

SUPERCLUSTERS! LESSONS + OPPORTUNITIES FOR CANADA

APRIL 2017

A DISCUSSION PAPER



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INTRODUCTION

As announced in Budget 2016 and reaffirmed in Budget 2017, the federal government has made a five-year, \$950-million commitment to support “superclusters”. This is a key component of the government’s Innovation and Skills Plan.¹ To advance this commitment, the government will make a small number of large investments to promote collaboration between private companies, universities, and governments through a competitive process that will launch later this year. The goal of these collaborations is to help more innovations move along the continuum from research to commercialization to scale. Applications could come from sectors such as advanced manufacturing, agri-food, clean technology, digital technology, health/bio-sciences and clean resources, as well as infrastructure and transportation.²

Innovative, globally competitive companies are essential to driving Canada’s economic growth. However, for these companies to win globally, Canada will need to implement this cluster strategy effectively. This strategy should build on areas of existing and potential strength. This policy brief explains the role of government in supporting cluster growth. It outlines the challenges and opportunities in implementing this strategy, and suggests approaches to maximize its long-term success.

WHAT ARE CLUSTERS?

Clusters are geographic concentrations of firms, non-profits, academic institutions, and other organizations within a common field that share knowledge, data, and resources.³

Summary of recommendations:

- Develop a clear, long-term cluster strategy based on the existing strengths of the regions in Canada;
- Encourage the creation of cluster organizations through public-private investments to increase connectivity between cluster actors;
- Evaluate the success of cluster policy goals;
- Establish an independent, expert body to track cluster health and advise on program administration; and
- Coordinate with relevant federal policies and with provincial and municipal governments, with a focus on streamlining access to government services and on collecting and sharing data.

A number of terms are often used to describe clusters, but for simplicity these concepts are captured under the term “clusters” in this policy brief:

- **Innovation networks** are used to describe “cluster-type” relationships that are not bound by physical geography.⁴
- **Superclusters** refer to clusters that are globally competitive, producing a large number of high-growth companies and successful exits, with deep capital and talent pools.

Cluster Theory

Cluster theory was formally developed by Professor Michael E. Porter at the Harvard Business School. According to Porter, clusters can be classified as “traded” (clusters that produce and then export goods and services, found only in certain regions) and “local” (clusters that produce goods and services for the local population, found anywhere) in Canada.⁵

Clusters have the following characteristics:

Location: The agglomeration of cluster actors (i.e., government, academic/research organizations, firms, and venture capitalists) increases interactions, which foster knowledge spillovers at a lower transaction cost. The co-location of firms also attracts specialized labour.

Critical mass: The co-location of workers, suppliers, and customers produces economies of scale usually reserved for large firms. In addition, suppliers and firms are more likely to develop specializations to differentiate themselves. This raises the overall quality of output and increases productivity and competitiveness.

Linkages: “Coopetition” is at the core of cluster interactions, driving innovation through information exchange and competitive pressures. Through active collaboration (i.e., supply chain linkages, joint projects), firms recognize mutual benefits and develop trust.⁶ Cluster participants tend to be more innovative than their peers not located in clusters.⁷

Clusters produce economic benefits including higher wages and increases in business formation, startup employment, and patents.⁸ As clusters grow, they attract talent and create an environment for entrepreneurs to start and grow businesses by facilitating access to goods, services, labour, and markets.

THE ROLE OF GOVERNMENT IN SUPPORTING CLUSTERS

Government plays a critical role in driving innovation. It shapes the policy frameworks within which companies operate, including by setting rules regarding consumer protection, competition, trade, and foreign investment. Most importantly, government helps overcome market failures that would otherwise inhibit the development of strong clusters.

