

Pathways to Ontario's Knowledge Economy:

A system for identifying existing
regional strengths and future prospects

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1 – Introduction

Ontario, like many jurisdictions, is currently facing major economic upheaval due to rapid advances in technology, increasingly porous borders, and shifting work practices. It is a time of significant anxiety, but at the same time there is a sense of possibility. The way forward has been made abundantly clear: in order to succeed in the 21st century economy places must develop vibrant “knowledge economies” underpinned by creativity, innovation, and entrepreneurship. Turning the rhetoric into reality is the stumbling block for policy makers. Exactly how these things are achieved presents a series of difficult choices, which if not made wisely, can prove to be costly mistakes. In the context of finite public resources, the pressure to make efficient decisions with taxpayer dollars is ever increasing. When it comes to economic development strategy the term “picking winners”—choosing to support and invest in certain industries and firms over others—is often derided. Yet, governments like Ontario do have to make judgements about where to direct resources if they want to develop their knowledge economies further. This report presents a system for identifying the most promising pathways for economic growth on a region-by-region basis within the Province of Ontario.

The Government of Ontario is well aware of what its economic challenges are. Finding solutions to these challenges is the hard part. To this end it has appointed Ed Clark, former CEO of TD Bank, to chair the Premier’s Advisory Council looking at how to best use public assets to spark the development of the knowledge economy. In his work so far, Clark notes that, “We must avoid a race to the bottom and instead participate in the parts of the economy which pay more but where we are competitive,” while acknowledging that, “We must double down on winners.”ⁱ The government certainly realizes that a blanket approach of supporting all is not an efficient strategy, but rather attention should accrue to the parts of the economy that offer the best prospects in a globally competitive and knowledge-driven economy. The recent change in the Federal Government has also led to a significant policy shift that is congruent with Ontario’s interests. During his time at the World Economic Forum in Davos Switzerland, newly elected Prime Minister Justin Trudeau sought to rebrand the country as a knowledge powerhouse remarking that, “My predecessor wanted you to know Canada for its resources. I want you to know Canadians for our resourcefulness.”ⁱⁱ This approach has also been widely and enthusiastically promoted at the local level by mayors, boards of trade, and institutional leaders such as university presidents. Writing in *The Globe and Mail*, the presidents of McMaster, The University of Toronto, and The University of Waterloo, recently argued for the creation of a “supercluster” focused between the cities that house their campuses, stating that, “Truly innovative economies and ecosystems are anti-fragile. They aren’t just resilient in the face of change — they thrive on it. This is the economy we envision for a Southern Ontario innovation supercluster driven by Toronto, Waterloo and Hamilton.”ⁱⁱⁱ While much of the will and the rhetoric are now tightly aligned, there remains a great deal of work

to be done to construct actual policies and systems that will help build Ontario's knowledge-based economy.

Current academic literature supports this approach to economic development. Creativity, innovation, and learning are all understood to be the main source of local competitiveness and economic sustainability^{iv}. In particular, the ability to generate, attract, and retain talent is a cornerstone of any strategy.^v Moreover, the notion that local economies tend to evolve from existing assets, rather than experience radical shifts unrelated to their previous trajectories, is becoming better understood.^{vi} Research in this field typically examines the structure of local economies and how this structure influences growth and change.^{vii} Measurement most often involves accounting for the mix of technologies (as measured by patents)^{viii} or the set of local industries.^{ix} In this report we assess the range of occupations.^x The field of 'evolutionary economic geography' is also starting to take into account the role of public policy in working with local structural realities in order to chart a course for future development.^{xi}

Sound economic development strategy pays close attention to context. It is not only specific to existing structures, but also inherently local in nature. A large jurisdiction like Ontario must account for the differences between regions and build on local strengths rather than implement strategies based on the latest alluring trend being sold by faraway futurists. In this report we present a detailed accounting of the existing local strengths of Ontario's 15 metropolitan regions in order to identify the sectors that are the top prospects for future growth. Provincial policy already formally recognizes the importance of local strategies for economic development through its cluster policies^{xii}. While these policies take an industrial location approach, this report seeks to meld this with a labour market or talent-based approach to local economic development. Richard Florida's insights of the "creative class"^{xiii} highlight the importance of talent attraction and retention in relation to local prosperity. This report presents a system for identifying local industrial strengths and future prospects based on its current stock of talent. The report examines the detailed occupational profiles of Ontario's city-regions and maps these onto industries that require specific sets of workers. The overall aim is to provide a system for evaluating the quality of potential investments under consideration by the Government of Ontario and its local partners with an emphasis on well-paid, export-oriented, and knowledge-intensive economic activities.

2 – Systematically identifying strengths and opportunities in Ontario and its city-regions

Our system for identifying industrial strengths and prospects starts with provincial policy derived from basic economic development principles. The sectors that are understood to provide the largest return are ones that are export oriented, provide higher incomes, and are knowledge-driven. Exports are key as they bring positive capital flows and signal a globally competitive industry. In today's economy the goal cannot be to simply "create jobs" but rather to "create good jobs." Higher incomes are generally a good indicator of job quality. Such jobs are typically "knowledge driven," meaning that they require workers to be innovate while performing non-routine activities.

Identifying the sectors that are most likely to benefit Ontario involves two steps. The first narrows down the entire field of industries to just the ones that are congruent with the three criteria of export potential, job quality (incomes), and knowledge. The second takes a region-by-region approach in order to identify which of the sectors identified in step one are most likely to succeed based on what kinds of economic activities already exist in each locality. Because labour markets are primarily local in nature, we examine the existing capabilities based on the occupational profiles of regions in order to determine both current strengths and future prospects. When local economies change and adapt, they typically do so by evolving into activities that are related to their existing strengths rather than radically shifting to activities which they had no previous capabilities.

In Canada, businesses are classified using the North American Industrial Classification System (NAICS) according to the core goods and services that they produce. General categories include activities such as natural resources, construction, manufacturing, retail, logistics, services, and public services. For this report we rely on data from the 2011 National Household Survey which provides data on detailed NAICS industries (4-digits) by city-region geographies. This includes 303 specific industry categories. The aim of the first step of our system is to narrow these industries by eliminating the ones that lack export potential, offer lower incomes, and are less knowledge-driven.

In the first instance, we remove 75 non-exporting sectors by eliminating industries such as retail, consumer services (e.g. dry cleaners), education, health, and public administration. This leaves us with a set of 228 that have some export potential. With this set we evaluate which ones provide above average incomes and/or are knowledge-driven. With the latter we look at the types of jobs within each industry. As businesses are classified by what their products are, jobs are classified according to their core function. In other words, workers are classified (National Occupational Classification – NOC) by what they do. This can mean anything from managers and scientists to artists, retail clerks, and assembly line workers. Florida's definition of the 'creative class' is the quintessential method for identifying the types of jobs that are knowledge-driven. In Ontario, roughly 1/3 of all jobs are in creative class occupations. For the purpose of this report we use a 30% cutoff in order to identify knowledge-driven

industries. This means that if at least 30% of all jobs in a particular sector are creative class occupations we classify the industry as “knowledge-driven.” *Exhibit 1* provides a Venn diagram of how many of the 303 NAICS industries fit into each permutation of the three criteria. The ones we focus on in this report must have export potential and provide above average incomes and/or are knowledge driven. This leaves us with a set of 122 sectors for a more detailed local analysis in step two.

