
Aspects of Cluster Development in Canada and Policy Implications

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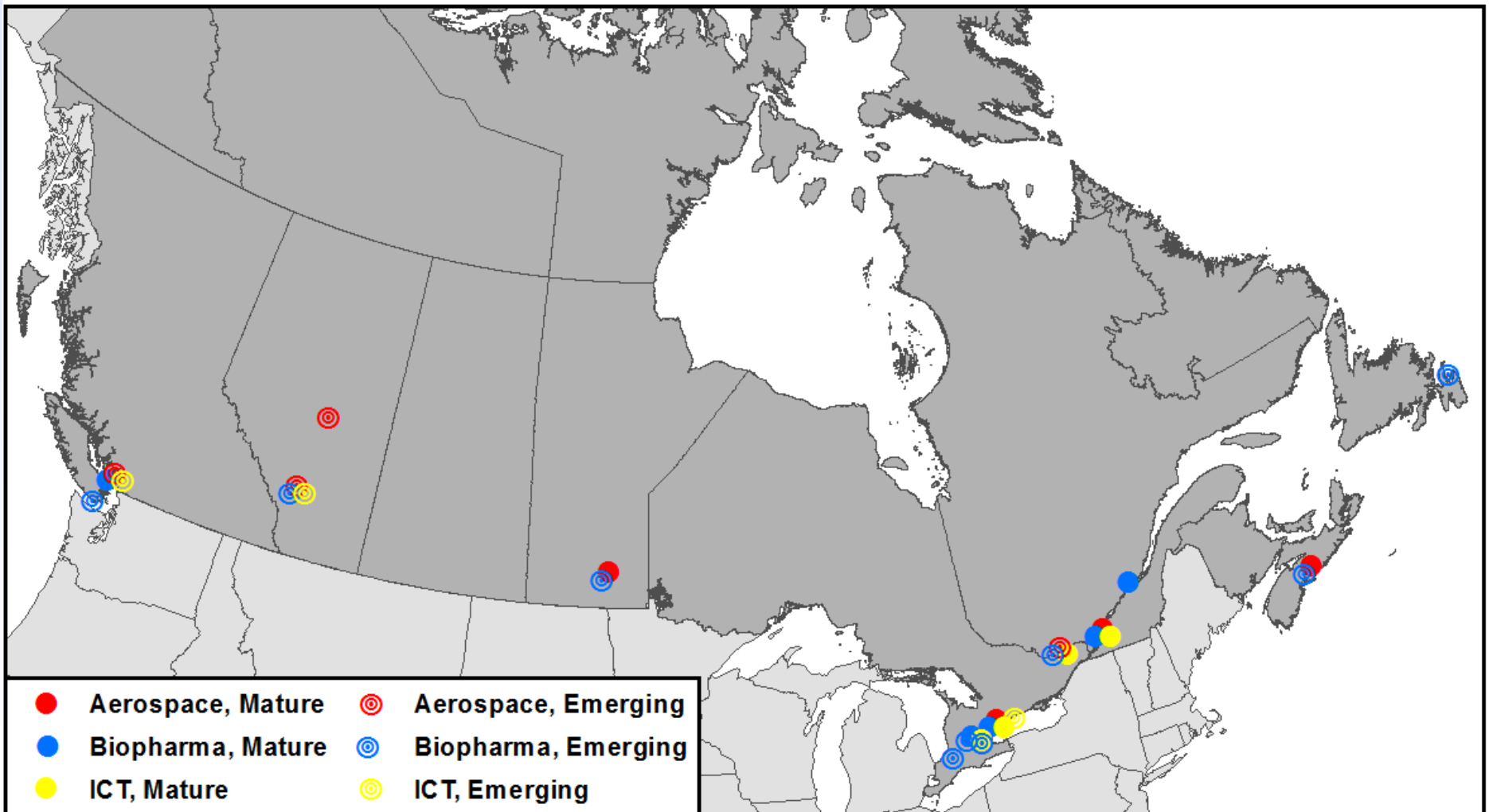