Government can provide targeted supports to fill the gaps left by the private sector in early-stage research, commercialization, and access to talent. This is especially prevalent for platform technologies, which are a focus of the federal cluster strategy.⁹ Platform technologies (such as the Internet) are used by many sectors, tend to provide increasing value for money over time, and make it easier to invent and produce new products or processes.¹⁰ Since governments are interested in net economic gain over the long-term, they are more willing to invest in the development and commercialization of platform technologies, which can attract private sector collaboration and involvement.¹¹

Government can also intervene to correct the issue of coordination among firms.¹² First, government can use its funding and convening power to incentivize the creation of cluster organizations, the main vehicle for improving cooperation. These can be independent teams or participant-led steering committees that act as program delivery platforms and fora for information and resource sharing between cluster participants.¹³ Cluster organizations are also a key source of intelligence for governments on the barriers to innovation and economic growth, and on opportunities to foster innovation through changes to existing policies, services and regulations.¹⁴ (See the Cluster Governance section below for more on cluster organizations.)

Second, developing and executing a clear cluster strategy can spur cooperation between firms to make them collectively better off.¹⁵ These activities include recruiting and training specialized labour, developing common infrastructure, and research and development (R&D).¹⁶ Most notably, collaboration distributes the high costs and risks of engaging in R&D, allowing firms to invest more in R&D than they otherwise would.

Finally, governments can support coordination within clusters by sharing local economic data and collecting robust data from participants. This information can help clusters organize and collaborate by identifying participants, tracking performance, and revealing strengths and weaknesses.¹⁷ The federal government's cluster mapping project is a good starting point.

There are limitations on a government's ability to promote innovation and economic growth through cluster initiatives. Clusters cannot be built from scratch. They must emerge at least partially from the bottom up, with private sector actors identifying promising

technologies and industries.¹⁸ Most importantly, an effective cluster strategy must build on the existing strengths of the region and lay out targeted initiatives and investments that will be delivered in a coordinated manner over a long time horizon to help overcome market failures. Cluster strategies have previously been difficult to implement, monitor and adjust. This is partially due to the rapid pace of technological disruption. It will be important for the federal government to ensure the close monitoring of cluster performance, track the emergence of new clusters, and apply a long-term planning lens that extends beyond this government's current mandate.

CHALLENGES + OPPORTUNITIES FOR CANADA

There are challenges and opportunities involved in implementing the federal cluster strategy. A few key considerations are outlined below.

Cluster Governance

The governance of clusters is critical to their success. In Europe, initiatives to grow and strengthen clusters are mostly led by cluster organizations.¹⁹ These organizations act as the intermediaries for cooperation between cluster actors and formulate a strategic direction for their respective cluster. The European Cluster Observatory lists 1,400 cluster organizations that are focused on building the cluster identity, cluster strategy and branding, and promoting innovation through joint R&D projects.²⁰

In Europe, 41 percent of cluster initiatives resulted because of a public call or cluster program.³¹ These initiatives are primarily public-private partnerships and are financed, on average, by 60 percent public and 40 percent private contributions.³² Incentivizing the creation of cluster organizations that are

private-sector led and able to effectively foster collaboration will be critical to Canada's cluster strategy. In the United States (US), Manufacturing USA is a notable example of a cluster organization, modelled after Germany's Fraunhofer Society.

Manufacturing USA

Manufacturing USA (previously known as the National Network for Manufacturing Innovation) involves a partnership between the US government and multi-sector organizations to establish and fund clusters.²¹

Manufacturing USA has four major goals. It aims to:

- Increase the competitiveness of US manufacturing;
- Facilitate the transition of innovative technologies into scalable, cost-effective, and high-performing domestic manufacturing capabilities;
- Accelerate the development of an advanced manufacturing workforce; and
- Support business models that help institutes to become stable and sustainable.²²

Manufacturing USA consists of a network of institutes that aim to address pre-competitive technical and workforce challenges. These institutes focus on areas that the federal government considers important for economic competitiveness or national security and are expected to increase manufacturing output.²³ Each of the institutes works to integrate new manufacturing capabilities and technologies into supply chains through collaborative R&D.²⁴ Institutes also support education, training, and workforce development programs and support technology transfer to meet industry's needs.²⁵