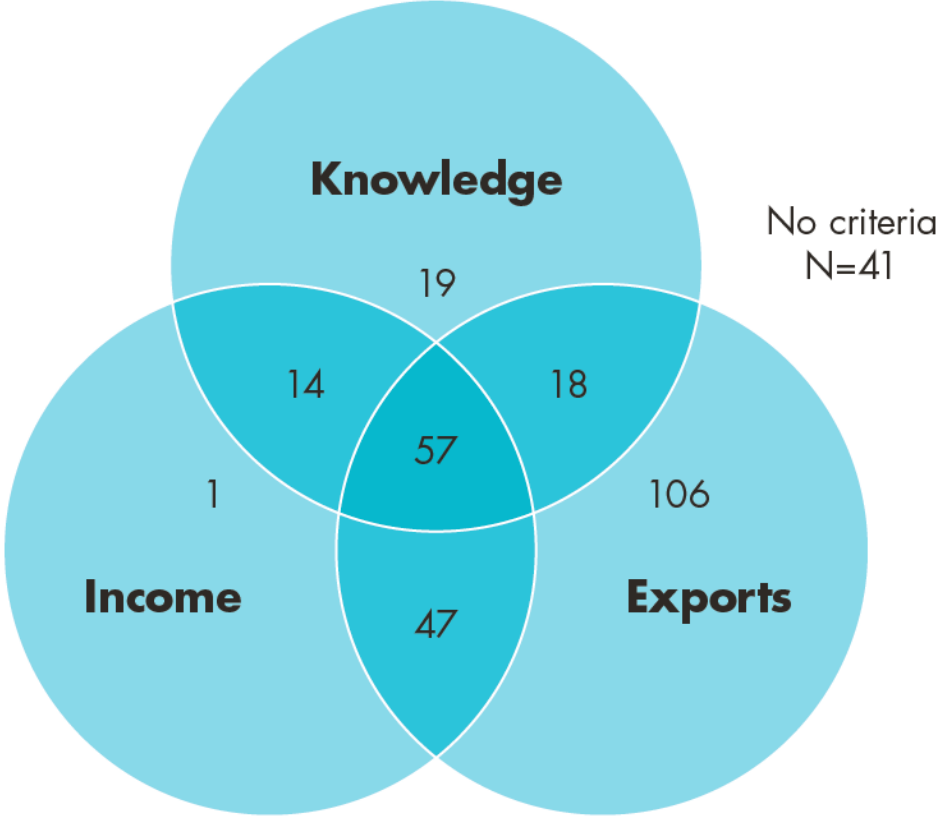


Exhibit 1: Classifying industries on three key criteria

City-region economies are not typically smaller scale versions of the larger jurisdiction in which they are situated, but rather they tend to be specialized in a limited number of industries. For this reason there cannot be a singular economic development policy for Ontario that does not consider the local variation across its regions. Step two of our process involves identifying what key industries each city-region currently excels at, and crucially, what additional industries offer the greatest potential for development.

Yet this is only part of the story. We must also assess how saturated the region is with respect to that given industry. If the LQ for an industry is high in a region, it may not matter that the industry also has a high suitability, as competition for labor resources may be too intense. On the other hand, a combination of low LQ and high suitability

may signal that a region has an unrecognized opportunity to reinvent itself, or at least to reallocate growth efforts and investments. Of course, all of these attributes are mitigated by the desirability of the industry's economic attributes such as average wages and export potential. Taken together, all of these factors allow us to develop a comprehensive picture of economic prospects for each of Ontario's regions.

To create an analytical framework that allows us to evaluate alternative industrial options, we utilize aspects of information and graph theory. To be precise, we employ a modified version of the metric of mutual information. Applying these techniques to the data available in the 2011 household survey allows us to extract subtle relationships that exist among labour occupations. To better assess industry prospects for each region we employ a novel metric of industry "suitability" based on the structure of its current labour market. Our 'Labour Market Suitability Index' (LMS) is a relative measure across all 147 urbanized regions of Canada and essentially quantifies how well the complex labor signature of a region matches the labor signature of each industry. The higher the suitability, the better the two signatures line up, indicating the likelihood that a particular region should support healthy growth in the particular industry.

The first step in visualizing the LMS involves plotting all of the occupations on a network graph (see *Exhibit 2*). Each node on the graph represents an occupation while the edges that connect them are derived from the propensity of any pair of occupations to co-locate. In other words, when pairs of occupations are found together in high frequencies, they have a high-level of co-location. The thinking is that if different occupations are systematically found to be in the same places, then there is likely some form of functional relationship between them. When we plot all occupations (and all pairs of occupations) on a network graph we can visualize the overall pattern of types of jobs and how strongly they are related to one another. We can then plot the profiles of city-regions or industries based on the prevalence of each occupation. Prevalence is represented by the sizes of the nodes. The colours correspond to the class of occupation based on Florida's categories (dark blue = creative class; light blue = service class; dark red = working class; green = agriculture & resource class).

When aggregated, these relationships give us a unique labour profile for not only each industry, but also each city-region (see *Exhibits 3 and 4*). We may then assess how well an industrial profile and a city profile match each other. Sometimes the profiles align very well, meaning that a city's labour structure is well suited to support that particular industry. On the other hand, they may not align well at all meaning that a city may face great difficulty in penetrating or growing in that particular industry.

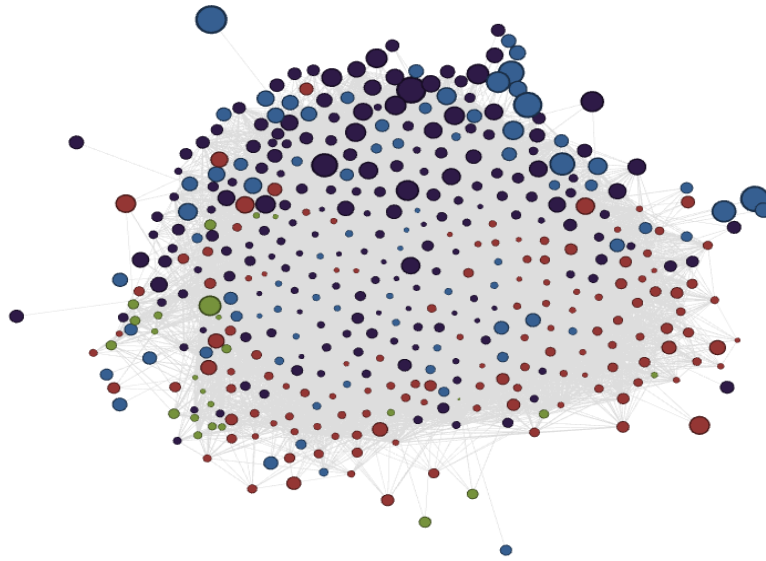
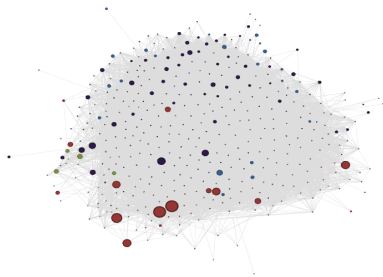
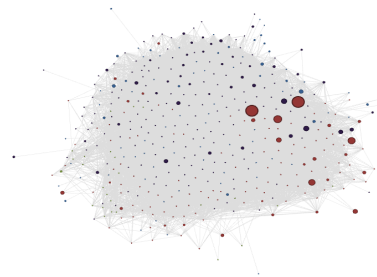


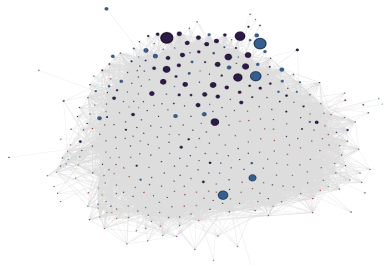
Exhibit 2: Occupations matrix for Canada



