
Clusters and Commercialization: Findings from the ISRN Research Initiative

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Innovation Systems Research Network



ISRN Project on Industrial Clusters

Core Research Questions

- To what extent — and in what ways — do local, extra-firm relationships and interaction enable firms to become more innovative and successful?
- What is the relative importance of local, national and global relationships and knowledge flows in spurring the development of regional clusters over time?



Cluster Case Studies

- Size and composition of the cluster
- History of the cluster's evolution, including key events (intentional and accidental)
- Relationships between firms
- Relationships between firms, research infrastructure, other institutions/organizations
- Geographical structure of these relationships
- Role of finance capital (especially angel investors and venture capitalists)
- Role of local social capital and civic entrepreneurs

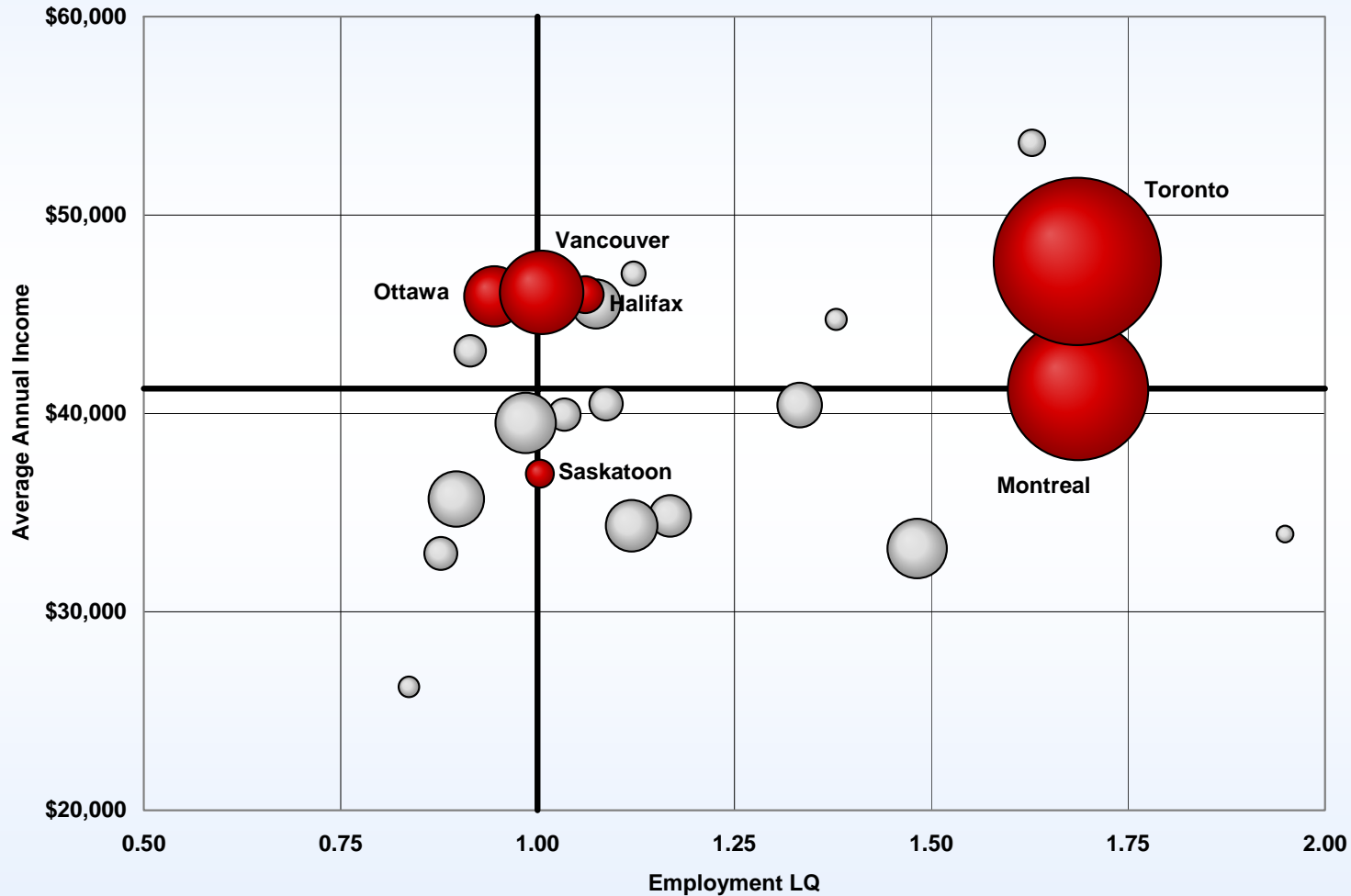


MCRI Case Studies (2001-2005)

- **Biotech/Biomed:** Montreal, Toronto, Vancouver, Ottawa, Saskatoon, Halifax
- **ICT/Photonics/Wireless/e-Commerce:** Vancouver, Calgary, Waterloo, Ottawa (Telecom and Photonics), Quebec City, New Brunswick, Cape Breton
- **Mechanical Engineering:** Aerospace (Montreal); Steel (S. Ontario), Auto Parts (Windsor, Waterloo)
- **Multimedia:** Montreal, Toronto, Vancouver
- **Food and Wine:** Specialty Foods (Toronto); Wine (Niagara, Okanogan)
- **Resource Industries:** Wood Products (BC); Mining Supply/Services (Sudbury)