These institutes are public-private partnerships of companies, academia, state and local governments, and federal agencies that co-invest in the institutes' activities.²⁶ Each institute provides state-of-the-art facilities that allow collaborative, mostly pre-competitive, development of emerging technologies.²⁷ Institutes conduct product calls to solicit proposals from members who self-organize into integrated project teams.²⁸ This project-funding model enhances the manufacturing innovation ecosystem by lowering barriers to entry, coordinating investments, and reducing waste.

The federal funding level is up to \$70 million matched or exceeded by funding from private industry and other non-federal sources, with a minimum 1:1 cost share.²⁹ Funding is for five to seven years.

Manufacturing USA institutes are responsible for:

- Recruiting members;
- Deciding how to share intellectual property;
- Developing technology roadmaps;
- Conducting advanced manufacturing R&D;
- Creating and demonstrating advanced manufacturing tools;
- Sharing pre-competitive knowledge among members; and
- Developing curriculum and training programs for the workforce.³⁰

Identifying Clusters

No two clusters are the same. The actors, elements, and stage of growth of a cluster in one region may be different than a cluster focused on the same field but operating in another region.³³ The onus is on the proponents of the cluster to justify the real or potential strength of their network. Mature clusters transitioning from national champions to world-class are distinct from those in development with emerging industries. Clusters at various developmental stages should be selected, supported, monitored, and assessed in markedly different ways.³⁴ In some cases, governments may choose to invest in a portfolio of clusters that span the cluster lifecycle.

Goal Setting, Monitoring and Evaluation

Clusters grow and change over time. Rapid technological change and market forces constantly alter the boundaries and sometimes threaten the existence of clusters. Monitoring the health of clusters over time, and emergence of new areas of strength, is critical.

However, monitoring clusters is a daunting task. Defining success is challenging because of the multitude of actors and intervening variables involved, the lack of clarity on a cluster's boundaries, and a long-time horizon for evaluation. Also, determining the threshold for a decent or high level of interconnectedness – an important measure of success – among cluster participants is subjective.³⁵

Appropriate metrics for tracking cluster health will vary for different clusters, depending on their stage of growth and existing assets.

Metrics could include an uptick in the commercialization of research, number of ventures formed, amount of capital attracted, sales in global markets, number of venture exits, and GDP output. Many of these metrics – particularly the latter – would be challenging to quantify. However, even estimates could shed light on directional changes over time.

Long-Term Planning and Risk Taking

Implementing a cluster initiative requires the federal government to exercise patience and courage. Planning for implementation and performance monitoring over a long time horizon, taking political risk, and learning from failure are not traditionally the strengths of government. However, determining a cluster's success will require more than one mandate, particularly where success hinges on advancing and commercializing basic research.

Moreover, investments come with a certain level of risk as it is impossible to predict the success of a cluster based on the current market. This uncertainty means significant political risk. It may require the government, at some stage, to declare a cluster initiative a failure. While the government's decision to focus on a few areas of strength will make any failures more evident, it is a step in the right direction to ensure that public dollars are invested in clusters that have the greatest chance to grow.

Intergovernmental Coordination

The federal, provincial and municipal governments will need to cooperate to effectively implement the Innovation and Skills Plan. Clusters benefit from coordinated

research and business support services, which will be challenging to cultivate in Canada's federal system. In addition, data sharing between levels of government can help the federal government to understand an ecosystem and effectively evaluate the merit of a cluster. Ideally, the federal government's cluster mapping project will draw on data from all governments to better identify potential clusters and track changes over time.

Virtual Networks

Where strength in a particular field is spread across more than one location, it will be important for cluster organizations in Canada to invest in virtual networks, given the country's size. The success of one geographically concentrated cluster can be augmented through networks with other strong clusters operating in the same field. To encourage this, government funding could be made contingent on data sharing and other requirements that help sustain network connections. It should be noted that certain benefits are uniquely attached to the concentration of cluster actors within one geographic region.