Key Elements of Clusters

- Established pillar companies with global reach
 - Firm linkages and networks
- Strong knowledge infrastructure
 - research university, government labs etc.
- Strong, diverse and thick talent pool
 - Specialized education and training institutions
- Specialized support services such as
 - Tech-savvy law and accounting firms
- Risk Tolerant Venture Capital and angel investors
- Governance regime
 - Civic leadership – ‘civic entrepreneurs’
- Supportive Policy Framework

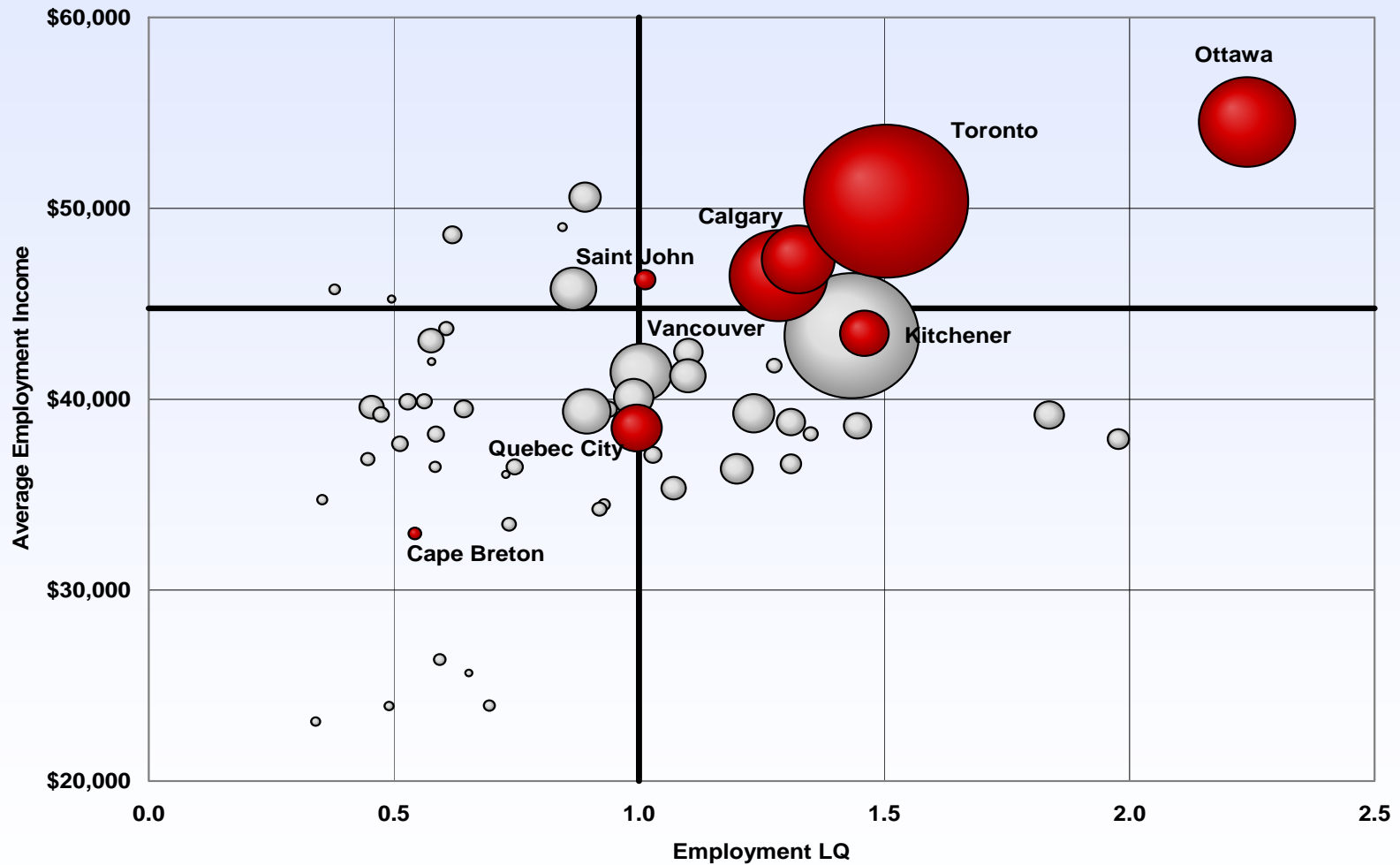


Aerospace, Biopharma & ICT Clusters

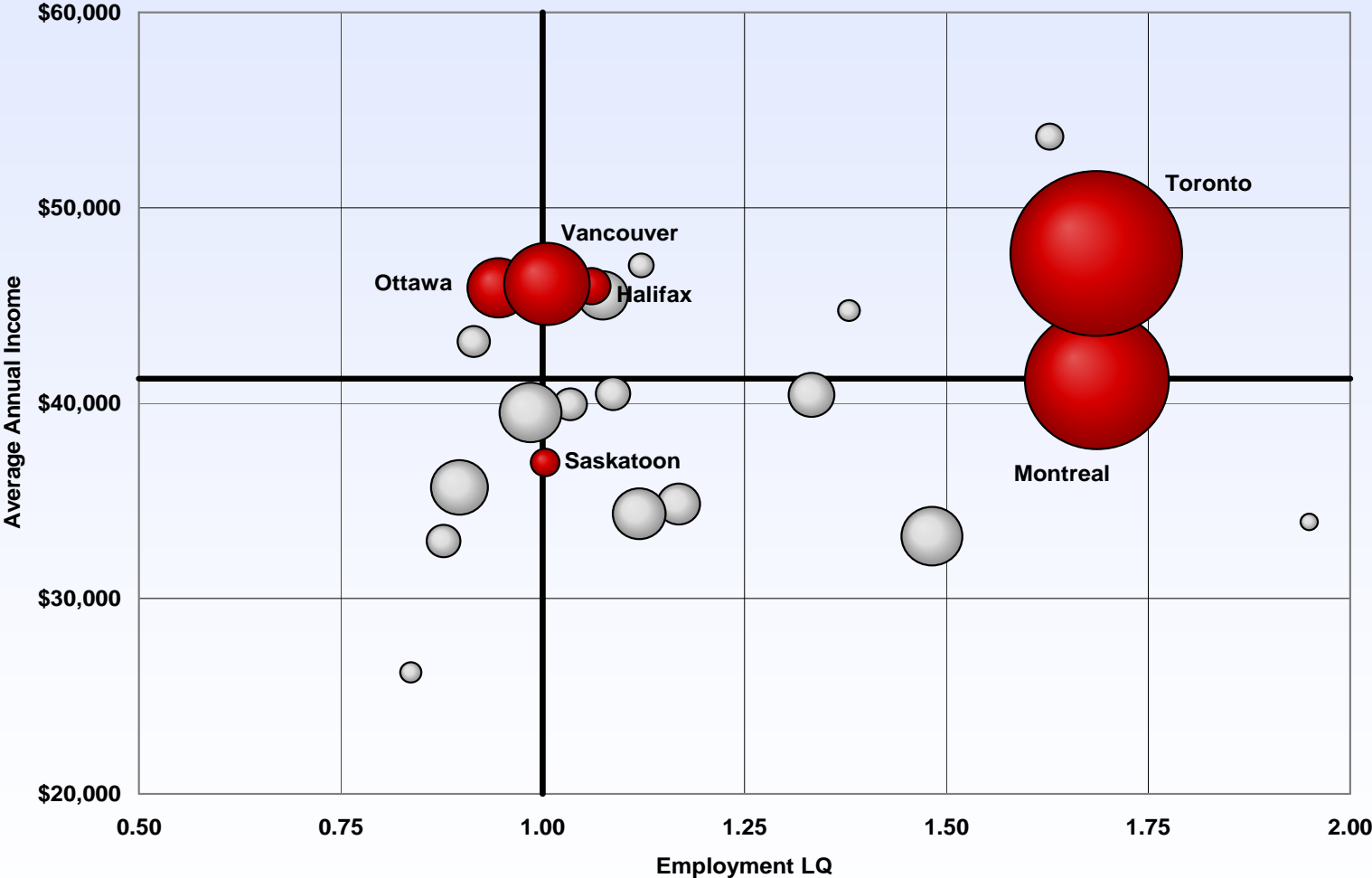


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ICT Clusters in Canada



Biopharma Clusters in Canada



Aerospace Clusters in Canada

- Montreal
 - Aerospace capital, with Toulouse and Seattle;
 - \$11.7 billion in sales in 2011;
 - 42,040 jobs;
 - 50 % of the Canadian workforce
 - 55 % of Canadian aerospace sales;
 - 70 % of Canadian R&D.
- Toronto
 - 2nd largest in Canada
 - □ Aircraft Systems & Equipment
 - □ Space Systems & Equipment
 - □ Aerostructures
 - □ Aircraft Integration
 - 22,000 jobs
 - □ 7 billion in revenues
 - □ 80% exports
 - □ 80% commercial

Enabling Factors in ICT Clusters

- Strong Local Research Infrastructure
 - Ottawa ICT – federal labs
 - Waterloo ICT – founding of university
 - Toronto – leading research university – ATI Technologies
- Critical trigger events
 - Ottawa – Bell Northern Research – US consent decess
 - Failure of Microsystems International Ltd
 - Waterloo ICT – Waterloo Maple and early spin-offs
 - Toronto – core firms (ATI) and MNC headquarters (IBM)
- 'Thick' labour market supports cluster formation