ISRN Life Science Clusters

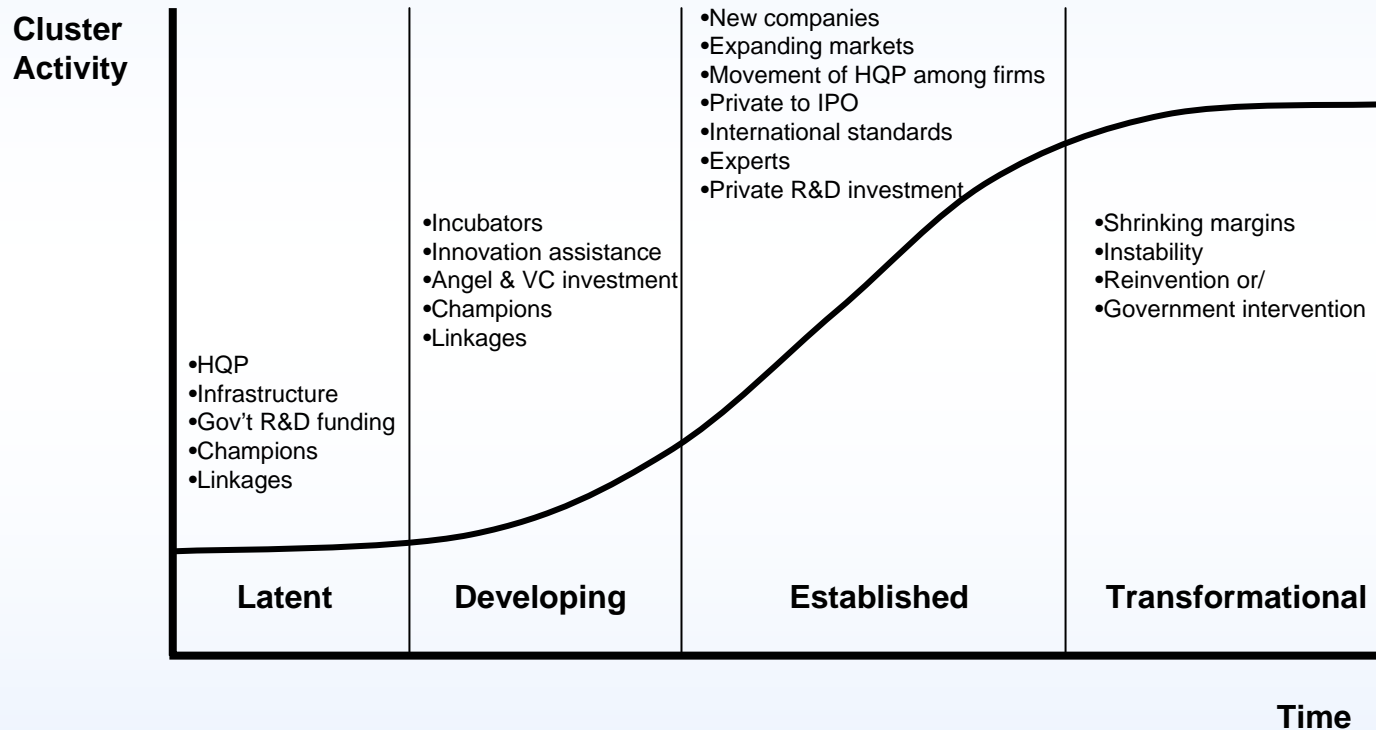


Path Dependence and Cluster Formation

- Initial conditions and trigger events
 - Entrepreneurial intervention
 - Role of lead or anchor firm
 - Spin-offs and technological spillovers
 - Key role of public sector institutions
 - Institutional and cultural dynamics
- Random acts of entrepreneurialism not fully explained by local circumstance:
 - “Chance, however, often has local antecedents, making its role less than it first appears” (Porter)
 - Cluster emergence inextricably intertwined with local institutions



ISRN's Cluster Life Cycle



Clusters and Industrial Structure

- Emerging contribution to cluster literature
 - Tends to generalize from one industrial sector across all others
 - i.e. Silicon Valley and ICT sector
- Applies one analytic model across wide variety of different geographic settings
 - Clusters are industrially specific
 - Distinction between analytic and synthetic knowledge bases
 - Key characteristics determined by
 - Age of cluster
 - Maturity of underlying technology
 - Supply chain linkages and/or disaggregation
 - Production model
 - Links to local labour markets



ISRN CLUSTER TYPOLOGY

Knowledge Dimensions	Industrial Structure and Cluster Linkages		
	Lead Anchor Firm	Global Supply Chain	Local Value Chain
Synthetic	Ontario Steel	Montreal aerospace Waterloo auto parts	Sudbury Mining S&S Windsor auto parts/ Machine tool & die
Analytic	NB-IT Ottawa photonics/telecom Calgary/Vancouver wireless	Saskatoon biotech Waterloo ICT Mtl, Tor, Van, Hal Biotech/life science	Cape Breton IT Mtl, Tor, Van media Quebec photonics Ottawa biotech
Hybrid			Ontario, BC wine BC wood products Ontario food