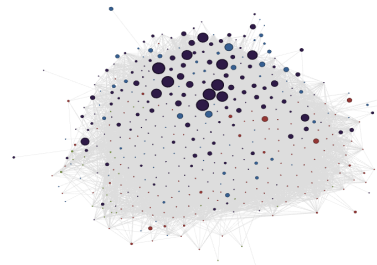
NAICS 2122 (Mining)



NAICS 3361 (Auto manufacturing)



NAICS 5112 (Banking)



NAICS 5415 (ICT Services)

Exhibit 3: Occupations matrices by industry

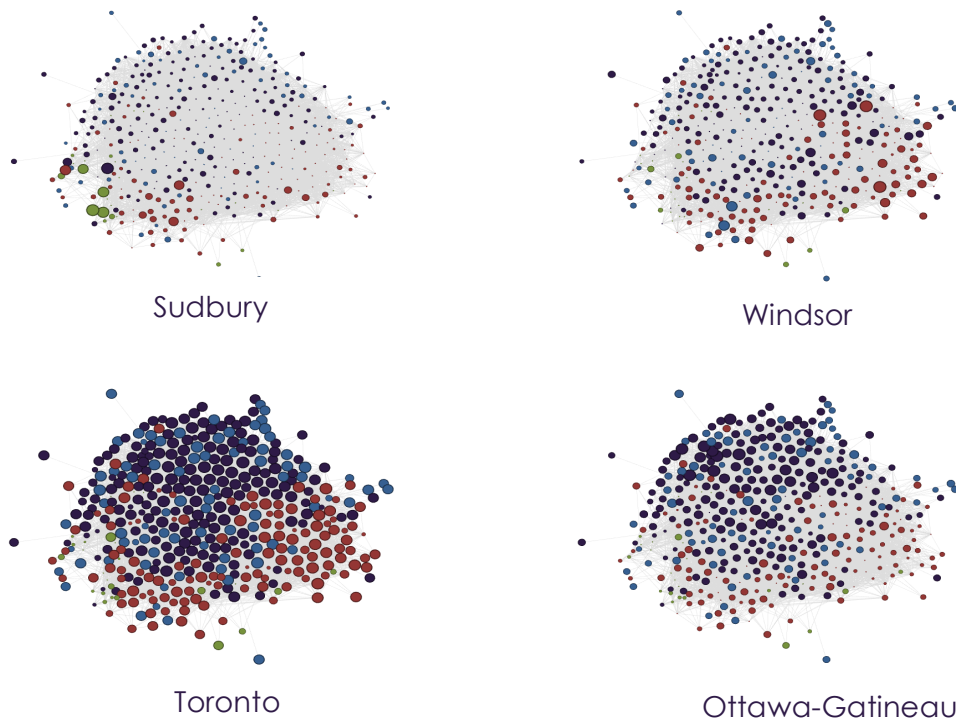


Exhibit 4: Occupations matrices by city-region

In addition to the LMS, we also calculate the location quotient of each industry. A location quotient indicates the relative local specialization of any given industry. It is derived from an industry's share of local employment divided by its share of national employment. For example, if a particular industry accounts for 10% of local employment and 5% of national employment, its LQ is 2. A LQ of 2 can be interpreted to mean that an industry is twice as common in a local environment as overall. Conversely, when an LQ is below 1, the industry is underrepresented locally. LQs greater than 1 can be said to be local specializations/strengths.

When we calculate the LMS and LQ for the 122 industries identified in step 1 we then classify them into local strengths, prospects, or potentially under threat. If an industry has a positive LMS and an LQ greater than 1 it is deemed to be an existing local strength. Conversely, if the LMS is positive and the LQ is below 1 then it is classified as a prospect. In such a case the industry is not currently a local specialization but the region's labour force profile suggests that it could become a local strength. In a few instances industries have an LQ greater than 1 but an LMS that is negative. This suggests that while an industry may currently be a local specialization the labour force may not exist in order to sustain it. In these cases we classify the industry as under potential threat. Further to classifying a region's industries in this manner, we then rank the local strengths and prospects based on combined rankings of LMS, LQ, labour market size, and average employment incomes.

3 – The state of Ontario’s Knowledge economy

Like most jurisdictions, Ontario’s economic geography is spiky. Not only do the regions differ in terms of levels of prosperity, their relative strengths are also distinct qualitatively. Toronto is undeniably the main engine of Ontario’s economy. It is the centre of the province’s knowledge economy with many business headquarters, knowledge institutions, and arts & cultural facilities. It is globally competitive and connected especially in finance, tech, and creative and cultural industries. Other city-regions in close proximity are also quite strong knowledge economies in their own right. Kitchener-Waterloo is a top-tier technology centre with a robust entrepreneurial ecosystem. Toronto and Kitchener-Waterloo form the two edges of the developing ‘supercluster’ initiative that seeks to tie together the fortunes of a set of regions that also includes Oshawa, Hamilton, and Guelph. Ottawa-Gatineau is also a strong knowledge-driven region, albeit in an anomalous manner as the national capital and home to the federal civil service. It cannot be dismissed as simply a government town however, as it also boasts a globally competitive ICT cluster.

While the aforementioned half dozen city regions are in relatively good position to prosper in a globally competitive, knowledge-driven economy, significant questions linger regarding much of the remainder of the province. Much of the southwestern Ontario economy has been built up around the automotive sector. While it provides many direct and indirect jobs, the sector is highly cost-sensitive and has lost out to other jurisdictions in the United States and Mexico over the past few decades. Automation of many routine jobs has also eliminated a significant number of positions. Smaller and mid-sized cities such as Windsor, St. Catharines, and Brantford are not likely to compete for high-end service industry jobs that tend to be located in larger urban centres. Instead their futures will likely depend on maintaining a competitive edge in advanced manufacturing industries. Whether that continues to mean automotive manufacturing or other activities that rely on similar skill sets remains to be seen.

Smaller city-regions in eastern and central Ontario such as Kingston, Peterborough, and Barrie are facing significant challenges adapting to the ever-evolving realities of the knowledge economy. These city-regions have narrower economies and a more limited range of capabilities. This results in fewer viable options for economic development. Building stronger connections to the GTHA ‘supercluster’ represent one possible way forward, especially as these regions are hampered somewhat by being further from the US border and vital trade routes.

The two northern city regions, Sudbury and Thunder Bay, are distinct in that their economies are mainly specialized in natural resource sectors. Resource-based economies are typically prone to boom-and-bust cycles that are dependent on global commodity prices. This can be a limiting factor when it comes to how much local control exists over the community’s economic fortunes. It would be wrong however to suggest that resource economies are not knowledge-based. In particular, it takes a significant amount of engineering know-how to locate and extract minerals

from deep below ground. These regions have options for globally competitive industries that stretch beyond resource extraction and into related value-added knowledge-driven services.