 - Ottawa and Waterloo blessed with strong research infrastructure that fed growth of talent base
 - Toronto – diverse group of MNC's and indigenous firms
- Challenge of finding management talent to support cluster growth



Key Characteristics of Biopharma Clusters

	Vancouver	Saskatoon	Toronto	Ottawa	Montréal	Halifax
Specialization	Human health (diverse)	Agriculture	Human health 'megacentre' (diverse)	Non-therapeutics; ICT-related	Human health 'megacentre' (pharma)	Human health and marine
Characteristics	Rapidly growing	Ag-biotech centre	Scale & diversity	Emergent	Drug discovery/ pharma	Small 'collection' of firms

Source: PriceWaterhouseCoopers 2003; BioNova 2004; OEOBC/OLSC 2004; Philips et al. 2004; Graytek 2005; Industry Canada 2005; Spencer and Vinodrai 2005;

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Catalysts in Biopharma Clusters

- Role of lead anchor firm sparked entrepreneurial activity & provided inspiration for the region
 - Vancouver: QLT Inc. (1981) working closely with UBC's University-Industry Liason Office (UBC-UILO) and resulting in spin-offs
 - Montreal: BioChem Pharma (1986) and a broad base of large pharmaceutical companies
 - Halifax: Biotech Working Group (1993); Ottawa: MDS-Nordion (1991); Toronto: Allelix (pioneering Canadian biotech company)
- Role of federal government through location of national laboratories
 - Saskatoon: NRC Plant Biotechnology Institute (NRC-PBI)
 - Montreal: NRC Biotechnology Research Institute (NRC-BRI)



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
 - 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



Role of Government Policy

