



# Developing EU cluster capacities to manage shocks

ECCP Discussion Paper

An initiative of the European Union





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## ECCP Discussion Papers

The European Cluster Collaboration Platform (ECCP) is the main hub facilitating cluster cooperation within the EU and beyond. It is supported by the European Commission through the COSME programme.

This Discussion Paper was submitted to the European Expert Group on Clusters as an input for their discussions. The European Expert Group on Clusters provides the Commission, EU countries and regions with recommendations, advice, and expertise, specifically on how to better use clusters as a strategic tool of industrial policy, interregional collaboration and to integrate SMEs into EU and global value chains. The members of the group are the EU countries and individual experts appointed in a personal capacity (selected via a call for applications).



## Introduction

For the UK presidency of the G7 in 2021 the OECD prepared a report on fostering economic resilience setting out the recent challenges to resilience, the importance of resilience also for the development of democratic societies and the policy options to strengthen it. The paper described also how the development of economic specialisation provided many benefits but is also a factor in making economic shocks more likely while increasing the impacts of those shocks.

The paper is part of an ongoing work process<sup>1</sup> at the OECD on resilient supply chains. Other international organisations like the WTO<sup>2</sup>, the World Bank<sup>3</sup> (mostly for developing countries) and UNCTAD<sup>4</sup> also developed a number of policy proposals to strengthen the resilience of supply chains ranging from developing logistical efficiency to a complete replanning of the supply chain.

The ECCP already focused on resilience in a previous discussion paper on the role of clusters in supply chain adjustments. The paper elaborated the increasing probability and impact of external economic shocks on EU companies and with that the importance of resilience to those shocks for the future development of economic progress of EU companies and the EU.

In that paper we set out the risks of the COVID crisis on the supply chains of EU companies and developed a typology of the different types of reaction available to those companies to strengthen their resilience to shocks. The paper also argued that companies need support to take some or many of the actions needed and discussed in detail how far and in which way cluster organisations could provide that needed support.

This current discussion paper builds on this earlier paper and broadens the scope. While the earlier ECCP discussion paper focused only on the COVID crisis and the induced risks for supply chains, this paper analyses other potential shocks and their impacts on resilience in more detail and discusses the actions needed by companies to increase their capacity to manage external shocks in general.

To clarify the different directions companies can take in building this capacity, we use a categorisation developed by the OECD<sup>5</sup> postulating that companies need to either; (1) prevent the built up of risk; (2) prepare to absorb shocks better when they occur; or (3) foster their abilities for a swift rebound from shocks.

The paper is structured in the following way:

- Chapter 2 describes the potential economic shocks that are relevant in this context and provides some examples of those shocks.
- Chapter 3 analyses the potential reactions of companies to those shocks and cluster actions to support companies in building their capacity to respond to shocks.
- The last chapter 4 provides the overall learning points from the paper.

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<sup>1</sup> OECD, *Keys to resilient supply chains*, 2021. Retrieved from <https://www.oecd.org/trade/resilient-supply-chains/>

<sup>2</sup> WTO, Vulnerabilities, resilience in global trading system examined in World Trade Report 2021, World Trade Report, November 2021. Retrieved from [https://www.wto.org/english/news\\_e/news21\\_e/wtr\\_16nov21\\_e.htm](https://www.wto.org/english/news_e/news21_e/wtr_16nov21_e.htm)

<sup>3</sup> Colon, Celian; Hallegatte, Stephane; Rozenberg, Julie, *Transportation and Supply Chain Resilience in the United Republic of Tanzania: Assessing the Supply-Chain Impacts of Disaster-Induced Transportation Disruptions*, report, World Bank, Washington, 2019.