CMA	Creative Class	Service Class	Working Class	Resource Class
Toronto	37.5%	44.2%	17.4%	0.9%
Guelph	32.9%	41.0%	24.1%	2.0%
Hamilton	32.7%	45.6%	20.0%	1.7%
Kitchener-Waterloo	31.8%	42.6%	24.1%	1.5%
Oshawa	30.0%	46.9%	21.7%	1.4%
'Super cluster' Total	36.2%	44.3%	18.5%	1.0%
London	31.0%	46.7%	20.2%	2.1%
Windsor	28.7%	45.1%	24.4%	1.8%
St. Catharines- Niagara	25.0%	51.5%	20.6%	2.9%
Brantford	24.0%	45.5%	27.7%	2.8%
Southwestern Ontario Total	28.0%	47.7%	22.0%	2.3%
Ottawa-Gatineau	43.9%	44.4%	10.8%	1.0%
Kingston	35.2%	49.2%	14.1%	1.5%
Peterborough	30.5%	48.0%	19.2%	2.4%
Thunder Bay	29.7%	49.2%	19.1%	2.0%
Greater Sudbury	28.6%	47.3%	19.2%	4.9%
Barrie	26.6%	48.3%	23.4%	1.6%
Eastern, Central, Northern Ontario	39.0%	45.8%	13.8%	1.5%
All Ontario CMAs	35.8%	45.0%	18.0%	1.3%

Exhibit 5: Occupation class share by CMA and groupings in Ontario

In terms of overall 'creative class' employment the Eastern, Central, and Northern Ontario set of metro areas is highest at 39.0% (see Exhibit 5). This is mainly driven by the Ottawa-Gatineau CMA which leads the country in creative class share of jobs. Kingston is also a significant factor. Public sector employment is the key contributor in both cases. The other four regions in the group have relatively low shares of creative class in the province. The 'Super cluster' grouping of regions is second with 36.2%

creative class employment. The Toronto CMA leads the way with 37.5%. The 'super cluster' group is the only one where all CMAs have at least 30% creative class employment. Southwestern Ontario has the lowest overall share of creative class employment at 28.0%. London (31.0%) is the only CMA with a share greater than 30%.

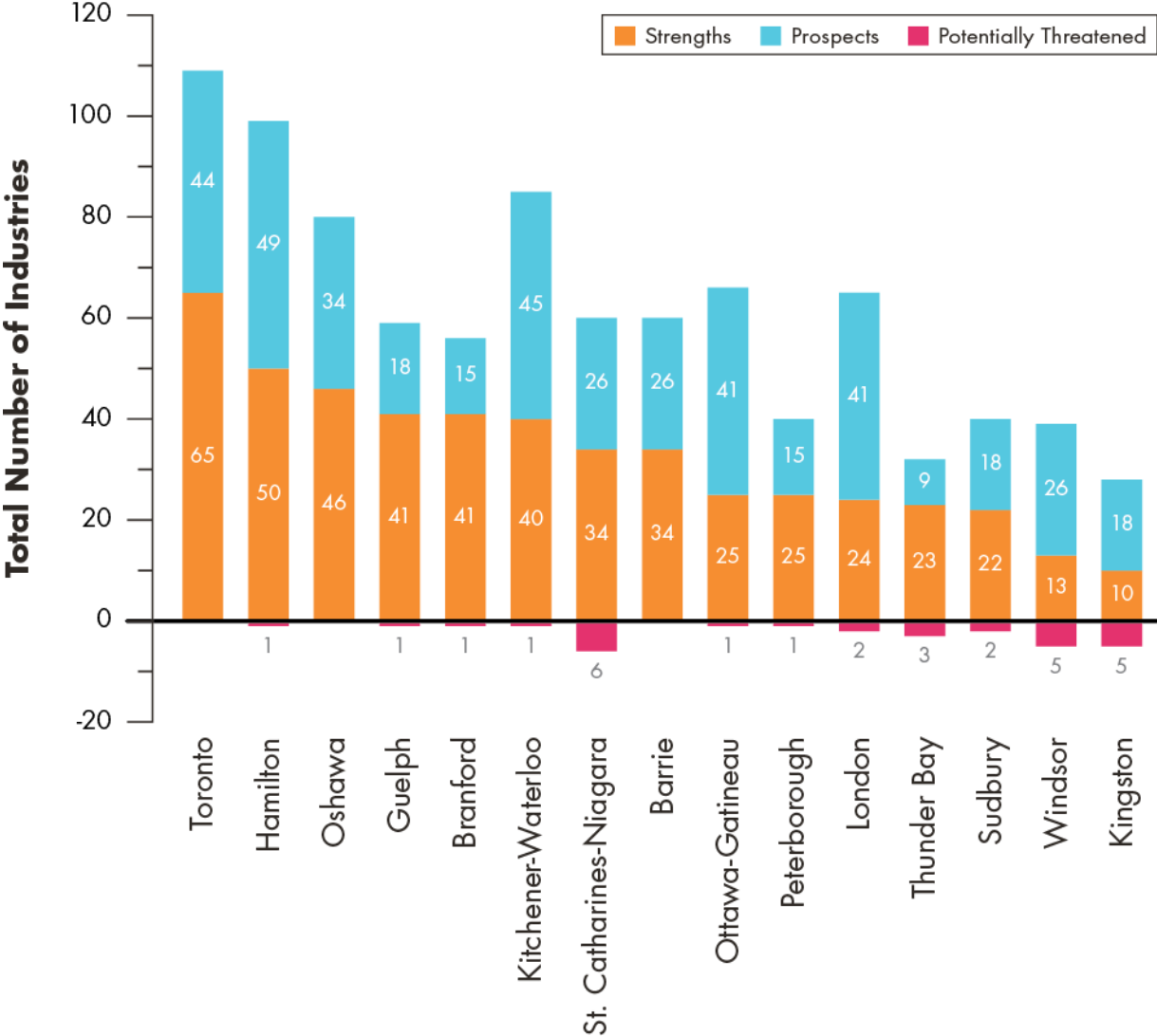


Exhibit 6: Number of industry strengths, prospects, and potential threats by city-region

When we calculate the total number of current industry strengths and future prospects for each city-region in Ontario we can clearly see a wide divergence in the range of current sources of prosperity as well as pathways to developing new knowledge-based sectors (see Exhibit 6). Toronto leads the province with 65 industries that are categorized

as strengths with a further 44 that meet the criteria of being viable future prospects. The three regions that are within the larger 'supercluster' region, Hamilton, Kitchener-Waterloo, and Oshawa, come in second, third, and fourth in terms of combined strengths and prospects. This area of the province clearly currently possesses the widest range of strengths as well as additional possibilities in the knowledge-economy going forward.

The spikiness of the province is highly apparent when contrasting the 'supercluster' cities to those less central. Kingston occupies the bottom spot with a mere 10 industry strengths and only 18 additional prospects. Traditionally, a public sector town, especially in higher education and military, Kingston has not been able to build a significant knowledge-driven, export-oriented private sector. Despite the presence of knowledge-building institutions there seems to be limited sectoral possibilities for future development. The northern cities of Sudbury and Thunder Bay are also heavily specialized with 22 and 23 industry strengths respectively. A tight focus on resource sectors also limits the number of future prospects that offer pathways to knowledge-driven diversification. Many city-regions exist somewhere in between. Most of them have an economic base built on manufacturing. Shifting these economies to increasingly knowledge-driven regions will likely be the main determinant of the province's overall success.