- Since 1997 Canada has introduced wide range of programs to support research and innovation
 - \$13 billion in new funding
 - Canada Foundation for Innovation
 - Canada Research Chairs Program
 - Creation of Canadian Institutes for Health Research
 - Expanded support for Federal Granting Councils
- Strengthen public-private research & partnerships
 - Business-led Networks of Centres of Excellence
 - Centres of Excellence in Commercialization & Research
 - Strategic Aerospace and Defence Initiative
- Canada produces 4% of world scientific output with .5% of population



Selected Cluster Initiatives

- National Research Council
 - Industrial Research Assistance Program
 - Cluster Initiatives – OECD Report 2007
- Targeted Ontario Policies
 - Sector strategies, 1992-1996
 - Office of Urban Economic Development
 - Support for Toronto, Ottawa cluster strategies
 - Biotechnology Cluster Innovation Program (BCIP)
 - Regional Innovation Networks/Ontario Network of Excellence
- Quebec – early 1990s
 - Industrial Atlas of Quebec
 - provincial economy as twelve industrial clusters
- Lack of integration with federal strategy



Cluster Strategies in Canada

- Clusters provide an effective means for policy support at the local and regional level
 - Need for 'policy alignment'
 - Clusters as 'focusing device'
- Problem of 'missed opportunities' (OECD)
 - Federal/provincial investments in research centres and programs
 - Lack of direct linkages to cluster strategies and policies
 - Lack of integration of science and industrial parks with cluster strategies
 - Lack of coordination of regional with national innovation systems
- Renewed interest
 - Industry Canada, FedDev (southern Ontario), Ontario government