<sup>4</sup> UNCTAD, *Building resilience key to prosperity for all in post-COVID-19 world*, October 2021. Retrieved from <https://unctad.org/news/unctad15-building-resilience-key-prosperity-all-post-covid-19-world>

<sup>5</sup> OECD, *Fostering Economic Resilience in a world of open and integrated markets – Risks, Vulnerabilities and areas for policy action*, Report prepared for the 2021 UK presidency of the G7, 2021



## What are relevant external shocks?

The international value chains and markets that have developed over the long process of globalisation are at risk of many different types of economic shocks, as has been demonstrated especially in the last 15 years with 2 global economic shocks taking their toll on the world economy (the financial crisis of 2008 and the COVID crisis of 2020). But apart from those global shocks, companies in the EU can also be impacted by more local or sectoral shocks, and the impacts of those shocks on companies can differ substantially.

This chapter therefore summarises the types of shocks that are particularly relevant in the context of actions that can be developed by cluster management and cluster policy. In the following chapters we develop on this basis, cluster support mechanisms that could build capacities to manage those shocks.

Classically, four overarching types of shocks (or risk of shocks) are distinguished in the literature<sup>6</sup>:

- **Monetary risks or shocks** like exchange rate changes or all types of changes to the capital supply of companies affect both the liquidity and in some cases also the profitability of companies. Governments and central banks in the EU have built a whole support infrastructure for those risks, and in this context, the role of clusters here is limited.
- **Political risks or shocks** can be any political changes that affect either the supply chains or the export markets of companies. This can be drastic political events like wars, civil wars, or terrorism, or more benign developments where countries change their rules to international trading significantly. Those shocks can hit specific supply chains or all supply chains depending on the locality and scope of the shock. Clusters with their deep expertise focus on specific value chains can be an important support actor here.
- **Technological risks or shocks** where rapid technological progress changes the relative market opportunities of companies, creating many opportunities but also loss of opportunities for companies that cannot keep up. The ongoing digital transformation would be an example for such a shock. As many cluster organisations bring together universities and RTOs with companies in a process of linking research and industry to promote technological progress, both cluster management and cluster policy are highly relevant for this type of risk or shock.
- **Natural disasters** can have an important impact on the availability and prices of supplies, and on product markets. Again, the impacts of these shocks are likely to be very value chain specific, given the differential impact of different types of natural disasters on different value chains and the local focus of those disasters, and in this way cluster organisations again can support the preparation for and the reaction of companies to this type of risk.

As pointed out above monetary shocks are not as relevant in this circumstances so we will concentrate on technological risks and shocks, political risks and shocks and natural disasters, discussing their relevance for clusters and cluster policies in turn:

### 1. Political Risks and Shocks

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<sup>6</sup> Valerie A. Ramey, *Macroeconomic Shocks and their propagation*, National Bureau of economic research, 2016



National political events and policies can have impacts on companies in international value chains. The most noteworthy are of course violent events like wars, civil wars, or acts of terrorism, but relevant can be all policies that either make supplies of companies more expensive or less available, or policies that hinder the export of goods to national markets. This can be direct bans of exports or imports as experienced during the COVID pandemic, but governments can also use tariffs or quotas or subsidies to homegrown companies or regulations favouring those companies to influence the relative market chances of their companies, reducing the chances of EU companies to either receive their supplies at a market price or being able to sell their products or services profitably. There are many examples of such events and shocks caused by political events and decisions in the literature of which the following show the range of potential shocks that could be relevant for clusters and cluster policy:

- The conflict between Ukraine and Russia on the Krim peninsula and the industrial area of the Donetzk, has hurt the free flow of goods over the common border. EU trade with Russia has therefore been conducted on new routes affecting especially the market for natural gas but also other trade flows.
- Terrorism attacks always have a strong impact on tourism flows and can in some cases cause economic troubles on a national scale. Recent examples of this are Egypt or Turkey, which suffered strongly from the drop of tourism income following terrorist attacks.
- Sudden changes to regulations as experienced in the COVID crisis can have a very negative impact on industries<sup>7</sup>. One example would be the **fruit and vegetable market** in the EU, heavily impacted by the shortage of seasonal labour which the COVID travel restrictions created. Some companies suffered major drops in income due to not being able to bring the harvest in or plant the vegetables and fruit in the first place.
- Over the year 2020 **international travel** was sometimes banned and at other times severely limited and all companies of the international travel value chain (aircraft carriers, hotels, restaurants and many more) had drastic losses in income to cope with<sup>8</sup>.
- While the **solar industry** in the EU started very strongly in international competition at the start of the last decade, they have since suffered from very strong price competition from Chinese and US companies<sup>9</sup>. While some competitive advantages were based on lower costs, European companies also complained about hidden subsidies for their US and Chinese competitors. In that time many EU companies suffered very important losses in business and some of them went even bankrupt.
- Another example of shock by regulation is the supply of **rare earth** materials. Government policies helped the Chinese providers of rare earth materials<sup>10</sup> to gain a very dominant market position, which are crucial for the production of chips and other IT equipment and has impacted on the global value chain of chip production and all sectors which use chips.