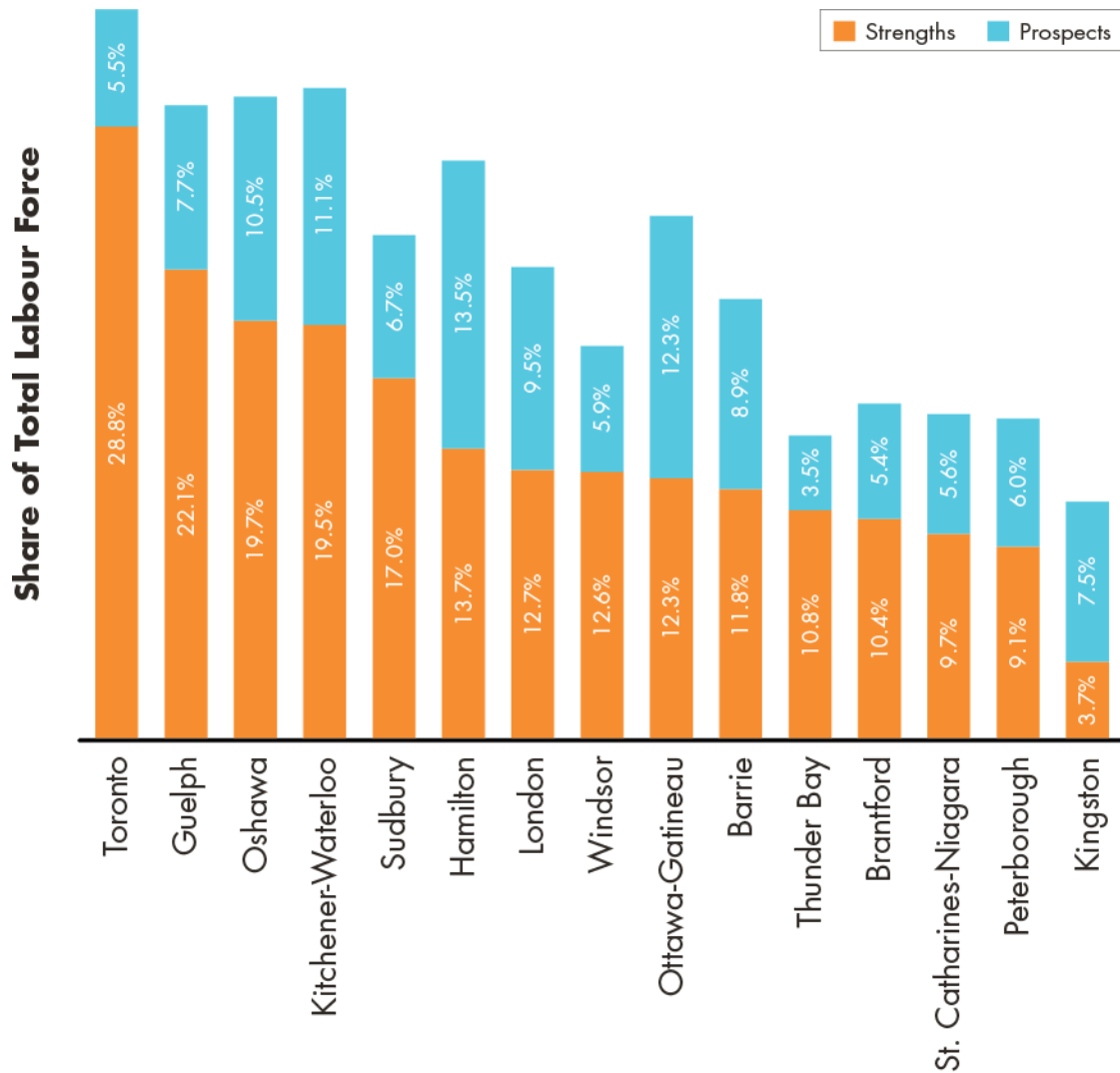


Exhibit 7: Number of industry strengths, prospects, and potential threats by city-region

When we look at share of total local employment in the place of number of industries, the spikiness of Ontario's city-regions strengths and prospects becomes even more pronounced (see *Exhibit 7*). At the top end of the spectrum, Toronto has 28.8% of employment in strong knowledge-economy, export-oriented sectors. While at the bottom end only 3.7% of all employment in Kingston is in industries categorized as existing strengths. On this measure, Kitchener-Waterloo moves up into second place while the other three 'supercluster' regions, Oshawa, Guelph, and Hamilton, round out the top five.

4 – Regional profiles and prospects

In this section, we take a detailed look at the province's 15 major city-regions (census metropolitan areas) in order to better understand their current industrial strengths and future prospects based on their labour market profiles (see *Exhibit 8*). We put Ontario's city-regions into three broad groups in order to make comparisons and to create a general picture of the province as a whole. For each group we compare the labour market profiles based on the relatedness of their current occupational strengths. We then present an overview of each city-region and identify their top 10 current industrial strengths and their top 10 future prospects. This lists are intended to provide basic guidance for the types of economic activities that are thriving in the local economy and the ones that could potentially grow based on the current strengths in the labour market.

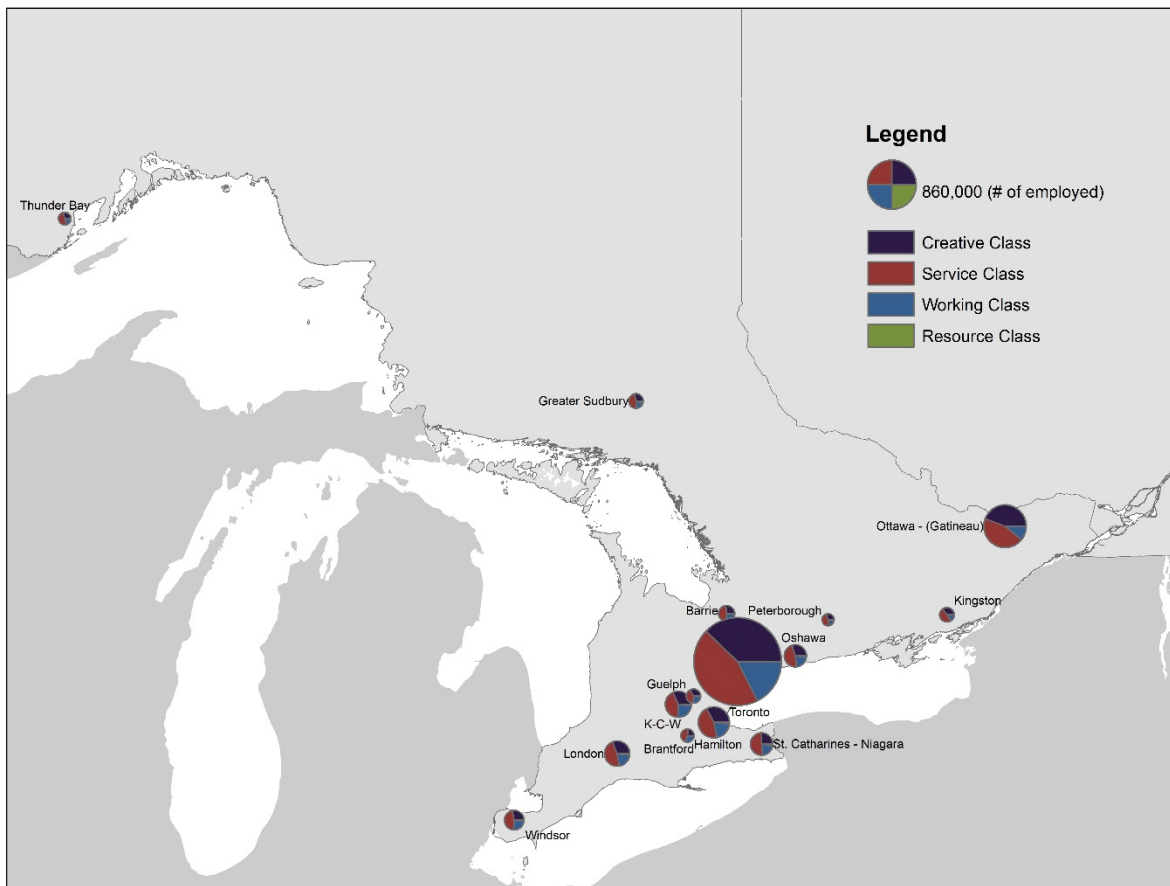


Exhibit 8: Map of Ontario CMA's with occupation shares

4.1 – ‘Supercluster’ Stars

While Toronto is the epicenter of Ontario's knowledge economy, it is certainly not the only significant city (see *Exhibit 9*). Kitchener-Waterloo in particular has a well-earned reputation as a major tech-hub, having produced companies such as Blackberry and Open Text as well as graduating world-class tech talent from the University of Waterloo. Other nearby cities such as Hamilton, Guelph, and Oshawa also boast many successes owing much to their research-intensive higher education institutions (McMaster, Guelph, and the University of Ontario Institute of Technology). There are efforts underway to better integrate these city-regions and thereby create a 'supercluster' that better coordinates knowledge-economy growth. This includes organizing infrastructure that is both soft (research institutes, incubators, cluster initiatives) and hard (intercity rail, regional airports) to focus public resources and maximize efficiency. The overall goal, as Ed Clark states it is to, “become the supercluster which is THE alternative to Silicon Valley.”^{xiv}

