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BACK TO THE FUTURE

MANUFACTURING BEYOND COVID-19

THE FUTURE OF MANUFACTURING CLUSTERS

From preparedness to competitiveness

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INTRODUCTION

Covid-19 is a global crisis that has impacted over three-quarters of the world's manufacturing outputs. Since the beginning of the outbreak, manufacturing and global supply chains have been challenged and disrupted by factory shutdowns, boom in demand for essential goods, trade restrictions, new regulations, as well as customer behavior shifts, with severe consequences for businesses and society.

Firms and policy makers have been forced to prioritize immediate short-term needs, but they now need to rethink and plan long-term strategies if they want to recover and stay competitive in the post-Covid era.

This chapter aims at understanding how industrial clusters are reacting to the pandemic, and in particular their role in shifting competitive boundaries, offering new and critical models for collaborative innovation, and in fostering the sustainable development of regions and nations.

To fulfill the aim of the paper, we collected examples, case studies and insights from a distinguished group of 12 international academics and practitioners, world experts of cluster development and Faculty Members of the MOC Network of Prof. Michael E. Porter at Harvard Business School.

In particular, we focused our attention on three main discussion areas:

- **How manufacturing clusters are redesigning themselves in connection to services**, minimizing barriers between manufacturing and service industries and reshaping the competitive boundaries of regions.
- **How manufacturing clusters are offering and responding to new models for collaborative innovation** within the manufacturing sectors.
- **How manufacturing clusters could help foster the transition toward a sustainable world**, providing an ideal ground for the implementation of Creating Shared Value strategies.

In the following paragraphs, for each one of these topics, we first introduce challenges and problems posed by the pandemic to firms, and then, thanks to all the contri-

bution we collected, we describe how clusters can help firms and regions overcome them, turning the potentially negative impact of Covid into opportunities. Finally, in the last paragraph the main results of the paper are presented. Collecting and analyzing contributions from all over the world, allowed us to formulate a set of key learned lessons and recommendations for managers, policy makers and industrial leaders to help them take informed decision about new sustainable growth and collaboration opportunities based on the complementarities and possible interdependencies that exist or are emerging between industries and clusters.

CONTEXT

According to prof. Michael E. Porter, clusters are “geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions in a particular field that compete but also cooperate”.

They are for sure one of the key actors of industrial ecosystems, especially during crisis and transformational times as the one we are living. On one hand they can foster interactions between large companies, SMEs, universities and other research centers, facilitating the critical cooperation with policy makers. On the other, they are in a unique position to spur connections and collective strategies that are needed to rethink and reorganize manufacturing supply chains. These kind of beneficial cooperation and wider engagement of different stakeholders make clusters the ideal ground for the adoption of ‘shared value’ strategies, a business paradigm that is assuming a central stage in today’s and future competitiveness, promising to create economic and social value for firms and communities, while answering to the most urgent needs of our time.

A significant number of cases, in both academic and professional worlds, now show us the importance and key role played by clusters in different manufacturing industries and located in different parts of the world. A recent and virtuous example is provided by the Europe-



an Commission and the tremendous success of the informal call they launched at the beginning of April, with the support of the European Clusters Alliance, to all the European industrial clusters. The goal was to map available production capacity for masks, PPE and ventilators in order to quickly address shortages and meet demand in response to the pandemic. In record time the call got over 1,100 offers from companies offering options to produce these medical supplies.

So, in times like this one, a cluster-based approach has proven to be a key asset for public policy to respond to challenges in well-informed and targeted way. Clusters can help spot new and emerging society's needs, strengthen the interactions among and along supply chains, and enhance firms' competitiveness and resilience to future shocks. As efficient neutral platforms, they should be used as primary channels to mobilize funding, policies and context-specific strategies.

The focus of this paper is on the microeconomic, firm- and cluster-centric response to the pandemic, a perspective that should accompany the macroeconomic and public health dimensions very often at the heart of the debate. As we learned from the last global financial crisis, a strong debate on how to upgrade microeconomic competitiveness is at least fundamental to foster the sustainable growth of a post-Covid competitive world.

