The 'new normal' in the automotive supply chain after Covid

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Abstract: In 2020 the World Health Organization declared Covid-19 a worldwide public health emergency. Companies were swept by a tsunami, whose impacts are still conspicuous on everyone, everywhere, all over the planet, being the supply chains (SCs) the most affected items within the industrial sectors. Firms had no time to properly face shortages of raw materials and parts or avoid logistics disruptions. The purpose of this manuscript is to describe the change in the supply chain configuration, structure, and processes that permanently impact the automotive industry firms, addressed to face Covid-19. In fact, many companies implemented significant investments in a very short time horizon that highlighted new forms of doing business, to fulfil customer needs or new inspirations to define the 'new normal' after the pandemic. The main contributions refer to the Alpha company case that is largely impacted by the SC disruption due the pandemic. Alpha owns a complex supply chain, which consists of an inbound logistic, manufacturing part processes, and a sophisticated outbound delivery, both in the car manufacturers and in the spare parts industry. About the methodology, Alpha developed new models using a Mixed-Integer Linear Programming (MILP) to reengineer the logistics of the European network, to lower costs, manage resources more efficiently and maintain resilience over the time. The main research findings are related to the actions to face the emergency and reduce its adverse impacts are basically due to a sudden reduction in demand, the production stop, the surplus of inventories and the internal inefficiencies coming from information mismatches. Therefore, Alpha has deeply revisited the internal processes, involving all the company departments, including manufacturing, purchasing and supply chain. To maintain a relevant strategic position into its competitive market, Alpha has implemented two main industrial projects: the new inventory management policy and the centralization of procurement processes.

Keywords: supply chain management, Covid, automotive industry, new normal

I. INTRODUCTION

Before Covid-19 only a limited portion of companies that have invested in Supply Chain (SC) projects over the previous years claimed that they had achieved a clear improvement of their Return on Investment (ROI, see Kim and Lee 2021). According to Azevedo et al. (2020), the main causes hindering the effective development and innovation of SCs are due to i) market volatility, which makes it difficult to plan the demand; ii) cultural defects, that favor an orientation toward the core business of a company instead of the global business; iii) the absence of a standardized operating model capable of facilitating the implementation and the fully effective cooperation of the actors in the chain (Raj et al. 2022). The absence of a common model of implementation, management and evaluation of the SC is perhaps the cardinal cause of the difficulties in developing an effective and systemic SC project (Aishida 2020, Cigolini et al. 2020).

The main problem to be solved is related to the efficiency and profitability performances decreasing in the 'new normal' scenario, mainly focusing on the recovery actions implemented by Alpha company on its supply chain network, addressed to face Covid-19.

Some existing solutions refer to online retail channels: customers who moved to these channels could stick to their new behavior even after the crisis. Furthermore, the desire to deepen the development of a strong culture of sustainability could be a trend that will extend considerably over time, becoming part of the "new normal" (Golan et al. 2020).

To be successful in the 'new normal' scenario after Covid-19, businesses need more than simple and static solutions. Covid-19 has showed inefficiencies in the existing configurations and could also lead to long-term changes in customer needs and behaviours (Remko 2020).

The main encountered limitations are related to the different variables to take in consideration for the new supply chain configuration. In fact, the resetting of many SCs has been driven by several forces (Alshater et al. 2021, Pozzi et al. 2019). (i) Lockdowns and social distancing: Covid-19 is putting logistics and retailers to the test. Both sectors are required to maintain a high level of customer service and, at the same time, to comply with the new safety and health requirements envisaged by the distancing measures. (ii) Restrictions on the movement of goods: the pandemic has caused interruptions in the SC of many industries, leading to delays and the urgency of planning shipments almost in real time. (iii) Changes in the demand: the crisis has significantly impacted on consumer purchases, since during the lockdown,

consumers stocked up on necessities with fear of potential supply shortage. (iv) Rise in importance of e-commerce: the most pronounced change in consumer purchasing habits has consisted in the transition from in-person purchases to e-purchases. Travel restrictions, long queues and closures of physical stores have brought down many barriers against online shopping and pushed customers toward electronic channels (Khan et al. 2021).