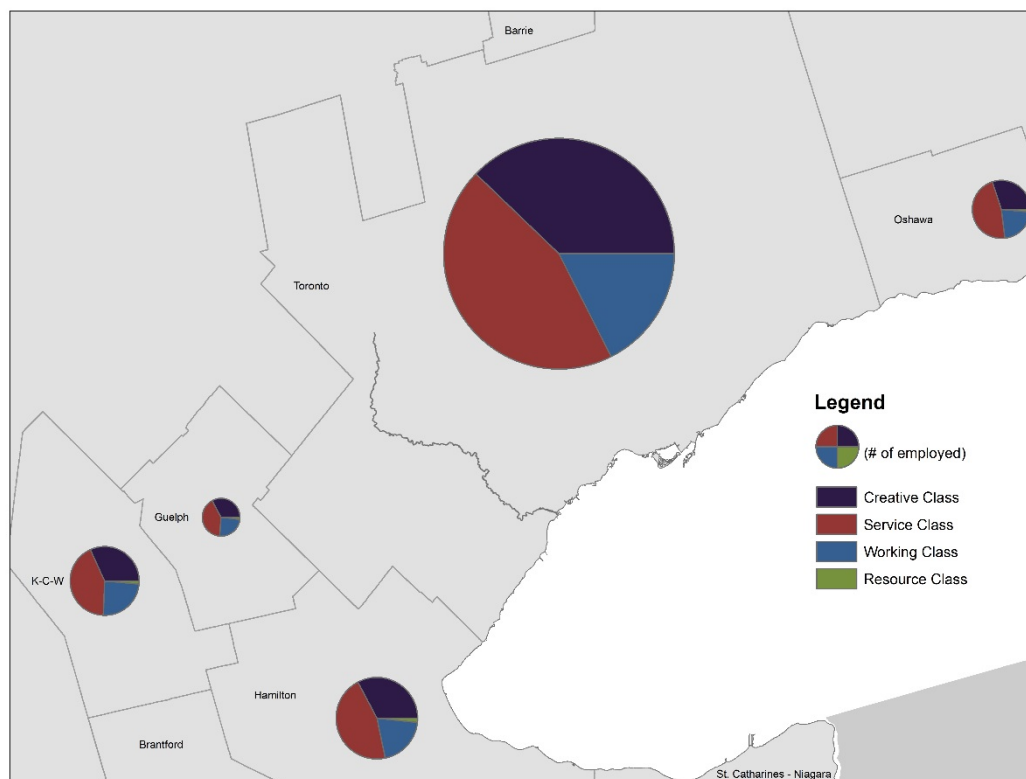


Exhibit 9: Ontario's 'supercluster' region

The five city-regions in the “supercluster” are all doing relatively well in the knowledge economy, although in quite different ways. When we compare the occupational

profiles (see *Exhibit 10*) we can see that Toronto possesses a much more tightly related set of strengths that tend to be creative class jobs. Kitchener—Waterloo and Guelph also possess creative class centric profiles, but have occupational strengths that are more loosely related. Oshawa and Hamilton have strong manufacturing histories (auto manufacturing and steel) that are still apparent when looking at their occupational profiles.

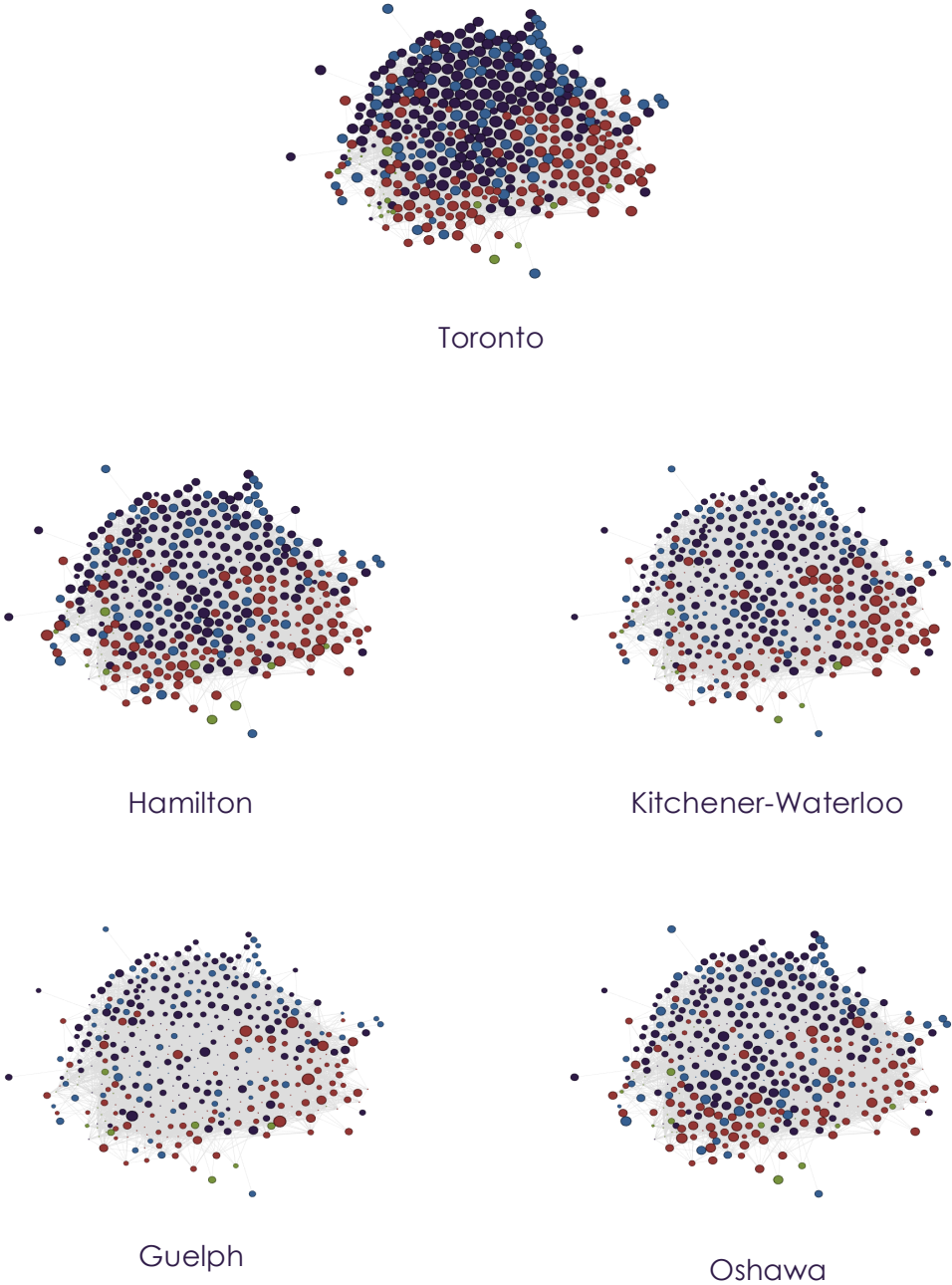


Exhibit 10: Occupational profiles of ‘Super cluster’ regions

4.1.1 - Toronto

The Toronto city-region has roughly six million residents and is by far the largest economic region in the country. It is also the Provincial Capital, home to three major universities (The University of Toronto, York University, and Ryerson University), and possess many of the country's key cultural institutions. Toronto is the financial capital and is home to many national and international headquarters. Needless to say, with a roster of assets like this, it is doing quite well in the knowledge economy. Not only does Toronto possess a large number (63) of industrial strengths (see *Exhibit 11*), many of these sectors are quite large. Its occupational profile affords it a wide range of possibilities to compete in the knowledge-economy. This diversity is also a source of resiliency, whereby workers have many options of where they can apply their skills.