Managing Expectations

Economic development programs typically involve spreading benefits widely rather than investing deeply. The federal government will need to manage the expectations of Canadians, industry actors, and other governments by maintaining clarity of purpose. The cluster strategy should be understood as a portion of the federal government's economic development activities, focused on growing a small number of globally competitive clusters. It will not support all of the industries that are important to Canada's economy, or align with

all cluster-based priorities of the provinces and municipalities.

While public funds will ultimately be directed to the most promising initiatives, the competitive selection process could mobilize a broader suite of cluster initiatives. Collaborative projects have sometimes been initiated despite losing out in the competition process.³⁶

Multi-Sector Collaboration

With increased public-private-academic collaboration, there is a substantial opportunity for an improvement in Canada's poor record of commercializing science.³⁷ Cluster organizations can act as hubs for all the actors in the commercialization process, such as universities, research institutes, government funding programs, incubators, accelerators, and private firms, to form connections between their activities and to identify opportunities more efficiently.³⁸

Competition vs. Collaboration among Businesses

Cluster participants must balance competition with cooperation in order to receive the full benefit of the strategy. Global competition spurs the need for collaboration within a cluster to create more innovative products and services. Over time, trust can be built between a cluster's participants through interdependence amongst local firms, repeated interaction, and familiarity, which allows firms to become confident that other participants will not act opportunistically.³⁹ Through trust, firms can begin to actively seek areas of mutual benefit that will improve their global market share. A more collaborative cluster will help its members become more competitive globally, and the success of one will benefit all.

RECOMMENDATIONS

The federal government's decision to invest \$950 million in a small number of strategic clusters and networks is a commitment to making tough choices and taking risks. The biggest challenges lie ahead as the government begins to implement, monitor, evaluate, and adjust this strategy. A number of approaches should be considered to give this strategy the best chance of success.

1. Co-Investment

The government's call for innovation network and cluster proposals should be designed to encourage the creation of organizations that increase connectivity between cluster actors.

Cluster organizations should be funded through a mix of private and public contributions. The Advisory Council on Economic Growth has recommended that contributions by the private sector make up at least 50 percent of the total funding for a cluster initiative.⁴⁰ Initiatives are more likely to succeed when firms themselves are willing to invest. This is an important indicator of cluster potential. The sustainability of these initiatives is also improved if they are not disproportionately reliant on public funding.

2. Evaluation of Cluster Policy Goals

To ensure that federal funds are being distributed efficiently, the federal government should establish performance indicators for tracking cluster policy success. (See Cluster Evaluation in Denmark for an example.) It will be important to set clear policy goals that will determine what performance indicators are used. The government has taken a step in this direction by articulating a few overarching

goals in its recent budget, indicating, for example, that superclusters "will make it easier for innovators and potential customers to work closely together on research, development, and demonstration activities that pursue major commercial opportunities, to boost productivity, create jobs and drive economic growth."⁴¹

However, more detailed goals and associated metrics will need to be defined. In doing so, the government should identify each cluster's stage of growth, benchmark clusters against global peers, and monitor their growth trajectory. Developing goals should be done in close collaboration with the cluster organization and with a focus on priority outcomes.⁴² While a cluster can have multiple economic benefits, if the priority is to see a Canadian industry ranked among the top few globally, then cluster policies should be oriented around this goal first and foremost. Job creation metrics, for example, while critical, may not be the best indicators of a cluster's success in all cases.