Hence, companies should take the Covid-19 opportunity not only to adapt their SCs temporarily, but also permanently (Ivanov 2020). For example, firms may decide to create specific SC risk-management processes, or to empower decentralization, to place inventory closer to customers and crisis-response plans (Cao et al. 2020).

This manuscript underlines the opportunities coming from difficulties related to Covid-19 health emergency and the weakness of the automotive sector. The company identified some initiatives, grouped into resilience program, selecting risks and opportunities in the 'new normal' scenario, revisiting its internal processes. Besides, a new warehouse will allow reaching to Alpha to manage the flows of tires in a more effective and efficient way.

With this research, based on the Alpha company, we focus to achieve some best practices to put available for other companies and industries in their supply chain re-configuration.

II. BACKGROUND

Some of the emerging trends that are driving transformations of the SCs in the context of the 'great resetting' will be deeply analyzed in the next paragraphs through empirical evidence. These trends can be summarized as follows (Aishida 2020, Pero et al. 2020). (i) Developing more agile mindsets and behaviors: agile organizations are designed to be fast, resilient, and adaptable. (ii) Increasing efforts toward sustainability: the new normal may see a stronger push for reduced environmental impact by customers and regulators, as lower pollution levels have been one of the few fortunate by products of reduced business activity (see also Joshi et al. 2020). (iii) Focusing on capability building, discovering new ways of doing things, like ordering online all essential goods, and working remotely. (iv) Increasing digitalization, that is empowering firms to reap benefits long into the future. For example, in a global emergency, several suppliers have had a hard time identifying new suppliers quickly, and this obstacle has emerged especially with the exponential growth of e-commerce (Tasnim 2020). (v) Setting specific risk management practices to generate long-term mitigation strategies. SCs are the economic networks that use raw materials, product manufacturing, transportation, and retailing to deliver all the products needed for human life (Ivanov, 2020). Covid-19 caused three categories of ongoing disruptions to supply chains (Hervani et al. 2021): (i) first, the pandemic disrupted supply as facilities closed under repeated outbreaks of infection and government-imposed lockdowns; (ii) second, the pandemic disrupted demand as customers stopped or reduced the consumption of some goods because of unemployment, lockdowns, or changes in their needs. (iii) third, Covid-19 significantly boosted demand for some specific products, such as medical supplies – like face masks and ventilators – cleaning supplies, food, and many other products suitable for shelter-in-place lifestyles (Gatenholm and Halldórsson 2022). One of the industries that has been mostly affected by Covid-19 since the initial phase of the pandemic is the car manufacturing sector. Indeed, the impacts on the SC originating in China – a very important country for this industry, especially for the supply of components – early began to spread globally. In addition to the stop of the production almost all over the world, the automotive sector was also hit on the demand side: many consumers faced with the uncertainty of the crisis, postponed, or cancelled the purchase of their new cars (Herczeg and Pató, 2020). Figure 1 (source: Italian Association of Automotive Industry (ANFIA), press release May 2020) shows the car registrations from 2007 to 2020 in Italy (in March and April), with the clear impact of the pandemic in 2020.

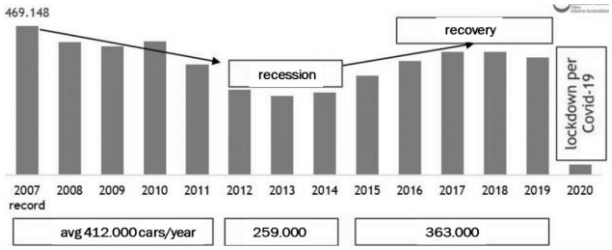

Fig. 1. Car registrations in March and April from 2007 to 2020 in Italy (source ANFIA)