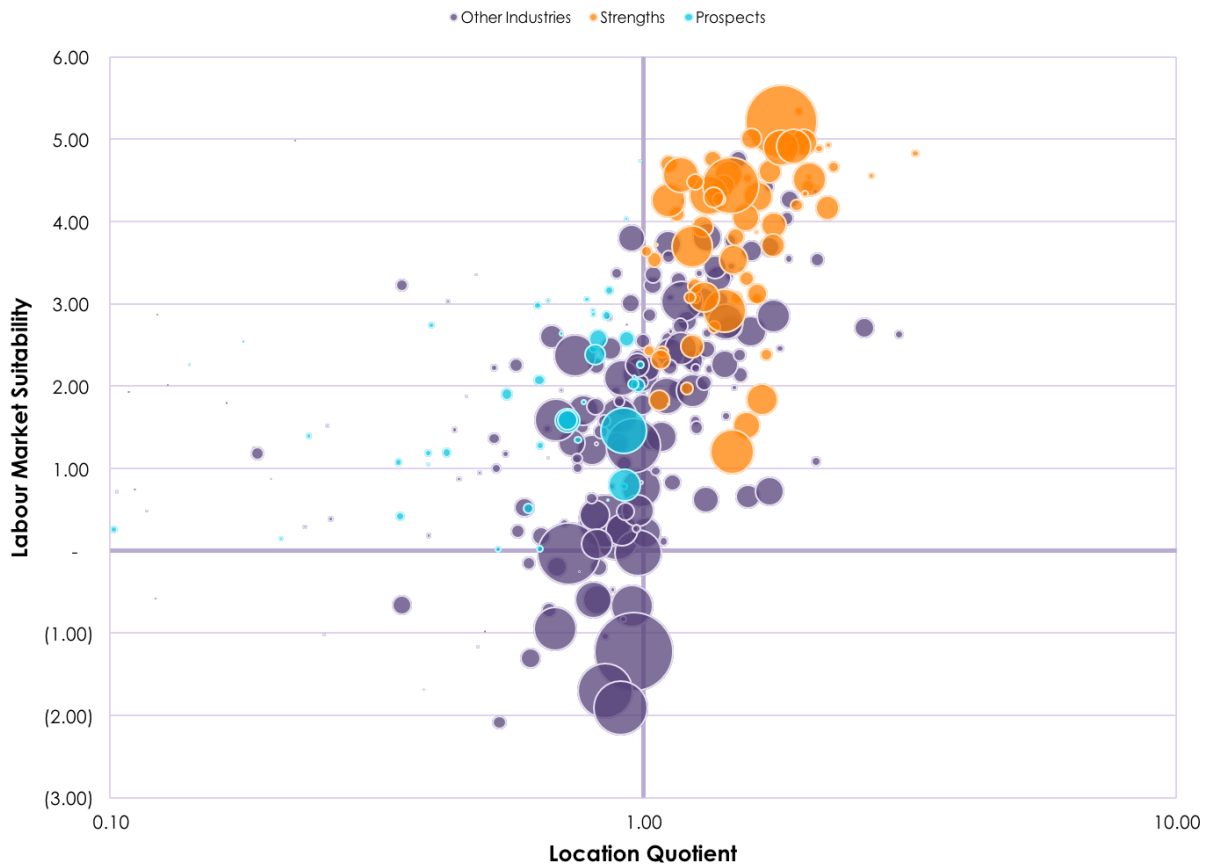


Exhibit 11: Identifying Toronto's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
5239	Other financial investment activities	4.89	1.81	25,920	\$100,505
5231	Securities and commodity contracts intermediation and brokerage	4.96	2.00	15,300	\$139,056
5221	Depository credit intermediation	5.22	1.82	101,670	\$ 70,364
4173	Computer and communications equipment and supplies wholesaler-distributors	4.51	2.05	23,255	\$ 86,316
5232	Securities and commodity exchanges	4.93	2.23	940	\$111,238
5261	Pension funds	4.83	3.24	1,330	\$107,313
5222	Non-depository credit intermediation	4.61	1.73	11,295	\$ 71,972
5415	Computer systems design and related services	4.44	1.46	64,965	\$ 74,156
5269	Other funds and financial vehicles	4.88	2.14	1,600	\$ 90,560
5418	Advertising, public relations, and related services	4.91	1.91	24,570	\$ 60,968

Exhibit 12: Toronto's top 10 industry strengths

The table above shows Toronto's top 10 industrial strengths based on its Labour Market Suitability index (occupational profile), degree of local specialization (LQ), size (total employment), and average incomes (see *Exhibit 12*). Not surprisingly, most of these strengths are in either finance or technology (advertising also comes in at number 10). Labour Market Suitability index scores above 4 demonstrate extremely tight fits between the types of workers that are in Toronto's labour market and the demand for such workers by these particular industries. Location quotients in the range of 2-3 are quite high, indicating strong local specialization. Many of these industries are very large with tens of thousands of jobs. Incomes, particularly in finance, are well above average with some hitting six figures. Toronto is well positioned to compete in the knowledge economy with these and other strengths. A key strategy going forward is to further develop the connections between its finance and tech industries

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5417	Scientific research and development services	2.38	8,780	\$ 78,658
2211	Electric power generation, transmission and distribution	1.58	12,725	\$ 92,566
4881	Support activities for air transportation	2.58	5,335	\$ 70,714
3364	Aerospace product and parts manufacturing	2.58	7,360	\$ 69,748
3251	Basic chemical manufacturing	2.46	1,945	\$ 85,857
2372	Land subdivision	2.26	1,495	\$ 98,108
5413	Architectural, engineering and related services	1.46	41,845	\$ 78,034
4121	Petroleum product wholesaler-distributors	2.74	975	\$ 90,721
4821	Rail transportation	1.90	3,035	\$ 76,014
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	1.58	8,290	\$ 71,391

Exhibit 13: Toronto's top 10 industry prospects

At first glance, Toronto's list of top future prospects is a somewhat counterintuitive mix of unrelated industries (see *Exhibit 13*). The main reason for this is that the city is already doing very well in most of the industries that its labour market suggests should be strengths. With that in mind, a few areas of possible future development do stand out. Scientific research and development services are usually aligned with public sector research institutions. More could be done to strengthen the private sector R&D industry in Toronto. Aerospace is a key strategic sector identified by the federal government in particular and should likely continue to be invested in. There are also a few industries related to the real estate sector in which Toronto has a number of globally competitive firms. Transportation and utilities also appear on the list and are likely related to Toronto being a major hub as much as they are true possible sources of future development.

4.1.2 – Hamilton

The Hamilton metropolitan area is Ontario's third largest behind Toronto and Ottawa. Growth in the "greater golden horseshoe" is increasingly melding the Greater Hamilton Area with Greater Toronto to the east as well as Kitchener-Waterloo and Guelph to the north. The city's economic fortunes have historically been linked to the steel industry, but life sciences and ICT have started to become strengths more recently (see *Exhibit 14*). McMaster University is a key asset for developing Hamilton's knowledge-based economy. Increased public transportation linkages, especially expanded GO service and a central LRT, are key components of a development strategy for the wider region.