MANUFACTURING CLUSTERS AND SERVICITIZATION: THE MULTIPLIER EFFECT

To escape the “commoditization trap” and price erosion, to meet new consumption habits and take advantage of the emerging and digitized technologies, manufacturers are increasingly reinventing their business models, implementing services to increase customer value, revenue stability and profits. The pandemic has particularly accelerated this phenomenon, calling for innovative solutions to problems with the supply of healthcare material, or for the new scenario of social distancing

that is approaching. Due to the new and challenging circumstances related to the pandemic, the servitization phenomenon is finally taking off, encouraging clusters to look for synergies and new alliances to develop their service business.

A number of real cases and great examples from all over the world highlight how new collaboration and supply chain configuration emerged in the last months, and how they could be leveraged in order to enhance regional and firm's competitiveness, but also their resilience in the face of future similar shocks. In particular, under impulse of the need to adopt Industry 4.0 technologies and practices first and then to tackle the most urgent challenges related to pandemic, new collaborations are emerging with the ICT and digital services industries.

In India, the Department of Science and Technology (DST) has worked on collaboration between the IT industry along with different sectors in manufacturing. For instance, with the increase of the number of e-transactions, banking and financial services industry will require ramping up the cyber security; healthcare sector would benefit with the development of e-medical records IoT enabled healthcare equipment. In Ecuador, the Financial Services Cluster pushed for the fast adoption of digital payment solutions by more than 1,000 small shops and proximity services; the initiative further expanded as the cluster started a conversation with also the National Association of Food & Drinks Manufacturers to extent the benefits of digital payments to boost sales and secure health.

Furthermore, in many different parts of the world – e.g. Colombia (Medellin), Spain (Valencia and Catalonia), France, Italy, Georgia, India – several great examples of how textile and fashion clusters are reacting to the pandemic emerged, showing how they have been able to quickly reconvert their production to face Covid-19 with specialized sanitary garments and accessories. Firms have not just been able to re-open with favorable economic and labor effects, and on-time market response with technical products, but also to include new offer in their catalogues. To this regard, the new and bilateral collaborations with research-educational institutions, design and testing laboratories, tech-providers, quality certifiers, B2B and B2C platforms, led



by cluster organizations and economic development organizations, have been fundamental. In Catalonia, for example, the coordination among manufacturers from the Lighting Cluster and technology and service providers (i.e. design, prototyping, testing services ...) from the Advanced Materials Cluster allowed the production of respirators and the application of photonics to fast virus diagnosis.

Furthermore, manufacturing firms are finally showing a growing conscience that visibility and a clear path for potential buyers to their product/service portfolio is increasingly important in the fluid, disorganized world that is emerging around us. This is the main reason why an increasing number of collaborations are emerging between manufacturing clusters and creative industries.

Cases and best practices show how a new paradigm of co-evolution where manufacturing, research, design and development are closely knitted into innovative clusters and networks that understand local needs and are mindful of ecosystem boundaries. They are still globally connected but at the same time they are strengthening interlinkages with local and regional clusters of production and consumption, igniting each other with a multiplier effect.

VIRTUAL MANUFACTURING CLUSTERS: NEW MODELS FOR COLLABORATIVE INNOVATION

The opportunities of the new economic landscape, mainly related to the increase in digitalization and decrease in the costs of communication, have led to the exponential growth of new forms of virtual collaborative platforms. In times of deep uncertainty and concerns related to trade restrictions in international markets, clusters are playing a key role in creating and offering new forms of collaborations fostering effective relationships, mainly just but also between related clusters. Matchmaking, data-sharing, collaboration and co-crea-

tion platforms are used by clusters to help companies react to the pandemic and foster innovation. To this regard, TCI is playing a pivotal role in facilitating the global matchmaking of clusters and firms by organizing large events, such as “The Global Cluster Matchmaking 2020”. They aim at helping firms build or re-connect with global network of likeminded organizations, get inspired by global experts, matchmake and scout for new collaboration partners all over the world.