The post-pandemic scenario will therefore be the result of a permanent market evolution. In the car industry, attention will fall even more importantly than ever on new alternative forms of sustainable mobility such as electric scooters, car sharing solutions, etc., even if they hardly are the only and main detractors of car sales. In the post-Covid scenario, the discussion about the centrality of cars in people's lives, as a tool for mobility will be more important: the travel comfort and the charm of new car models will continue to reward car manufacturers and to push the demand, but maybe a little bit less (Akram et al. 2020, Cigolini et al. 2021b). In this post-Covid-19 scenario there will be exceptional stimuluses for all the players in the industry, who will have to review their strategies to be able to remain in the market (Herczeg and Pató 2020).

Another significant issue concerns the electric car sector. In the recent years, many car manufacturers have decided to invest in electric mobility. Predicting what will exactly happen to the electric world is difficult. In the short term after the first outbreak of the pandemic, the sector has slowed down. On the other hand, it is unthinkable that the evolution toward electric mobility will be questioned. The factors that will determine its future are various and, for the most part, exogenous in their nature: the

persistence of the health emergency, the intensity of the economic crisis, the level of investments, environmental regulations, and the resilience of electric battery manufacturers (Gao et al. 2021).

Within the future expected dynamics, companies are particularly focused on the consolidation of their large distribution network which, for reasons linked to the economies of scale and the ability to reduce fixed costs, will be able to strengthen their position. Moreover, after the health crisis, car manufacturers are trying to implement a reduction in vehicle stocks in the sales networks, adopting a more flexible approach, with a transition from a 'push' model – based on cars ready for delivery – to a 'pull' model, based on a more customized approach, aimed at stimulating market demand.

To guide companies throughout these innovations, it is essential to have a good leadership able to take control over change and, at the same time, to ensure business continuity (Cannas et al. 2020, Cigolini et al. 2021a, McMaster et al. 2020). Besides, in an era of great changes, it will be essential to ensure the protection and professional development of employees. It will be necessary to strengthen relationships with customers and acquire new digital skills. Lastly, even not less important, is to redefine the strategic management of the supply chain in the light of the disruption of market dynamics (Akram et al. 2020). An effective logistics management approach can support the initiatives that the company implement to reach competitiveness, as it is explained in the further sections (Gultekin et al. 2022).

III. Reshaping the logistic network of Alpha company with the new warehouse

Alpha is a multinational company that operates in the world tire market and carries out a careful and detailed analysis on how the company faced the serious Covid-19 pandemic emergence, with a particular focus on the SC. In 2020, Alpha faced the difficulties related to Covid-19 health emergency and the weakness of the automotive sector. Facing a stagnant global economy, due to repeated lockdowns and various containment measures, Alpha has acted quickly to protect its employees, limit the impact on its stakeholders and support the communities in which operates.

The consequences of the pandemic have severely impacted Alpha, causing irreversible changes in its processes, activities, organizational structure, and ultimately SC. The risk associated with a health crisis is classified as highly unlikely, but with severe consequences. An important obstacle, therefore, was in the ability to predict what was happening, which is something that many companies in the world have underestimated, preferring to focus on much more frequent risks like cyberattacks, supply disruption or damage to brand reputation.

However, Alpha immediately faced the emergency with the optimistic perspective that the impacts, the changes, the choices and the problems not only would constitute an element of difficulty for the company, but, above all, a shock for the business, a reason to relaunch and change the processes, to grasp the opportunity to generate value in the future by giving birth to a new reality, a 'next normal', a scenario in which temporary changes translate into a permanent reconfiguration of the processes, activities and of the SC.

The 'new normal' post-Covid-19 will constitute an improved, optimized, and rationalized reality, ready to face the challenges of the future in a more agile and dynamic way. Table I shows the main initiatives implemented by Alpha to identify risks and opportunities in the 'new normal'.

The spread of Covid-19 all over the world created uncertainty in the markets and a drastic economic downturn. To cope with the emergency, Alpha developed the so called 'resilience program', which was presented to the shareholders in April 2020. The main aspects covered by the resilience program are (i) the structure cost, (ii) housing, (iii) handling, (iv) transportation, (v) value added services and (vi) CapEx management.