Cluster evaluation should include the following elements:

- Using input and output indicators to assess the range of services cluster organizations provide and the direct adoption of these services by cluster actors;
- Clear articulation of medium and long-term outcome targets that are most relevant to cluster actors (i.e., new collaborations, R&D initiatives, commercialization projects) and consistent monitoring to evaluate cluster health over time;
- Evaluating long-term impacts; and
- Benchmarking performance metrics to international standards in order to

assess potential and encourage learning from peers.⁴³

For effective evaluation, data sharing requirements should be established at the time of funding. Continued funding should be contingent on whether or not all required data is submitted to the federal government and other monitoring bodies.

3. Monitoring

In order to ensure that clusters and cluster organizations are evaluated transparently, the federal government should establish an independent, expert body to continually track cluster health and advise on program administration. This body would be responsible for supporting the government in the following:

- Developing and implementing cluster evaluation plans;
- Monitoring and evaluating funding recipients to ensure policy objectives are met;
- Tracking emerging clusters; and
- Making recommendations on support for new clusters and on adaptation or wind-down of support for exiting clusters.

4. Rationalizing Cluster Supports

A cluster strategy should be linked with the rest of the Innovation and Skills Plan. Cluster organizations can be powerful platforms for developing talent, delivering programs to frontier firms, and better coordinating government support. Constituents of winning superclusters could be given expedited, single-window access to relevant government programs, for example, related to talent

attraction, training, and R&D funding. A cluster strategy could also require policy changes in related areas, such as foreign investment and trade. Understanding where these changes are needed requires active dialogue, as well as data sharing, between the federal government and cluster organizations.

The cluster strategy also functions as a key conduit for intelligence gathering and implementation of other elements of the government's Innovation and Skills Plan.

Moreover, it requires all levels of government to collaborate on removing barriers to a cluster's growth, streamlining access to federal, provincial and municipal supports, and advancing policy and service changes to ensure that clusters have the greatest chance at success.

CONCLUSION

Cluster strategies are challenging to implement. The federal government should be commended for taking a bold risk to accelerate innovation in Canada's economy. The real challenges, however, will be faced in the coming years. Close and continued attention will be required on the part of the federal government, as well as cluster actors, to evaluate and fine-tune the strategy, and to ensure it aligns with other areas of policy.

CASE STUDY: Cluster Evaluation in Denmark

Researchers and policy makers agree that sound evaluation of cluster policy is critical to provide legitimacy and the ability to learn and adapt. Denmark's monitoring and evaluation of the economic outcomes of its cluster policy have been highlighted as a model that embodies the essence of what is required in cluster evaluation.⁴⁴

The national clusters supported through the Innovation Network Denmark program are subject to annual performance reviews. These "Performance Accounts" measure the direct effects of public and private funds on collaboration and innovation outcomes.⁴⁵

The Danish Agency for Science, Technology, and Innovation contracted DAMVAD Analytics to conduct an economic impact analysis of the innovation networks. The assessment used eight years of longitudinal data from a treated sample of 1,225 companies that benefited from the program. To quantify the impact of the program, control groups consisting of companies with similar characteristics to the beneficiaries were used as the counterfactual case.

Some of the results include:

- The econometric analysis found that participation in the program increased the probability of being innovative (including product and process innovation) by more than 4.5 times in the year after participation.
- Participation also increased the likelihood of R&D collaboration by 4 times relative to non-participating firms.⁴⁶

By developing these Performance Accounts, and measuring and then evaluating them through a third party, successful results can be quantified and best practices developed, while unsuccessful results can provide lessons and facilitate improvements.