Regional clusters and cluster organizations are in particular helping manufacturing firms with new virtual tools aimed at carrying on competitive intelligence activities, investigating new business opportunities on foreign places and thus finding new strategies for market expansion. In Canada, the Bluewater Wood Alliance created an online communication hub to timely help members and start reflecting beyond the crisis (by using a decision-tree) to look ahead on how to repair value chains, develop new skills and secure finances. The interest in the cluster activities grew exponentially with regular participation of main industry players and local administration officials. In Switzerland, the Watchmaking Cluster is evolving in order to boost business model innovation among its members, offer new ways of presenting manufactures’ products, such as smaller and more exclusive events.

Clusters are also speeding up the process of insights and innovative ideas sharing and promotion, creating new platforms for the launch of training and R&D projects. In Denmark, the 40 clusters are offering various collaboration activities, including innovation projects to develop new products, processes, business processes or other business development. They have started a range of new R&D projects in response to the identified needs, applied for more short-term funding for these projects and facilitated more interaction within the cluster to uncover new solutions. For igniting new growth, they also changed their matchmaking methods to be more online which has led to more participants in the activities, with better outcome due to the online efficiency. For example, the cluster Medtech Innovation Consortium (MTIC) is in the process of developing research and innovation projects to help mitigate the corona virus damages with various foundations.



Based on the insights we collected from many different countries and contexts, a new form of ‘virtual’ and, sometimes, ‘temporary’ clusters are emerging, which enable any firms with Internet connection to engage with other individuals, private actors and/or public organizations, without geographic restrictions. We have witnessed the rise of these new collaborative forms mainly aimed at supporting essential public services, facilitate the supply of necessary equipment to face medical and essential goods shortages, and facilitating much-needed interactions between producers, suppliers and delivery companies. In Georgia, government institutions acted as the main Institution for Collaboration (IFC) as they extremely supported local apparel producers to import special equipment for producing masks and protective medical equipment. If before there was no company that produced masks in Georgia and all was imported, already in April there were couple of companies that were ready to produce more than 200,000 masks per day. Likewise, the Biosaxony Cluster in Germany is currently setting up a nationwide network of 3D printing experts - together with the numerous research institutions of the DRESDEN-concept research alliance and the University of Leipzig - to supply clinics and other healthcare providers with materials currently lacking. In Poland, a member of the Silesian Aviation Cluster, has created and shared a report in which it describes the use of 3D printing in the fight against the Covid-19 coronavirus epidemic. The report describes how to change the supply chain using 3D printing, what materials can be used to manufacture device components, personal protective equipment etc.

MANUFACTURING CLUSTERS AND SHARED VALUE STRATEGIES: THE PATH TOWARD A SUSTAINABLE WORLD

Post-COVID-19 economies have an opportunity to rethink manufacturing and contribute towards build-

ing a more resilient, equal and sustainable society. The current global manufacturing model tends to still rely on linear production systems, which are highly wasteful, ineffective and polluting, but Covid-19 gives us the chance to rethink supply chains. In particular, closer linkages between production and consumption cycles and their connection with demand-led innovation, driven by locally relevant problems and solutions, will set the foundation for a more sustainable world.

To this regard, clusters could provide an ideal ground for the implementation of new business models and sustainability strategies, and to rethink capitalism according to the new paradigm of “Creating Shared Value” (CSV). CSV has been introduced by Michael E. Porter and Mark Kramer in 2011 and defined as “policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates”.

When it comes to social innovations and CSV strategies, an alignment on the same long-term strategic vision among the different stakeholders involved is absolutely necessary to bring about large-scale impact. To this regard, clusters could play a fundamental role in creating trust, a sense of network membership and in spreading knowledge.

Clusters could be used as fundamental organizing framework to understand regional economies and develop sustainable development strategies pursuing environmental and social issues.

In Minnesota (U.S.), the Goodhue County Collaborative in Youth Skills Training (GCC-YST) has been formed to successfully tackle the growing shortage of workers and the disproportionately low number of young people entering the field of Advanced Manufacturing, which are challenging the competitiveness of small, medium and large companies in the region. The GCC-YST is taking a county wide approach – in collaboration with School Districts and Employers - to aligning systems and resources, with the final goal of building a mutually beneficial collaborative partnership in support of work site learning experiences. The plan is to provide new platforms for success with learning opportunities and career exploration that allow students to further



develop their career interests, work-place skills, and understanding of opportunities in the area of Advanced Manufacturing.