Mature Cluster Characteristics

	Total employment	Total firm count	% labour force with bachelor's degree or higher	Share of degrees in maths & science	PhDs per 1,000 labour force	Average employment income (2005)	Unemp. rate
Aerospace							
Halifax	1,070	18	21.5	71.3	14.0	\$ 58,599	1.9
Montréal	27,010	233	23.9	66.2	7.2	\$ 51,517	2.6
Toronto	12,665	329	27.7	69.0	9.5	\$ 52,308	3.1
Winnipeg	3,575	53	14.7	69.1	N/A	\$ 60,533	1.8
<i>All other regions</i>	<i>30,980</i>	<i>1,723</i>	<i>13.6</i>	<i>66.1</i>	<i>1.1</i>	<i>\$ 54,039</i>	<i>3.9</i>
Bio-pharma							
Québec City	14,845	2,138	37.2	57.3	24.3	\$ 40,071	3.3
Montréal	77,470	13,401	41.4	52.7	30.7	\$ 47,208	3.6
Toronto	107,375	29,786	50.2	54.0	27.1	\$ 54,277	3.8
Guelph	2,410	552	45.0	55.6	27.0	\$ 45,486	4.8
Vancouver	40,080	11,712	47.5	56.5	37.8	\$ 47,130	3.5
<i>All other regions</i>	<i>192,995</i>	<i>64,298</i>	<i>34.2</i>	<i>59.5</i>	<i>21.1</i>	<i>\$ 45,300</i>	<i>3.8</i>
ICT							
Montréal	29,180	1,078	37.0	61.7	8.4	\$ 54,996	3.1
Ottawa - Gatineau	12,075	441	51.3	72.7	24.0	\$ 74,060	4.2
Toronto	38,875	2,034	47.3	64.6	10.9	\$ 59,204	3.4
Kitchener-Waterloo	5,860	176	35.9	66.7	6.8	\$ 56,039	5.3
<i>All other regions</i>	<i>85,610</i>	<i>4,078</i>	<i>22.7</i>	<i>67.9</i>	<i>4.8</i>	<i>\$ 56,369</i>	<i>3.2</i>

Emerging Cluster Characteristics

	Total employment	Total firm count	% labour force with bachelor's degree or higher	Share of degrees in maths & science	PhDs per 1,000 labour force	Average employment income (2005)	Unemp. rate
Aerospace							
Vancouver	4,060	184	20.44	65.90	2.46	\$ 54,263	3.08
Ottawa - Gatineau	2,145	41	36.13	59.40	11.66	\$ 65,221	3.73
Calgary	1,910	182	12.57	72.80	5.24	\$ 49,965	3.93
Edmonton	1,715	109	11.08	62.55	N/A	\$ 60,419	2.61
Bio-pharma							
Victoria	6,210	1,826	48.15	55.70	45.09	\$ 41,242	4.25
Calgary	21,305	9,499	43.53	58.66	22.77	\$ 58,350	2.89
Kitchener	7,540	1,413	38.99	61.33	20.56	\$ 58,111	4.18
Ottawa - Gatineau	24,225	7,167	56.59	59.88	46.44	\$ 59,326	3.12
Halifax	6,125	1,217	45.06	58.77	8.98	\$ 44,975	3.92
St. John's	2,785	485	34.47	61.75	19.75	\$ 39,101	5.03
Hamilton	10,320	2,568	34.79	54.45	27.62	\$ 48,280	5.08
London	6,815	1,352	35.36	58.12	38.15	\$ 41,384	4.11
Winnipeg	9,800	1,919	39.34	61.27	21.94	\$ 44,150	3.21
ICT							
Oshawa	1,690	47	18.94	63.08	N/A	\$ 58,009	2.37
Vancouver	14,095	829	46.19	62.31	11.00	\$ 59,061	3.72
Calgary	6,095	371	34.45	60.39	5.74	\$ 55,682	2.46

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