TABLE I
RISK AND OPPORTUNITIES IDENTIFIED BY ALPHA

Risk	**Opportunities**
Demand risk assessment	Elevating the role of Supply Chain
Inventory (service) risk assessment	Digital transformation
Access to labor	Continuity/risk mitigation strategy
Access to transport	Cost optimization
Supply risk assessment	Supplier risk
Communication	Network design
Financial risk assessment	Sales and Operations planning

Alpha has deeply revisited the internal processes, touching all the processes / departments, including manufacturing, purchasing and SC. Alpha is requesting to rework on the six work streams revising all the assumptions to ensure more efficiency, structure resizing, work force resizing / optimizing, resilience and significant cost saving and sharing. Alpha has launched several projects to improve its logistic network, so to increase the resilience along the SC, after Covid-19. In fact, the pandemic highlighted that the logistic infrastructure was not so solid as it seemed, especially for what concerns the outbound logistics. The most recent project now concerns the enforcement of the network capacity, through the construction of a warehouse for the storage of tires. This project will allow to manage inventories more efficiently, build more resilience - so to better face potential new risks - and optimize costs.

Based on the previous considerations, one of the biggest projects taking in place is related to a new warehouse that

will allow reaching to Alpha both efficiency and high service level (effectiveness).

In line with the distribution model that will be applied also in other production centers of the company around the world, the new warehouse will allow Alpha to manage the flows of tires in a more effective and efficient way. The high innovation content of the new warehouse will allow to improve the customer service for the Italian market.

The greater efficiency in terms of logistics will allow Alpha to reduce costs and obtain significant improvements in terms of sustainability. Moreover, the building of the new warehouse will reduce CO2 emissions related to the transfer of tires and will lead to the generation of clean energy through the construction of a 1.2 MW photovoltaic system. The creation of a sustainable network is in line with the desire to implement a strongly eco-friendly 'new normal', since the pandemic has paid much more attention to sustainability issues, highlighting how weak the environment and society are compared to those new possible threats and risks. The operations of the new warehouse will be entrusted to the logistics partner who already manages the service in Italy on behalf of Alpha. Based on some restrictions caused by pandemic, as distancing between workers, Alpha decided to implement some initiatives to the workers as face masks, gloves, and voice picking.

The use of face masks and gloves was not only accomplished by common people walking in the street or going to the supermarket. Within working spaces and, specifically, warehouses (but also production plants), Alpha had to find a solution to avoid and decrease human contacts, interactions and the touching of goods, instruments, and tools, so to limit the spread of the virus. Voice picking (or vocal picking) is the main solution to these problems. Voice picking is a technology that, using vocal synthesis devices, can send simple and clear voice commands, indicating the path to follow to the staff and the activities to be carried out.

The voice picking system supports and optimizes the logistic operations of picking and order preparation; it works in combination with a Warehouse Management software and helps improve the productivity in the warehouse.

When picking uses vocal synthesis technology, the advantages for operators are both in terms of communication and convenience: the devices allow pickers to move inside the work aisles with their hands free, to be able to wear gloves, to receive orders directly from the system and, above all, to be able to work with better ergonomic and healthy conditions. The results are more efficiency in picking operations and more safety inside the warehouse. Moreover, voice picking is definitively easy to implement and represents an effective way to manage orders without using paper, which is a mean of transmission of viruses and bacteria. Voice picking is a technology which is not completely new, but still not fully implemented in Alpha's owned warehouses. The objective of the company is, therefore, to strengthen and increase its utilization. In fact, it i.

IV. NETWORK RE-ENGINEERING

The main strategy aimed at building resilience for the post-pandemic scenario consists in lowering the overall costs as much as possible, while maintaining the requested service level. If the overall cost structure is lower than the actual situation, Alpha has higher margins and a better financial stability. Because of that, resilience is raised, since resources are strengthened so to cope with new risks, stresses, and shocks. True resilience is not about managing a particular instance of risk, but about being ready for anything through the execution of each activity. This new way of operating must include not only specific actions toward the resolution of the pandemic, but also long-term decisions that can optimize the network, while making it more resilient for the future.