ENDNOTES

- ¹ Minister of Finance, 2016, p. 120.
- ² Minister of Finance, 2017, pp. 79-80.
- ³ Porter, 1998.
- ⁴ Innovation Policy Platform, 2013a.
- ⁵ Institute for Competitiveness & Prosperity, n.d.
- ⁶ Preissl, 2003, pp. 7-11.
- ⁷ Breschi, 2008, pp. 167-168.
- ⁸ Muro & Katz, 2010, p. 11, 25-26.
- ⁹ Innovation, Science, and Economic Development Canada, 2016, pp. 11-12.
- ¹⁰ Mazzucato, 2011, p. 54.
- ¹¹ Mazzucato, 2014.
- ¹² GLA Economics, 2006, p. 20.
- ¹³ INNO Germany AG, 2010, p. 106.
- ¹⁴ Advisory Council on Economic Growth, 2017, p. 13.
- ¹⁵ Walley, 2007, p. 18.
- ¹⁶ Porter, 2009, p. 2.
- ¹⁷ The World Bank, 2009, p. 15.
- ¹⁸ Organisation For Economic Co-operation and Development, 2007, p. 13.
- ¹⁹ European Commission, Joint Research Centre: Institute for Prospective Technological Studies, 2016.
- ²⁰ European Cluster Observatory, n.d.
- ²¹ Sargent, 2014, pp. 4, 6.
- ²² Advanced Manufacturing National Program Office, 2016, p. viii.
- ²³ Advanced Manufacturing National Program Office, 2016, p. 4.
- ²⁴ National Economic Council, 2016, p. 17.
- ²⁵ National Economic Council, 2016, p. 18.
- ²⁶ Manufacturing USA, n.d.
- ²⁷ Advanced Manufacturing National Program Office, 2016, p. 4.
- ²⁸ Advanced Manufacturing National Program Office, 2016, p. 5.
- ²⁹ Advanced Manufacturing National Program Office, n.d.
- ³⁰ Advanced Manufacturing National Program Office, 2016, p. 20.
- ³¹ Ketels, Lindqvist, & Sölvell, 2013, p. 19.
- ³² Ketels, Lindqvist, & Sölvell, 2013, p. 3.
- ³³ Bagwell, 2008, p. 33.
- ³⁴ Christensen, Lämmer-Gamp, & zu Köcker, 2012, p. 10.
- ³⁵ Motoyama, 2008, p. 358.
- ³⁶ European Commission, Joint Research Centre: Institute for Prospective Technological Studies, 2016.
- ³⁷ Expert Review Panel on Research and Development, 2011, p. 7-1.
- ³⁸ Innovation Policy Platform, 2013b.
- ³⁹ Enright & Ffowcs-Williams, 2000, p. 9.
- ⁴⁰ Advisory Council on Economic Growth, 2017, p. 10.
- ⁴¹ Advisory Council on Economic Growth, 2017, p. 18.
- ⁴² Advisory Council on Economic Growth, 2017, p. 18.
- ⁴³ Christensen, Lämmer-Gamp, & zu Köcker, 2012, p. 40.
- ⁴⁴ Izsak, Ketels, zu Köcker, & Lämmer-Gamp, 2016, p. 45.
- ⁴⁵ Iris Group, 2011.
- ⁴⁶ Innovation Network Denmark, 2011, pp. 4-5.