The Local and the Global

- Key elements of the literature maintain the importance of the local supply network and demand conditions for cluster development
- ISRN findings contradict this
 - Both key suppliers and customers are often non-local
 - Cluster firms are well integrated into global supply chains and knowledge networks
 - This is more true for ICT, bio-life sciences and mechanical engineering
 - In multimedia, food and wine clusters, local demand conditions and supply base are more critical
- Clusters are anchored to their locality by agglomeration economies,
 - especially the labour market



Local Biotech Nodes in Global Networks

- Knowledge networks of innovative biotech firms are non-local
 - Firms that patent are more likely to draw upon global knowledge flows
 - Hire larger proportion of workers from outside Canada
 - More likely to grant IP rights to foreign firms
 - Patenting firms two and a half times more likely to grant IP rights to foreign firms compared to non patenting firms
 - VC and capital from collaborative alliances more likely to come from non-local sources
- Canadian biotech firms more likely to have collaborative agreements with Canadian partners
 - Impact on patenting not as great as impact of international collaboration



Research Infrastructure

- Research institutions play different role in different clusters
 - Often a supporting, not causal role
 - Must distinguish by research areas and knowledge base
 - Most clusters are not spun-off from research institutions
 - Waterloo and Ottawa are exceptions in ICT
 - Montreal (BRI) and Saskatoon (PBI) exceptions in biotech
 - Universities generate strong research outputs in life sciences
 - GTA and Montreal leaders in biomedical research
 - U of T played role in 44 of 55 DBF's in GTA (2001)
 - Historically Toronto has led in biotech startups but recently overtaken by Montreal
 - GTA has highly fragmented system for tech transfer and commercialization
 - OCN, MaRS and RIN's (Biodiscovery, WGTA Consortium, York Biotech intended to overcome this limitation



Key Attractors for Biotech Clusters

- Linkages with research institutions
 - 63 per cent of MAT and 75 per cent of core bio/pharma firms have formal/informal exchanges with Ontario research institutions
 - 48% of MAT and 70% core bio/pharma report these relationships are very important for the development of new products and services
 - For MNC MAT firms, local exchanges also important for product modification and testing
- Availability of financing:
 - Core bio/pharma firms identify availability of local financing as second most important growth factor
 - Core biotech firms rely heavily on local angel investors and venture capital funds
 - Local strengths in start-up and late-stage financing
 - But identify key mid-stage gap



Role of Talent and Local Labour Market

- Depth and breadth of labour market
 - key ingredient for cluster development
- Depends on strength of educational institutions
 - Underlying quality of place
- Talent
 - 68% of MAT firms and 64% of core bio/pharma firms identify local supply of skilled workers as their top growth factor
 - Local sources of talent include universities and colleges, ethnic networks and “pill-hill”
 - Range of skills from engineering to sales
 - Firms identify local knowledge and expertise as especially key input



Building Network Relationships

- Formal networks play important brokering role for new and aspiring entrepreneurs
 - Provide entrepreneurs with opportunities for peer learning
- Reduce barriers to entry for business startups
 - Overcome knowledge gap
- Develop mentoring programs
 - Link entrepreneurs with experienced business people
 - Use members of advisory boards or screening committees as mentors
 - Link tenants with incubator graduates
 - Use cluster membership for networking and mentoring
- Networks nurture and private sector leaders
 - Civic entrepreneurs
- Build strategic alliances with supportive institutions



Cluster Policies and Tools I: Improve Cluster Dynamics

- New Technology and Firm Growth
 - Firms cannot access or identify strategic knowledge
 - Support cluster specific information and technology centres
 - Create forums to explore market opportunities
 - Conduct technology foresight exercise
 - Provide business assistance
 - Firms do not apply expertise of knowledge suppliers
 - Set up cluster specific technology and research centres
 - Subsidize collaborative R&D and technology transfer
 - Lack of critical mass
 - Promote spin-offs and expansion of existing firms
 - Pre-seed venture capital



Cluster Policies and Tools II: Inter-Actor Network Creation

- Firms do not collaborate with other firms
 - Support brokerage and networking programs
 - Form cross-agency cluster teams
 - Support export networks and coordinated purchasing
 - Initiate public procurement for innovative products
- Institutional mismatch between research infrastructure and market needs
 - Facilitate joint industry/research cooperation
 - Support local adaptation in university-industry links
 - Develop human capital
 - Initiate technology transfer programs



Cluster Policies and Tools III: Cluster Formation

- Limited interaction between actors in cluster
 - Establish platforms (sites) for dialogue
 - Broker and network agencies and schemes
- Information failure
 - Cluster analysis and competence audit
 - Sponsor strategic studies
 - Conduct benchmarking
 - Disseminate cluster information
- Lack of cluster identity and awareness
 - Create brand for cluster
 - Externally promote cluster
 - Have national and regional authorities disseminate cluster information