In India, a project called “Scaling up Sustainable Development of MSME Clusters in India” was set, to enable the adoption of sustainable environment and social business practices across selected foundry MSME clusters. The specific goal of the project, considering the current scenario of energy constraints in India, was to design, develop and link financial instruments in order to improve MSME’s access to environment friendly technologies, and to strengthen policy dialogue and dissemination for promoting energy efficiency and reduction in greenhouse gas emissions. Likewise, The Micro and Small Enterprises Cluster Development Programme (MSE-CDP) provides funding for the creation of Common Facility Centers like common processing, design, testing, training, R&D, effluent treatment centers etc. which is in line with eco-industrial guidelines. This would allow “the geographic concentration of interconnected companies to cooperate with each other and efficiently share resources leading to improved environment quality and economic gains”. A number of best practices have been carried out by industries across sectors, tackling environmental issues mainly related to water and air pollution, such as the Leather Tanning Clusters and the Textile clusters.

More focused on the well-being of citizens, in Italy there is the Wellness Valley cluster, an international living best practice of an ‘ecosystem of health’. The cluster initiative has identified and pursued shared value opportunities by enabling the multi-stakeholder local ecosystem with a double perspective: inwards, to improve quality of life of regional citizens by promoting a healthy and active life style, and outwards, to increase the attractiveness of the territory for national and international tourists, and for highly-qualified and skilled workforce mainly in the fitness equipment manufacturing industry.

The AKTI Green Cluster of Cyprus has recently realized that a key pillar for improving the future resilience of its companies relies in the empowerment of women entrepreneurship. Rural women entrepreneurs make up the 60% of Green Cluster members and many of them face

barriers that limit their ability to be independent and strong. Thus, the cluster is working on many different initiatives to sustain women’s small businesses as a crucial step for achieving a more equitable and sustainable world. Moreover, during the initial wave of the Covid-19 pandemic, the Green Cluster took quick actions to protect and support small farm owners by collecting testimonials from members and capitalizing on the cluster infrastructure.

Cases and examples show that clusters can support shared value creation, helping companies to build new products and services which are better aligned with societal needs, redefining productivity in the value chain with a more efficient use of natural resources and developing skills of local suppliers.

OPPORTUNITIES AND RECOMMENDATIONS

To fulfill the aim of this paper, i.e. to understand how manufacturing clusters are helping firms address and react to the challenges posed by pandemic and their role in regional and local competitiveness, we have collected and analyzed the above reported cases and examples, from regions and industries spread all over the world, and valuable insights from the Manufacturing clusters group’s members. Thanks to this analysis, we have learned some key lessons on how to turn the potentially negative impact of Covid into opportunities for manufacturing clusters, coming up with a set of key recommendations for industrial leaders and policy makers. First, economic development organizations and cluster organizations will be a critical pillar of the post-Covid recovery. According to our findings, clusters are the ideal context to channel spending into investments that can be the foundation of prosperous and sustainable economies, not a “short-lived bonfire of consumption”. Clusters accelerate the maturation of collaborative environments between the different actors within regions, preparing the ground for times of crisis and new challenges. Thus, policy makers should use clusters to



design joint cluster initiatives relying on the key role of IFCs.

Second, regions and countries that most successfully managed to get through the pandemic crisis, are the ones with a high diversity of manufacturing industries. However, although diversified, manufacturing industries should also share strong similarities in terms of technology, specialized labor or infrastructure. In this context, companies face wide market outlets (which reduces the risk for the country/region) but share similar needs (which reduces the risk of investing for cluster participants). Therefore, clusters and cluster organizations should understand how 'transferable skills' could be shared and transferred horizontally among firms and networks; firms should design internal policies and human resources training activities along these trajectories to boost and build transferable skills, with the aim of adding value to both their company and other related industries, developing new products/services or new businesses; policy makers should foster cooperation and collaborations among different actors of the value chains, with a horizontal scope.

Third, findings suggest us that necessity has generated a virtuous convergence of interests among actors and firms, and that clusters have found in Covid-19 the right momentum to become the ideal platforms to deal with the shock and quickly prepare members for the new opportunities that are emerging from it. In times of deep uncertainty and concerns related to trade and travel restrictions in international markets, Covid-19 has generated and accelerated the 'globalization of ideas', making everyone aligned on the same page, and toward the same future agenda.