WORKS CITED

- Advanced Manufacturing National Program Office. (2016). *National Network for Manufacturing Innovation Program Strategic Plan*. National Science and Technology Council, Executive Office of the President. Washington D.C.: Advanced Manufacturing National Program Office. Retrieved from <https://www.manufacturingusa.com/sites/all/assets/content/2015-NNMI-Strategic-Plan.pdf>
- Advanced Manufacturing National Program Office. (n.d.). *Funding*. Retrieved from Manufacturing.gov: <https://www.manufacturing.gov/funding/>
- Advisory Council on Economic Growth. (2017). *Unleashing the Growth Potential of Key Sectors*. Ottawa: Government of Canada. Retrieved from <http://www.budget.gc.ca/aceg-ccce/pdf/key-sectors-secteurs-cles-eng.pdf>
- Bagwell, S. (2008). Creative Clusters and City Growth. *Creative Industries Journal*, 1(1), 31-46. Retrieved from http://archive.londonmet.ac.uk/www.citiesinstitute.org/library/b46466_3.pdf
- Breschi, S. (2008). Innovation Specific Agglomeration Economies and the Spatial Clustering of Innovative Firms. In C. Karlsson, *Handbook of Research on Innovation and Clusters: Cases and Policies* (pp. 167-192). Cheltenham, UK: Edward Elgar.
- Christensen, T. A., Lämmer-Gamp, T., & zu Köcker, G. (2012). *Let's Make a Perfect Cluster Policy and Cluster Programme*. Berlin/Copenhagen: VDI/VDE Innovation + Technik GmbH.
- Enright, M., & Ffowcs-Williams, I. (2000). Enhancing the Competitiveness of SMEs in the Global Economy: Strategies and Policies. *Conference for Ministers responsible for SMEs and Industry Ministers*. Bologna: Organisation for Economic Co-operation and Development. Retrieved from <http://www.oecd.org/cfe/smes/2010888.pdf>
- European Cluster Observatory. (n.d.). *Clusters at your fingertips*. Retrieved from European Cluster Observatory: <http://www.clusterobservatory.eu/index.html>
- European Commission, Joint Research Centre: Institute for Prospective Technological Studies. (2016, April 19). *S3 Cluster Organisations*. Retrieved from European Commission, Smart Specialization Platforms: <http://s3platform.jrc.ec.europa.eu/cluster-organisations>
- Expert Review Panel on Research and Development. (2011). *Innovation Canada: A Call to Action*. Ottawa: Industry Canada. Retrieved from [http://rd-review.ca/eic/site/o33.nsf/vwapj/R-D_InnovationCanada_Final-eng.pdf/\\$FILE/R-D_InnovationCanada_Final-eng.pdf](http://rd-review.ca/eic/site/o33.nsf/vwapj/R-D_InnovationCanada_Final-eng.pdf/$FILE/R-D_InnovationCanada_Final-eng.pdf)
- GLA Economics. (2006). *The rationale for public sector intervention in the economy*. London: Greater London Authority. Retrieved from

https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/rationale_for_public_sector_intervention.pdf

- INNO Germany AG. (2010). *Clusters and clustering policy: a guide for regional and local policy makers*. Brussels: European Union.
- Innovation Network Denmark. (2011). *The impacts of cluster policy in Denmark- An impact study on behaviour and economical effects of Innovation Network Denmark*. Copenhagen: Danish Agency for Science, Technology and Innovation. Retrieved from https://ec.europa.eu/research/evaluations/pdf/archive/fp7-evidence-base/national_impact_studies/the_impacts_of_cluster_policy_in_denmark.pdf
- Innovation Policy Platform. (2013a). *Innovation networks and clusters*. Retrieved from Innovation Policy Platform: <https://www.innovationpolicyplatform.org/content/innovation-networks-and-clusters>
- Innovation Policy Platform. (2013b). *Processes and actors in technology transfer and commercialisation*. Retrieved from Innovation Policy Platform: <https://www.innovationpolicyplatform.org/content/processes-and-actors-technology-transfer-and-commercialisation>
- Innovation, Science, and Economic Development Canada. (2016). *Innovation for a Better Canada: What We Heard*. Ottawa: Government of Canada. Retrieved from [https://www.ic.gc.ca/eic/site/o62.nsf/vwapj/Innovation-for-a-better-Canada.pdf/\\$file/Innovation-for-a-better-Canada.pdf](https://www.ic.gc.ca/eic/site/o62.nsf/vwapj/Innovation-for-a-better-Canada.pdf/$file/Innovation-for-a-better-Canada.pdf)
- Institute for Competitiveness & Prosperity. (n.d.). *Canadian Cluster Data*. Retrieved from Institute For Competitiveness And Prosperity: <https://www.competeprosper.ca/clusters/data/by-cluster>
- Iris Group. (2011). *Innovation Network Denmark Performance Accounts 2011*. Copenhagen: The Danish Agency for Science, Technology and Innovation.
- Izsak, K., Ketels, C., zu Köcker, G., & Lämmer-Gamp, T. (2016). *Smart Guide to Cluster Policy*. Brussels: European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and. Retrieved from <http://ec.europa.eu/DocsRoom/documents/16903/attachments/1/translations/en/renditions/native>
- Ketels, C., Lindqvist, G., and Sölvell, Ö. (2013). *The Cluster Initiative Greenbook 2.0*. Stockholm: Ivory Tower Publishers. Retrieved from <http://www.czechinvest.org/data/files/the-cluster-initiative-greenbook-3916-cz.pdf>
- Manufacturing USA. (n.d.). *Our Partners*. Retrieved from Manufacturing USA: <https://www.manufacturingusa.com/pages/our-partners>
- Mazzucato, M. (2011). *The Entrepreneurial State*. London: Demos. Retrieved from http://oro.open.ac.uk/30159/1/Entrepreneurial_State_-_web.pdf