## 2. Technological risks

On the other hand, companies can be severely affected by technology or market risks outside their control. Those risks can manifest in many different ways, but they are very often linked to technological developments which influence the productivity of some market participants but not all and change their relative market chances. This can happen directly in the production process or in the supply chain when technological progress changes the use

<sup>7</sup> OECD, *Fostering Economic Resilience in a world of open and integrated markets – Risks, Vulnerabilities and areas for policy action*, Report prepared for the 2021 UK presidency of the G7, 2021

<sup>8</sup> OECD, *Fostering Economic Resilience in a world of open and integrated markets – Risks, Vulnerabilities and areas for policy action*, Report prepared for the 2021 UK presidency of the G7, 2021

<sup>9</sup> Llewelyn Hughes, Jonas Meckling, *The politics of renewable energy trade: The US-China solar dispute*, *Energy Policy*, Volume 105, 2017, Pages 256-262

<sup>10</sup> Nabeel A. Mancheri, Benjamin Sprecher, Gwendolyn Bailey, Jianping Ge, Arnold Tukker, *Effect of Chinese policies on rare earth supply chain resilience*, *Resources, Conservation and Recycling*, Volume 142, 2019, Pages 101-112



and usefulness of supplies in the value chain. Of course, these technology changes can be linked to government policies discussed above. Examples from the literature on this would be as follows:

- Linked to policing reducing carbon emissions, the use of **electric vehicles** is expected to grow very quickly<sup>11</sup> (also fostered by government policies) with a corresponding decrease in the sales for fossil fuel powered cars. Some European companies were very quick in seeing this trend while others underestimated the trend and are currently working intensively on the catch up.
- Another shock for some European companies was the increasing importance of **software development** especially in vehicles of all types<sup>12</sup>. The predominance of US companies in the software industry is perceived as a growing risk to the European vehicle industry and companies are working hard to reduce or mitigate this risk.
- Another example would be a mix of political and technological shock which is the move to a **green energy system**. Many technologies linked to fossil fuels lose their value while others become much more valuable following the political decision to reduce emissions. Depending on the technologies the company is specialised in this can be a positive and negative technological shock for them.

### 3. Natural disasters

Lastly, local natural disasters can also have an important impact on companies in the EU. By making supplies unavailable or expensive or by interrupting export markets they can force some European companies to adapt. Examples would be natural disasters which hit highly specialised economic regions or those with a strong link to supplies of raw materials (forest fires). Examples from the literature would be as follows:

- One example for an economic shock from natural disaster is the **tsunami and earthquake** in Japan in the year 2011 which destroyed a nuclear power station and led to radioactive contamination. The energy shortages following the earthquake had severe impacts on many specialised industries in Japan and reverberated around the globe<sup>13</sup>.
- One other example would be the increased occurrence of forest fires in many parts of the world linked to the heating up of the atmosphere due to carbon emissions<sup>14</sup>.

#### Short term shocks and long term vulnerability

The used example already shows another distinction of shocks which is very important for companies needing to react to it. Some of the shocks are drastic and short-term (Covid restrictions) while others are less abrupt but probably durable (e.g. technology shocks).