Fourth, findings highlighted how territorial competitiveness implies looking beyond simple economic productivity. In this context, clusters have a strong social value and might work on projects with a 'shared value' perspective. Horizontal cooperation and systemic actions among all the actors along the value chains promoting inclusive and sustainable innovation should be incentivized considering that circular economy models and sustainable strategies are no more ancillary, but intrinsic to the concept of competitiveness in manufacturing clusters. Companies can leverage on cluster

participation for supporting their long-term growth through the development of their suppliers and other stakeholders being impacted by their business operations. To promote better shared value practices, greater awareness of business and human rights should be created, working closely with NGOs and providing targeted training to stakeholders. Moreover, firms should engage in multi-stakeholder conversations, so as to develop guidelines which would promote long-term shared value creation.

Furthermore, manufacturing clusters that tackled the pandemic crisis more successfully are whose ones populated by firms that innovate by pushing out the boundaries of their core business into adjacent spaces, identifying potential areas for growth. In these cases, innovation is particularly defined as 'trend-driven' and 'collaborative'. Manufacturing clusters should, indeed, act as trend-driven organizations, constantly monitoring the external ecosystem to understand which trends will drive innovation in the future, with a horizontal perspective, while differentiating from competitors. At the same time, cluster organizations and IFCs should facilitate and promote tangible and collaborative innovation responses of cluster initiatives, fostering joint activities and projects at a local but also global level, as it is doing TCI Network. The resilience and the future performance of the manufacturing sector will depend a lot on industrial commons such as shared knowledge and investment in shared technologies.

Finally, it seems that we should rethink the traditional distinction between B2C and B2B, and we should start thinking about B2I – Business to Individuals. Companies succeed or fail today based on their ability to build and maintain lasting relationships with individuals. Clusters and cluster organizations should promote the implementation of new operational models in the value chain so as to facilitate the direct interaction with customers. This represents a kind of reversion to the pre-industrial world, when most purchases were personal, until the advent of mass production and standardization. Today, we are witnessing a return to the personalization of the offer, sewn around the individual needs of each customer, regardless of the context in which they are operating (B2B or B2C).



CONCLUSION

The paper provides an overview of the main competitiveness challenges that firms are facing and how manufacturing clusters are navigating the consequences of Covid-19, helping them to transform to the new reality. In particular, clusters are supporting firms in addressing three main challenges that, according to the evidences collected, span across countries, regions and industries:

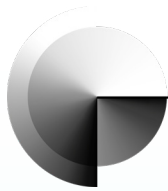
- **Accelerating servitization processes** to foster the transition toward digitalization of value chains and Industry 4.0 practices, and making industrial firms more 'omni-channel minded'.
- **Enhancing agility and collaboration** to react fast, adopting flexible and adaptive business models built on the key concept of 'co-create and learn'.
- **Re-focusing strategies toward social and environmental goals** to better address the emerging needs of people and planet with 'creating shared value' practices.

Shifting these transitions into concrete actions - trying to recap and summarize the recommendations more detailed described in the previous paragraph - the Manufacturing group has highlighted the main guidelines that industrial leaders and policy makers should follow in the design and adoption of recovery plans, to boost growth and competitiveness in post-pandemic era:

- **Invest in human capital development and rethink 'globalization of education'** by developing new field of studies to prepare workforce in the areas of new technologies (e.g. data analytics, programming for AI and related skills); and by creating new networks of universities across countries to have virtual mobility and intercultural competences.
- **Introduce new measures in innovation policies** at different levels: an activity level (e.g. support to R&D and implementation of new, collaborative business models); a company level (e.g. support to start-ups and scaling up); a sectoral level (e.g. improvements in overall business environment, promoting collaboration in clusters and networks); a market level (e.g. deregulation of markets).

- **Raise awareness of the great benefits of multi-stakeholder collaboration within and among clusters:** "collaboration as a competitive advantage" is the key message to be more resilient, as well as a more balanced mix between local and global supply chains and networks.





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