an early stage (downside risk management) in an emergency, it is also important in times of usual business to detect and predict changes such as a rapid expansion or shift in demand and implement production, procurement and other activities flexibly to minimize opportunity losses (upside risk management) while enhancing the ability to respond to downside risks. SC resilience is a measure that establishes management processes (plan, operate, organize) enabling this kind of business operation throughout the supply chain.

Below, we consider the increased sophistication of management processes that lead to the strengthening of SC resilience based on examples of crisis in Section 2 and examples of times of usual business in Section 3.

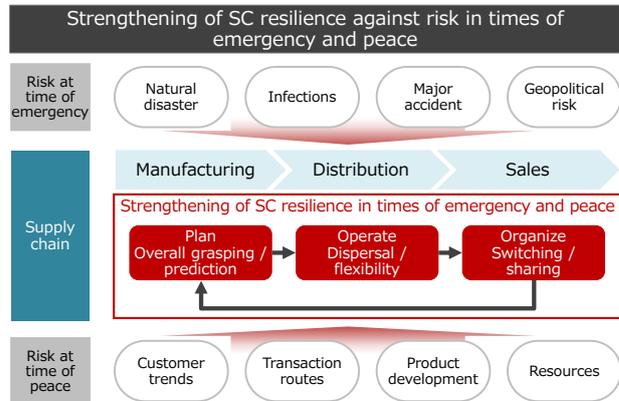


Figure 1 Strengthening of SC resilience in response to times of crisis and times of usual business

## 2. Strengthening of resilience that enhances the ability to respond to crisis

In order to increase supply chain resilience, management processes need to be reformed so that the full visibility and prediction of supply chain management (planning-related work), the distribution and flexibility of tasks (operation-related work), and the switching and sharing of resources (adjusting and organizing) can be executed at a higher level.

The full visibility and prediction in planning is the function of grasping the overall situation and predicting its impacts in order to give instructions on preparation and countermeasures to a confused field, where it is not known what is happening during a crisis. For example, when a container ship ran aground in the Suez Canal in March 2021, more than 150 ships were stranded and transportation and distribution were thrown into chaos. However, major global manufacturers worked with logistics companies to grasp and analyze the damage situation and designed alternative routes to minimize the impact on customers, thereby reducing the damage.

Responding flexibly in response to a crisis, it is necessary to ensure the execution of plans by preparing task distribution and resource flexibility. For example, while there was a shortage of medicines and masks due to the COVID-19 disaster, Chinese e-commerce company Alibaba collaborated with other logistics companies to build Green Route<sup>Note</sup>, and responded by distributing roles with production and delivery agents.

Further, in adjusting and organizing, if there are limits to the ability of individual companies to respond at a time of crisis, it is important to facilitate cooperation between divisions and business operators. In order to build up a production of the emergency supplies in a short period of time, it is important to establish the plug and play platform that enables the interoperability of machine control programs and the switching of production systems.

### 3. Strengthen supply competitiveness in times of usual business by strengthening resilience

The strengthening of resilience should be a strategy that also leads to the improvement of earnings at times of usual business. In particular, it is effective to strengthen resilience by linking planning, operations and organization in industries where changes in market conditions are drastic, transaction structures are complex, and it is difficult to grasp the overall supply chain. For example, in industries such as construction materials, where transaction routes are spread across multiple stages and a variety of products, if there is information cooperation infrastructure that allows the sharing and grasping of supply and demand and the state of inventories in the overall supply chain in planning, man-hours for inventory management and searching, including long-tail products, can be reduced, and transaction opportunities can be increased. If the number of infrastructure users increases, the combinations of buyers and sellers can be increased significantly, and the ability to cope with supply and demand fluctuations and the risk of shortages can be strengthened.

Distribution and flexibility of tasks in operations has evolved in the major retail companies. As customer needs diversify and uneven regional distribution and omni-channel logistics increase, the company is dispersing inventories among stores in each region and channels and increasing the proportion it handles flexibly. The company is realizing management efficiency while enjoying the merits of decentralization by implementing the centralized management of goods held in a distributed way virtually and handling them flexibly as required.

Switching and sharing resources in adjusting and organizing is emphasized in areas such as electronic products and parts where product life cycles are short and the difference between peak and bottom demand is large. In addition to the switching and expansion of production among the company's bases, it is also possible to consider sharing expensive equipment among multiple companies instead of investing as an individual company. When that happens, the plug and play platform such as the facilitation of production switching (setup) between user companies and the adjustment of facility usage plans will be important. The greater the number of participating companies, the more fluctuations and uneven distribution of demand can be absorbed and SC resilience increased.

### 4. Strengthening of SC resilience solutions based on DX

The strengthening of SC resilience requires digital transformation (DX) as a prerequisite. In the supply chain overall, the improvement of resilience at times of emergency and in times of usual business is made possible by: [1] building an IoT network that enables the full visibility in real time and enhancing prediction functions through simulations (planning DX); [2] implementing the centralized management of dispersed inventories and facilities using virtualization technology to enable smooth flexibility (operations DX); and [3] facilitating the switching of production management and control data required for the use

and sharing of facilities among divisions and business entities (adjusting and organizing DX).

Hitachi Research Institute is also promoting research on ideal solutions that will realize improvements in SC resilience. The SC Control Tower is a service that collects, grasps and predicts information on the SC overall and proposes countermeasures in dashboard format. While the SC Control Tower looks after the planning of SC resilience, it will be important for operations and organizing to advance the digitalization of logistics centers and transportation and delivery work, optimize work planning and management in a virtual environment, and develop the solutions that will control actual work. Hitachi Research Institute will continue research that contributes to the improvement of corporate economic value, environmental value and social value through the strengthening of SC resilience.

Note: A free transportation network for relief supplies built by the transportation support platform of Cainiao, the logistics arm of Alibaba Group

#### Introduction to the author



Hiroto Matsumoto  
Senior Manager, 3rd Research Department, Hitachi Research Institute  
Mr. Matsumoto worked at the Chubu Area Operation of Hitachi, Ltd., before appointment to his current position. Recent themes include AI, IoT, robotics and supply chain innovation.