Predicting the type of shock they are facing is therefore a very important action for all companies and clusters faced with shocks or preparing for it. Most of the shocks described above can have very lasting impacts or be only transitory. A cluster of suppliers hit by an earthquake would normally be transitory, but if companies reassess their location due to the earthquake it might have long-lasting impacts on other supply chains. On the other political decisions can sometimes be very long-lasting while others (like a ban brought in for electoral reasons) can only be

<sup>11</sup> Dunnan Liu, Bowen Xiao, *Exploring the development of electric vehicles under policy incentives: A scenario-based system dynamics model*, Energy Policy, Volume 120, 2018, Pages 8-23,

<sup>12</sup> Shladover, S. E., *Connected and automated vehicle systems: Introduction and overview*, Journal of Intelligent Transportation Systems, 22, 2018, pages 190 – 200

<sup>13</sup> Nanto, D.K., Cooper, & Donnelly, J., Johnson, R., *Japan's 2011 Earthquake and Tsunami: Economic Effects and Implications for the United States*, 2011

<sup>14</sup> Bärbel Langmann, Bryan Duncan, Christiane Textor, Jörg Trentmann, Guido R. van der Werf, *Vegetation fire emissions and their impact on air pollution and climate*, Atmospheric Environment, Volume 43, Issue 1, 2009, Pages 107-116



transitory. So companies and clusters need to understand how transitory and shock will be to decide on the best way ahead.

The following chapter is therefore about different types of reactions of companies which are determined both by the type of shock and its likelihood to be transitory.



## Shocks, change needs and actions to support them

To deal with those shocks, companies need to identify and implement the right actions based on the change needs caused by the specific shocks. The following chapter describes

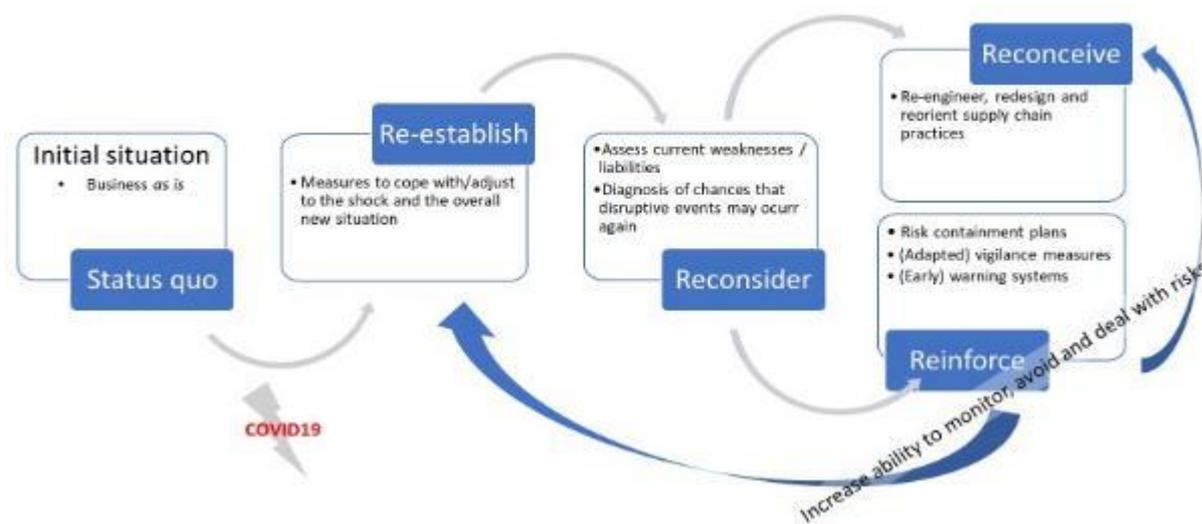
- Which types of actions are available?
- What capabilities and capacities do companies and clusters need to take those actions?
- How can cluster policies support the development of those capabilities?

### Types of actions

As described above, the different shocks have different impacts on companies in the EU depending on the type of shock, length of shock, type and size of company, and many more. Companies can react to those shocks in different ways depending again on the type of company and the type of shock to react to. The following chapter therefore sets out potential actions that companies could undertake to become more resilient. The assessment follows the structure set out in an earlier ECCP Discussion paper on “The role of clusters in supply chain adjustments”. We distinguish between 4 potential types of actions which will be discussed in turn.