In this context, Alpha has developed a new methodology based on a Mixed-Integer Linear Programming (MILP) method with the goal of identifying the number and the localization of the distribution warehouses to serve all the European market: (i) to minimize the overall distribution costs (sum of primary transport cost, distribution, warehousing and handling costs); (ii) to maintain the requested service level in terms of delivery lead time toward the delivery points; (iii) to create resilience along the entire distribution network.

The implementation phase can be summarized according to the following steps, which also map the increasing progression of value added and time: (i) identification of SC strategies; (ii) data collection analysis and validation; (iii) baseline model of the current SC; (iv) definition of potential scenarios; (v) analysis of impacts on cost, lead-time, etc., (vi) presentation of the solutions.

The model implemented tries to optimize the trade-off between costs and service. The initiatives have been implemented with some progressions, considering both the operative and economic convenience to do it. In fact, stage I represents a higher service level (high effectiveness) but with higher costs (low efficiency), favouring a decentralized network at national level. At the other extreme, stage II emphasizes a lower stock management cost. Stage III shows a trade-off configuration between cost and service. The company key drivers to take in consideration, to select the right model, are: (i) business strategy, (ii) service level, (iii) market demand, (iv) production/supply, (v) warehouses network design.

The demand required by the 'destination nodes' (customers) and the production supplied by the 'origin nodes' (plants) are given. There is a number of available 'intermediate nodes' (local warehouses), whose operating costs are known (housing and handling). The model aims to define, at the same time, which local warehouses to 'activate' (how many and where), the quantities to be sent to each local warehouse activated and the quantities to be delivered from each warehouse

to the customers, to minimize the sum of the costs of primary, secondary transport, handling, and housing.

Starting from about 50,000 customers spread over 1,300 geographical areas, it is necessary to carry out aggregations, which however do not modify the result of the analysis but allow to operate on more significant historical data thanks to the reduction in variability. Given a specific geographical area with a well-defined number of customers, it is possible to determine the centroid, calculated from the flows absorbed per customer, by noting also that the positions of the centroids have slightly changed with the pandemic. In case of delivery to the islands, the amount absorbed has been concentrated in the centroid corresponding to the port of shipment.

Figure 2 (see Maiorano 2021) outlines the main logistics macro-areas assumed in the model, with a concentration localized in Central Europe

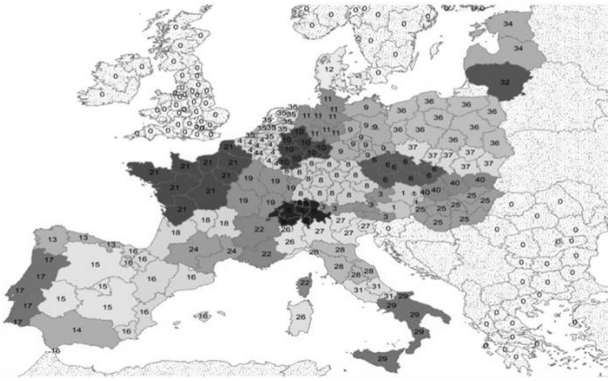

Fig. 2. The logistics macro-areas assumed in the model

The problem can be modelled using MILP. The variables used are described below.

D (j) = yearly demand of the centroid j [ton/year]

K (h, i) = 1 if the warehouse h supplies the macro area i (to which centroid j belongs); k(h, i)=0 otherwise;

d (h, j) = distance from the warehouse h to centroid j [km];

cs (h, j) = secondary distribution cost from warehouse h to centroid j [€/(ton km)];

p (p,j) = percentage of D(j) coming from plant p [ton/year];

cp (p, h) = primary transport cost from plant p to warehouse h [€/ton];

cw (h) = warehousing cost (handling & housing) of warehouse h [€/ton].