-
- Mazzucato, M. (2014, July 18). *Mission Finance: starting to think big again*. Retrieved from Financial Times: <https://ftalphaville.ft.com/2014/07/18/1901312/mission-finance-starting-to-think-big-again/>
- Motoyama, Y. (2008, November). What Was New About the Cluster Theory? What Could It Answer and What Could It Not Answer? *Economic Development Quarterly*, 22(4), 353-363. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.910.884&rep=rep1&type=pdf>
- Muro, M., & Katz, B. (2010). *The New "Cluster Moment": How Regional Innovation Clusters Can Foster the Next Economy*. Washington D.C.: Brookings Institute. Retrieved from https://www.brookings.edu/wp-content/uploads/2016/06/0921_clusters_muro_katz.pdf
- National Economic Council. (2016). *Revitalizing American Manufacturing: The Obama Administration's Progress in Establishing a Foundation for Manufacturing Leadership*. Washington D.C.: National Economic Council. Retrieved from https://www.whitehouse.gov/sites/whitehouse.gov/files/images/NEC_Manufacturing_Report_October_2016.pdf
- Organisation For Economic Co-operation and Development. (2007). *OECD Reviews of Regional Innovation: Competitive Regional Clusters*. Paris: Organisation For Economic Co-operation and Development. Retrieved from http://artnet.unescap.org/tid/artnet/mtg/gmscb_regionalclusters.pdf
- Porter, M. E. (1998). Clusters and the New Economics of Competition. *Harvard Business Review*. Retrieved from <https://hbr.org/1998/11/clusters-and-the-new-economics-of-competition>
- Porter, M. E. (2009). *Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition*. Institute For Strategy And Competitiveness. Boston: Harvard Business School. Retrieved from http://www.hbs.edu/faculty/Publication%20Files/Clusters_and_Economic_Policy_White_Paper_8e844243-aa23-449d-a7c1-5ef76c74236f.pdf
- Preissl, B. (2003). *Innovation Clusters: Combining Physical and Virtual Links*. Berlin: German Institute for Economic Research. Retrieved from http://www.diw.de/documents/publikationen/73/diw_01.c.40665.de/dp359.pdf
- Sargent, J. F. (2014). *The Obama Administration's Proposal to Establish a National Network for Manufacturing Innovation*. Washington D.C.: Congressional Research Service. Retrieved from <https://fas.org/sgp/crs/misc/R42625.pdf>
- The World Bank. (2009). *Clusters for Competitiveness: A Practical Guide & Policy Implications for Developing Cluster Initiatives*. Washington D.C.: The World Bank. Retrieved from http://siteresources.worldbank.org/INTRANETTRADE/Resources/cluster_initiative_pub_w eb_ver.pdf

Walley, K. (2007). Coopetition: An Introduction to the Subject and an Agenda for Research. *International Studies of Management & Organization*, 37(2), 11-31. Retrieved from <http://www.tandfonline.com/action/journalInformation?journalCode=mimo20>