- Re-establish
- Reconsider
- Reconceive
- Reinforce

Figure 1: Flowchart regarding supply chain rearrangement decisions



Source: own elaboration

### 1. Re-establish



If the company concludes that the shock is temporary and that the impacts can be mitigated without structural changes to production processes or supply chains or products, it may choose to re-establish its old way of working as quickly as possible. Actions are confined to dealing with the outcomes of the shock like financial replanning or insurance review.

## 2. Reconsider

If on the other hand, companies may conclude that their business model needs to change to be sustainable following the shock, companies will need to examine the pros and cons of their options to redefine their supply lines, their production processes or sales offer. They will examine the needs of reconsideration and the pros and cons of their different options. For this, companies need to understand the most relevant risks of shocks they are facing. For each of those identified risks they will try to understand which different parameters of their sourcing, production and sales processes they could change to lower or avoid those risks. This can be the first step of the development of a new business case.

## 3. Reinforce

In some cases, the analysis will come to the conclusion that reinforcement actions and more minor changes to their processes are enough to reduce or mitigate risk and prepare for future shocks. For those elements that can be reinforced, this would mean that measures specifically targeted on reducing the risks are taken that do not change the overall supply, production and sales process. Examples of such measures would be:

- Introducing bigger buffers for supplies or products to absorb shocks
- Reorganise contracting or improving insurance cover to lower risks
- Finding alternative or additional suppliers for the more at risk supplies
- Broadening export markets to mitigate risks
- Staggering production processes to allow to improve resilience to supply delays

## 4. Reconceive

If on the other hand companies work out in their reconsideration that important parts of their processes need a more thorough reform, they will change their supply chains, their production processes, or their sales processes as needed. Having identified the need for a new business plan under reconceive in this step the alternative business plan would be developed. Depending on the identified needs for change, the value chain and many more factors the actions to take can be very different. The following list only provides examples.

- Changing production processes or even products to mitigate potential shocks
- Changing supply routes, suppliers or even supplies (by internalising production or in case of production changes)
- Changing product markets, sales processes or the like

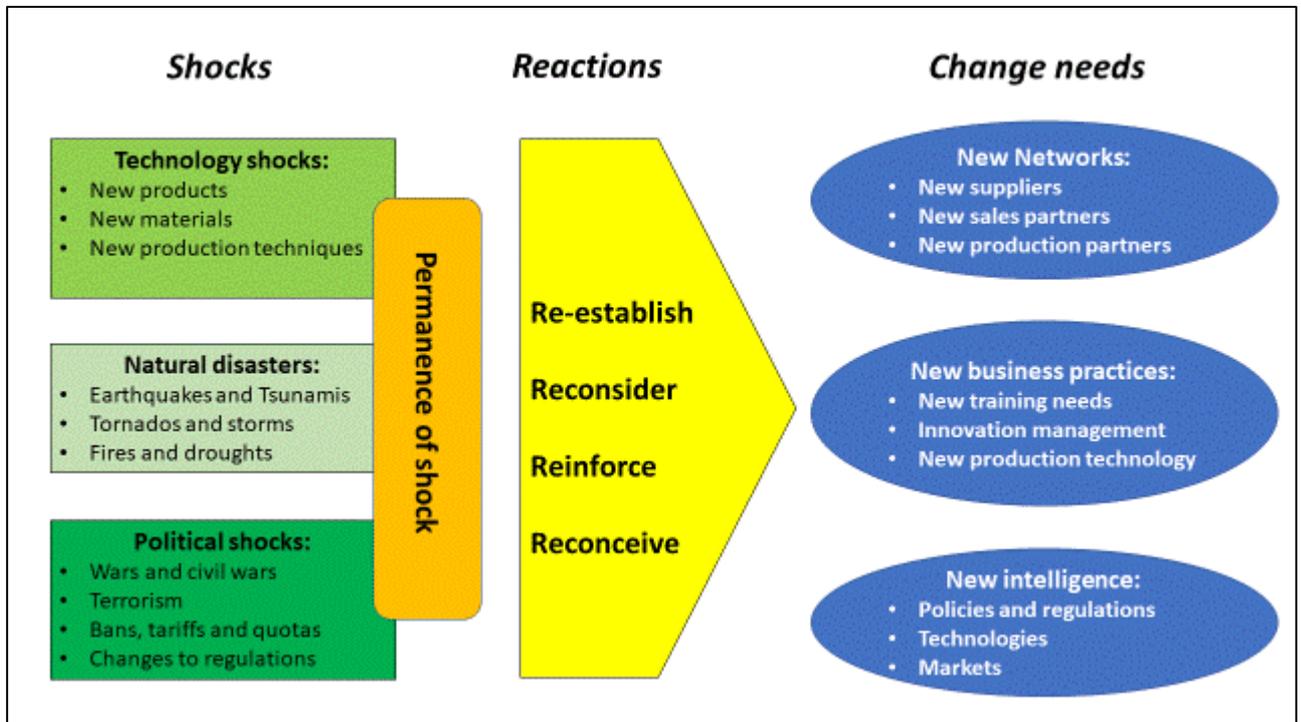
From the discussion above it is very clear that both the assessment of durability of the shock and the analysis of the type of shock determine the change needs. The change needs differ very much but can be summarised in three distinct groups:

- **New networks:** If companies require new suppliers new sales partners, new production partners or new research partners they will have to build new stable networks.
- **New business practices:** Other companies will require changes in their business practices, to adapt to innovation, build new training capabilities or adapt to new production technology.
- **New intelligence:** Other companies will need intelligence on markets, technologies, and regulations to find the right actions for them.



The following figure summarises the relationship of the relevant shocks with the change needs.

Figure 2: Reacting to shocks



Source: own elaboration

The three groups of change needs are very much linked to the three groups of potential cluster actions that have been identified in earlier ECCP papers being networking, business support and intelligence, showing the potential importance of clusters in this change process.

### Capacities and capabilities to respond to shocks

To understand the risks of the different shocks described in chapter 2 and to support the identification, development and implementation of relevant actions to mitigate those risks (described above), cluster organisations will require a broad set of capacities and capabilities.

Cluster organisations in the EU can have a very important role in helping their companies to prepare for shocks and to mitigate the risks of those shocks. The set of capabilities depend on the types of shocks and the support needs that companies have to prepare for and weather those shocks.

The following chapter therefore describes the needed capabilities by type of shock as described in chapter 2 and analyses the needed capabilities based on the categories of actions described above in this chapter (re-establish, reconsider, reinforce and reconceive). As far as possible some examples for those capabilities are provided:

1. Political shocks



Clusters can have an important role in supporting companies dealing with political risks. The capabilities they need to for this could be classified in the following way:

- Companies require a good understanding of political and regulatory decisions and their durability and trends to be able to robustly decide on the way ahead. Clusters can help companies gather and share **intelligence** on the political landscape and events of their key supply and export markets which would be an important capability.
- On the other hand companies will require some **business support** if they aim at reinforcing their supply chains, production methods or sales practices. Advising companies on choosing the right reinforcement actions and helping them to implement them will be another important capability of clusters.
- If companies attempt a complete reconsideration of their practices many more capabilities will be required. Companies will need **intelligence** on markets, technologies, policies and regulations) but they will also need **business support** remodelling their practices. But the most important capability will be a **networking** capability helping the companies to remodel the value chain, taking account of the new political and market conditions.

**Example 1 - SmartSports4GoodLife** is one of the 13 third generation [European Clusters Partnerships for Excellence](#), a cluster capacity-building programme funded under the COSME programme, aimed to facilitate cross-cluster networking and learning and support the specialisation of specialised and customised business support services to SMEs. The Partnership is composed of five clusters and focuses on the need to face the European sports industry challenges for the next years. The Partnership started in February 2020, one month before the COVID-19 pandemic required to close gyms and sports clubs. The Partnership adapted to this shock by focusing its activities on strategy building, upskilling and diversification taking into consideration the global changes brought by the pandemic.

Another example is mentioned below as the Saxonian Innovation cluster.