The objective function entails the minimization of overall inbound, warehousing, and outbound costs: (1)

$$\min\left(\sum_{h=1}^{H}\sum_{j=1}^{J} cs_{h,j} * d_{h,j} * h_{h,i} * D_j + \sum_{h=1}^{H}\sum_{j=1}^{J} cw_h * \right.$$

$$\left. * k_{h,i} * D_j + \sum_{h=1}^{H}\sum_{p=1}^{P} cp_{p,h} * \sum_{J=1} p_{p,j} * k_{h,i} * D_j \right)$$

In solving the problem, the objective function must be integrated with two constraints: (i) the single sourcing constraint, imposing that each macro area must be sourced by a single local warehouse:

$$\sum_{h=1}^{H} k_{h,j} = 1 \quad \forall i \tag{2}$$

(ii) the non-overcrowding constraint, imposing that the number of warehouses activated for a given set of macro-areas must be less than or equal to n:

$$\sum_{h=I}^{m} a_h \leq n \tag{3}$$

Where: $a_h = \max_i(k_{h,i})$

The last step of the model is to draw, given a potential warehouse (ah = 1), the isochronous curves, that are all the points, near the warehouse, serviceable within a given range of time. Using the MapPoint™ software, two isochronous curves are calculated: the points reachable within 24 and 48 hours from the warehouse, respectively. Isochronous curves represent the service constraint for Alpha.

From the definition of the isochronous curves, delivery operations are then managed. For example, deliveries to be carried out within 24 hours from the cut off to the last time available for delivery, are provided with approximately 7 hours, to cover a maximum distance of about 500 km, net of driving stops and crossing the transit points. Figure 3 (see Maiorano 2021) shows an example of isochronous curves.

Fig. 3. Example of an isochronous curve

The results reported here show how Alpha introduced new models to optimize resources and activities, by (i) the introduction of new warehouses to optimize the flows; (ii) the need to move the objectives on further cost reduction without penalizing the service level and (iii) the

will to raise the resilience along the entire distribution network. The MILP model is a good solution to reach these targets and to implement a flexible and adaptable solution.

The COVID-19 crisis is giving two essential lessons to the companies. The first one is that resilience must be appropriately built to face any disruptive event and is the result of a long preparation and allocation of adequate resources and analysis tools. The second one is that the ability to get out of this crisis, with very few damages, is directly proportional to the ability to respond to unexpected sudden events that can change daily. The use of data analytics, combined with managerial skills, is an essential asset to react quickly, to guide decision-making processes and to evaluate their sustainability and actual performance.

V. Conclusions

From the analysis it emerged that companies have reacted and managed the crisis generated by Covid-19, together with the perception that the various sectors have on their business perspective.

Disruption in SCs, raw materials shortage and manufacturing shutdowns are identified as the main challenges initially faced by almost all companies. Moreover, the intuition that the future will not be the same and that SCs will experience a 'new normal', different from the previous periods, were pushed by the birth of several driving forces to reset SCs: lockdowns and social distances, restrictions on the flow of goods, changes in demand and rise in importance of e-commerce.

The global SC, which is still adapting to the pandemic, has therefore redefined its boundaries in a new fashion. There are no general solutions for a problem that is quite complex on its own: no single size fits all. However, there is a relevant need to identify the most appropriate ways to optimize the SC processes and to understand the reactions of the business models and some emerging trends are driving transformations of SCs in the context of the great resetting: developing of more agile mindsets and behaviours, focus on capability building to discover new ways of doing things, increasing efforts toward sustainability, digitizing the entire chain, and optimizing the management of inventory.

By analyzing the situation of companies when the pandemic broke out, a very wide picture of the businesses can be made. A macro classification has been set up, composed by two types of markets.

The first type is represented by all companies where demand collapsed during the pandemic: the sector of manufacturing capital goods, tourism, fashion, and services. Companies affected by the crisis in this way had to implement operational plans aimed at increasing efficiency by reducing costs and building resilience, while coping with repeated production stops. Alpha company belongs to this category and clearly shows the way a company managed to escape from a period of production and economic standoff, through advanced planning and technology tools.

The second category of markets is represented by all companies that experienced a sudden and dizzying increase of demand, which created stockouts, empty shelves and unavailability of products for a long time. This phenomenon, due to the bullwhip effect, has amplified the disruption in the upstream layers of the SC, particularly affecting suppliers, who faced a race for raw materials, to align demand with supply. This alignment took a long time. The sectors mostly characterized by these behaviours are the food and beverage, healthcare, and the world of e-commerce. In pharmacies or supermarkets, consumer products such as hand sanitizers, face masks or alcohol became fully available at least six months after the outbreak of the pandemic. Along with these sectors severely affected by the crisis, although in different ways, there are also companies in charge of carrying out the largest logistics operation ever, as the distribution of anti-Covid vaccines worldwide. The developments mainly from Pfizer, Moderna and Astra Zeneca have come at a phenomenal speed and the deployment and distribution of vaccines brought to light an entirely new set of challenges for logistics companies already experiencing a year unlike any other. Cold chain capacity is one of the most important factors in distributing any vaccine, but a vaccine that needs to be stored at –70°C is merely something the traditional SC is not currently prepared for.

Also, last-mile delivery is one of the biggest challenges: with a shortage of drivers there is not enough staff to carry out the last-mile delivery from seaports to end destinations.

This paper aimed to describe the supply chain re-configuration, focused on the Alpha company (that compete in the automotive industry) as a response to the Covid-19 problem.

Based on Alpha case, a new methodology focused on distribution warehouses to serve all the European market has been implemented. New knowledge is now available in the Operations and Supply Chain community, for the academics and practitioners.

VI. Future paths

Leaders of all the companies in the world should take the opportunity of the crisis not just to temporarily fix the problems in their SCs, but also to transform the problems in the long term and reinvent a new reality. Re-elaborating SCs to avoid past errors and to meet future needs will require a long and comprehensive approach. Moreover, to address the need for increased resilience, firms can consider establishing dedicated SCs and cross-functional risk-management teams. Working alongside the different company areas like manufacturing, procurement, operations or SC, these units are responsible for assessing vulnerabilities across the nodes of the SC and to apply a bold risk-mitigation strategy in

response. This framework might include accelerating decentralization, keeping inventory closer to customers, and developing crisis-response models and capabilities. Similarly, to push the SC's digital capabilities a coordinated view throughout the nodes is needed, so that firms can get interconnected with the latest technological tools and capabilities. Systems able to deliver plans autonomously and integrated with machine-learning tools can be useful in many instances and can easily understand the 'new normal' much faster than traditional systems for building operations continuity, preserving cash and creating SC resilience. Digitization is able to empower companies to achieve benefits in the long run. Whether through more accurate data and forecasts or through reduced lead times, digitization of the end-to-end SC will contribute to eliminate inefficiencies in the business operations, raise responsiveness and significantly reduce overall SC costs. Besides, digital tools allow real-time monitoring of staff, equipment, and resources, enabling to lower cost by eliminating wasteful processes. Companies can implement digital logistics activities for product deliveries, using hundreds of datapoints to trace and optimize data with real inputs, to obtain efficient real time solutions. Moreover, with digitization, even retailers can take decisions based – for example – on sudden fluctuations in demand, while growing technologies such as artificial intelligence or blockchain can help be ready for unexpected events. By connecting manufacturers, warehouses and logistic servers, data provides retailers and companies a higher control, by acting on issues quickly and effectively. In the 'new normal', enterprises must be so agile to properly compete in the market. Firms will leverage the crisis to deeper analyze their business models and implement more sustainable SCs for the future. Winning strategies to give SCs more transparency and resilience must embrace long-term investments or, at the same time, accept a continuously increasing cost of goods.

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