## 2. Technological shocks

Reaction to and preparation for technological shocks will very often require a reconsideration from companies as production processes, supply chains and sales strategies have to be reworked. Again, companies require a vast array of support to manage this transition. Clusters can offer much of this needed support if they maintain and build the capabilities for **intelligence** provision (on markets, technologies and regulations), for **business support** (e.g. training or supply chain build-up) and **networking** (e.g. bringing new value chains together).

**Example 2 - Innovation cluster in Saxony – HZWO:** Propulsion systems for transport need to become emission free very quickly in order to safeguard our climate. Developing integrated transport systems on the basis of a hydrogen the innovation cluster in Saxony brings together research and local companies to develop technology solutions and new business practices together. The innovation cluster is funded by the Saxonian regional government and supports the companies with networking events, with training and business support activities, and with intelligence on technologies and markets.

## 3. Natural disasters

On the other hand, the support needed to react and to prepare for natural disasters is much more limited. Companies require **intelligence** to understand the risks of their supply chains and sales paths. In some cases they also may require **business support** in diversifying the risk and mitigating the risks.

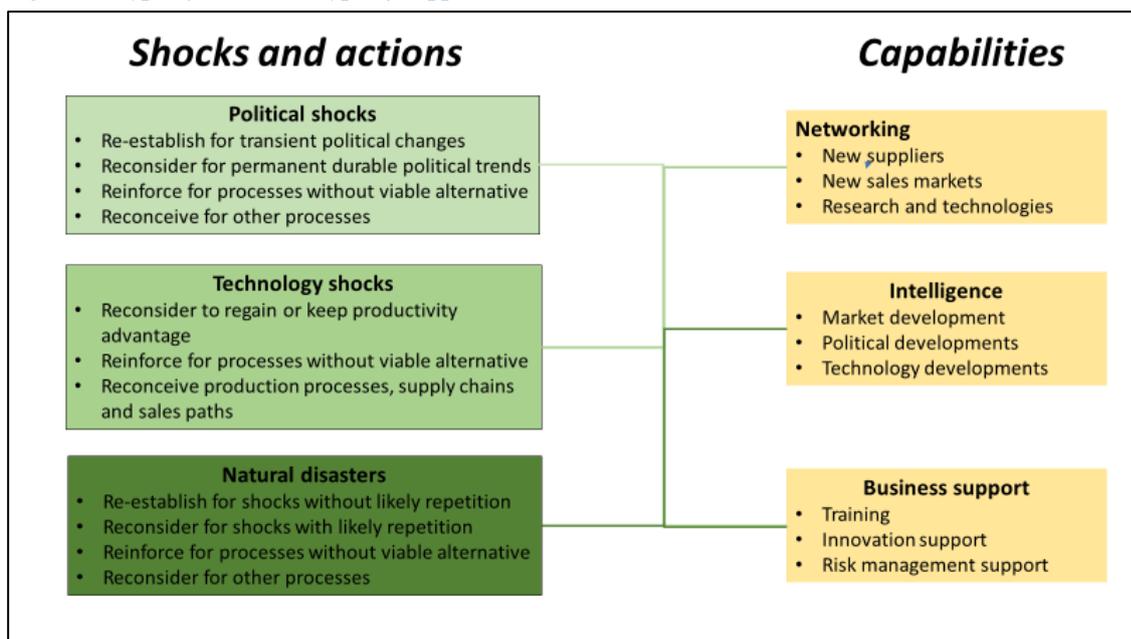


**Example 3 - Catastrophe risk assessment framework of ports and industrial clusters - A case study of the Guangdong province:** An example for a risk assessment that could be useful for clusters is a research paper<sup>15</sup> from China analysing the vulnerability of different sectors to a typhoon due to their impact on seaports. If a port is blocked due to a typhoon, many other sectors will experience delays and production stops. The paper aims to assess ports and industrial clusters catastrophe risks, by using the Guangdong province in China and the typhoon hazard as a case study. The petrochemical cluster was found to be the most vulnerable while textile and apparel textile and apparel industrial clusters were the least vulnerable. This is an important example of providing clusters with the foresight to prepare for shocks.

**Example 4 - Kobe Earthquake 1995:** The earthquake in Kobe hit very specialised manufacturing clusters. Research<sup>16</sup> conducted on the economic impacts of the Earthquake on the clusters showed that initially the clusters were hit even harder than independent plants due to their high degree of specialisation and value chain effects but the plants in stronger clusters had in the long term a higher survival probability.

The strong interdependence of shocks and support needs are summarised below:

Figure 3: Type of shock and type of support need



**Policies to enable clusters to foster those capabilities**

Seeing that most clusters are groups of businesses of a specific value chain it is logical that very often the companies and also the cluster organisation have the skills to run the business as they know it and develop it within the known parameters. This means that whenever those parameters shift permanently and the partners and their

<sup>15</sup> Xinhua Cao, Jasmine Siu Lee Lam, Catastrophe risk assessment framework of ports and industrial clusters: A case study of the Guangdong province, 2019.

<sup>16</sup> Matthew A. COLE, Robert J R ELLIOTT, OKUBO Toshihiro, Eric STROBL, Industrial Clusters and Manufacturing Plant Survival, RIETI Discussion Paper Series 15-E-008



cluster organisation need to reconceive, they are running the risk of not having all required capabilities and capacities for such a rethink.

To enable clusters to provide these crucial support elements, the ECCP and policy makers can support the build-up of those capabilities and capacities in cluster organisations.

- By helping to build **intelligence** capabilities across clusters, policy makers can foster the ability of clusters to provide the right information on markets, regulations and supply chains that companies need for a rebuild and to prepare for risks.
- Financing on the other hand or enabling important **business support** functions like training or supply chain or export organisation the clusters can be enabled to also reach companies that cannot fund those services by themselves but still would benefit from it. Lastly and most importantly policy makers and the ECCP can support clusters in their task to help affected companies in reviewing and changing their business model. The complexity of the task can easily overwhelm clusters as they need to provide to companies the new **networks** needed but also the **business support** and the **intelligence**.

Those policy options are summarised and listed in the ECCP policy toolkit paper (not published yet) and in the [policy toolkit](#) itself.



## Summary

The previous assessments show that clusters with the right capabilities and capacities can support companies preparing for shocks and reacting to them. Improving the resilience of their companies is and could be (and in many cases already is) indeed be an important part of the value proposition and with that the business model of cluster organisations<sup>17</sup>.

As the paper showed many clusters are positioned very well to fill that role but also have some challenges to overcome:

**Opportunities:** The focus of clusters is not the single company and not even the sector but the whole value chain. As described above the shocks can affect value chains in very specific ways and clusters understand these impacts and can differentiate them from challenges of single firms. They are promoters of the ecosystem and if the ecosystem is challenged by technological, political or natural disaster shocks they can organise the reaction to that not for a specific sector or a specific company but for the whole ecosystem or value chain.

- By providing the right **intelligence** on market developments, political developments and technological progress clusters can support companies in considering the right adaptation steps. The companies need to understand the potential duration and the impacts of the shock to decide on whether they should be re-establishing or reconsider
- Cluster can also help companies to reform their processes if more drastic action is required. Especially by providing the needed contacts to new suppliers, new markets, researchers, policy makers with **networking** they can support companies which need to rebuild. By adding **business support** measures, clusters can also help companies to adjust their whole organisation (training, risk management, innovation and other fields) to the shocks or prepare them for it.

**Challenges:** On the other hand the analysis above also shows important challenges for clusters to overcome.

- As they all form a specific value chain the expertise and experience of clusters and its members is very often focused on that specific value chain. Reorganising the group of companies when a shift of parameters has happened therefore requires often an additional input of expertise and experience.
- Very often those parameter changes also require a change of the group which also is hard to achieve in existing structures. Building new clusters and finding the right partners for those clusters requires an input of additional contacts and networks.

As the work of the ECCP around the policy toolkit has shown those challenges can be overcome by cluster policies that focus on providing or building those capabilities.

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<sup>17</sup> Christian Rangen, Victor Haze, *Cluster Business Models – Exploring Business Models in Global Innovation Clusters*, Strategy Tools



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