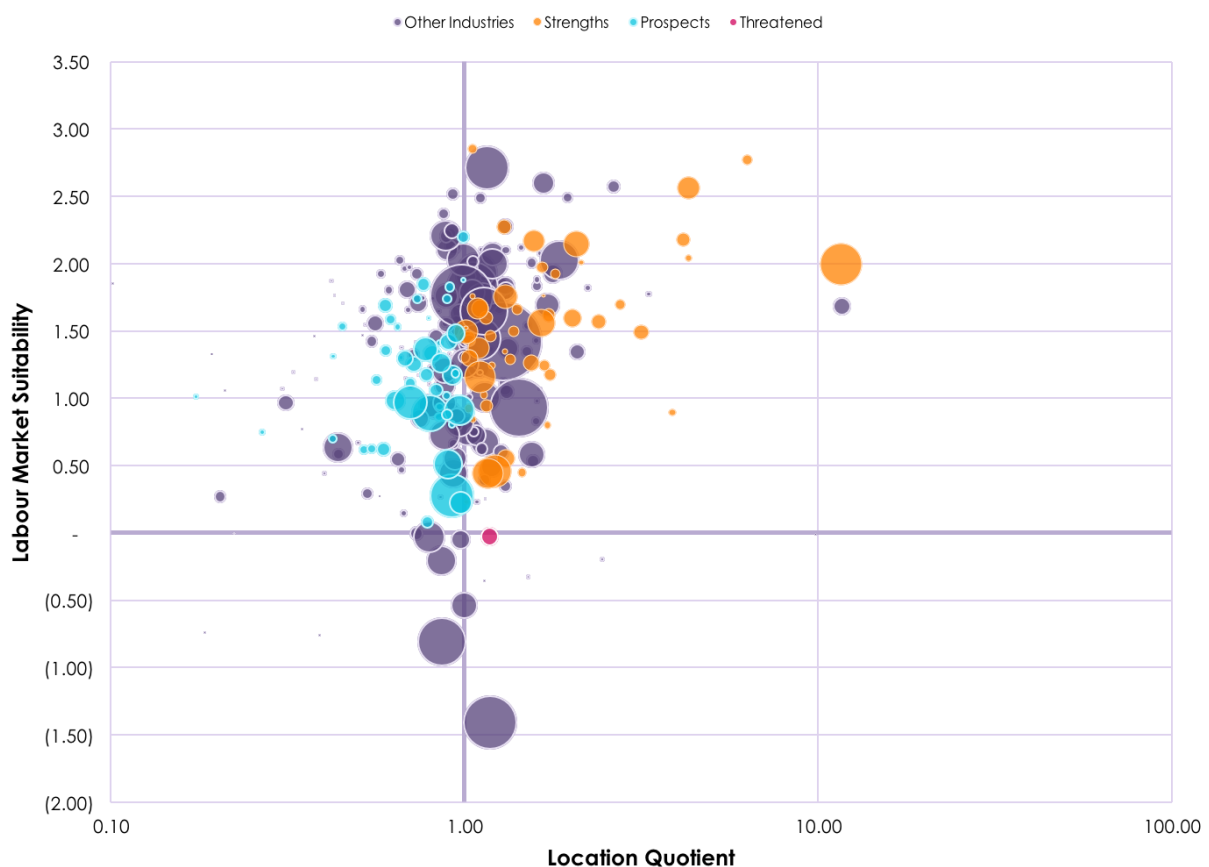


Exhibit 14: Identifying Hamilton's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3311	Iron and steel mills and ferro-alloy manufacturing	2.00	11.60	5,675	\$ 68,221
3361	Motor vehicle manufacturing	2.14	2.07	2,245	\$ 74,469
4162	Metal service centres	2.56	4.30	1,650	\$ 64,164
3274	Lime and gypsum product manufacturing	2.04	4.29	160	\$ 72,111
3312	Steel product manufacturing from purchased steel	2.18	4.16	645	\$ 63,687
4161	Electrical, plumbing, heating and air-conditioning equipment and supplies wholesaler-distributors	2.17	1.57	1,550	\$ 63,140
4179	Other machinery, equipment and supplies wholesaler-distributors	1.76	1.30	1,910	\$ 67,101
3339	Other general-purpose machinery manufacturing	1.59	2.02	1,070	\$ 65,625
3251	Basic chemical manufacturing	1.66	1.41	425	\$ 85,857
4145	Pharmaceuticals, toiletries, cosmetics and sundries wholesaler-distributors	1.67	1.11	1,045	\$ 80,178

Exhibit 15: Hamilton's top 10 industry strengths

Though there are signs that Hamilton is shifting toward a more knowledge-intensive and service-oriented economy, the steel industry remains the local economy's most notable strength. Most of the top industries identified by our system as Hamilton's existing strengths are related to steel and metal production (see *Exhibit 15*). Steel and metal have been important exports for Ontario as well as a key input to other sectors such as automotive manufacturing. The industry has been steadily losing employment for many years as it is a highly cost-sensitive sector that has also experienced a significant amount of automation. While the steel industry often conjures up images of dirty and dangerous work, it should not be dismissed as not being knowledge-intensive. Engineering knowledge is a crucial input that should continue to be developed.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
4173	Computer and communications equipment and supplies wholesaler-distributors	1.33	1,150	\$ 86,316
2373	Highway, street and bridge construction	1.84	690	\$ 71,896
2211	Electric power generation, transmission and distribution	0.98	1,415	\$ 92,566
5417	Scientific research and development services	1.30	920	\$ 78,658
5171	Wired telecommunications carriers	1.37	2,060	\$ 69,017
2362	Non-residential building construction	1.17	1,415	\$ 74,494
3364	Aerospace product and parts manufacturing	1.69	670	\$ 69,748
5413	Architectural, engineering and related services	0.89	4,560	\$ 78,034
5416	Management, scientific and technical consulting services	0.91	3,215	\$ 76,211
5411	Legal services	0.51	2,955	\$ 96,617

Exhibit 16: Hamilton's top 10 industry prospects

While many of Hamilton's existing strengths are related to the steel industry, many of its future prospects are associated with ICT and science-based sectors (see *Exhibit 16*). Our system points to activities such as scientific research and development services (NAICS 5417), wired telecommunications carriers (NAICS 5417), and management, scientific and technical consulting services (NAICS 5416) as knowledge-intensive industries that Hamilton could develop based on its current labour market profile. A secondary set of industries that our system highlights as possible future prospects are connected via the construction and real estate sector. This includes architectural and engineering services (NAICS 5413).

4.1.3 – Kitchener-Waterloo

Kitchener-Waterloo has a reputation as a world-class hub for technological innovation. Best known for producing Blackberry, the region has spawned many world-leading ICT companies. Much of its success stems from the University of Waterloo, which has developed top-ranked computer science and mathematics departments as well as the internationally renowned Perimeter Institute for Theoretical Physics. In addition to first class academics, the university has strong, longstanding industry linkages including a highly successful co-op program. One of the key challenges facing the Kitchener-Waterloo region is its ability to retain the top talent that it produces. As a mid-sized city, it lacks the critical mass of cultural and entertainment amenities that nearby Toronto possesses. Compounding this issue is the difficulty in travelling between the two. Separated by just 100km, journeys can take many hours depending on traffic. There are hopes of building a regular high-speed rail link, but these plans are many years from fruition. As a global player, Kitchener-Waterloo also has to be weary of competition with far-off locales. It is purported that Silicon Valley is home to 300,000 Canadians, many of whom have connections back to the region.

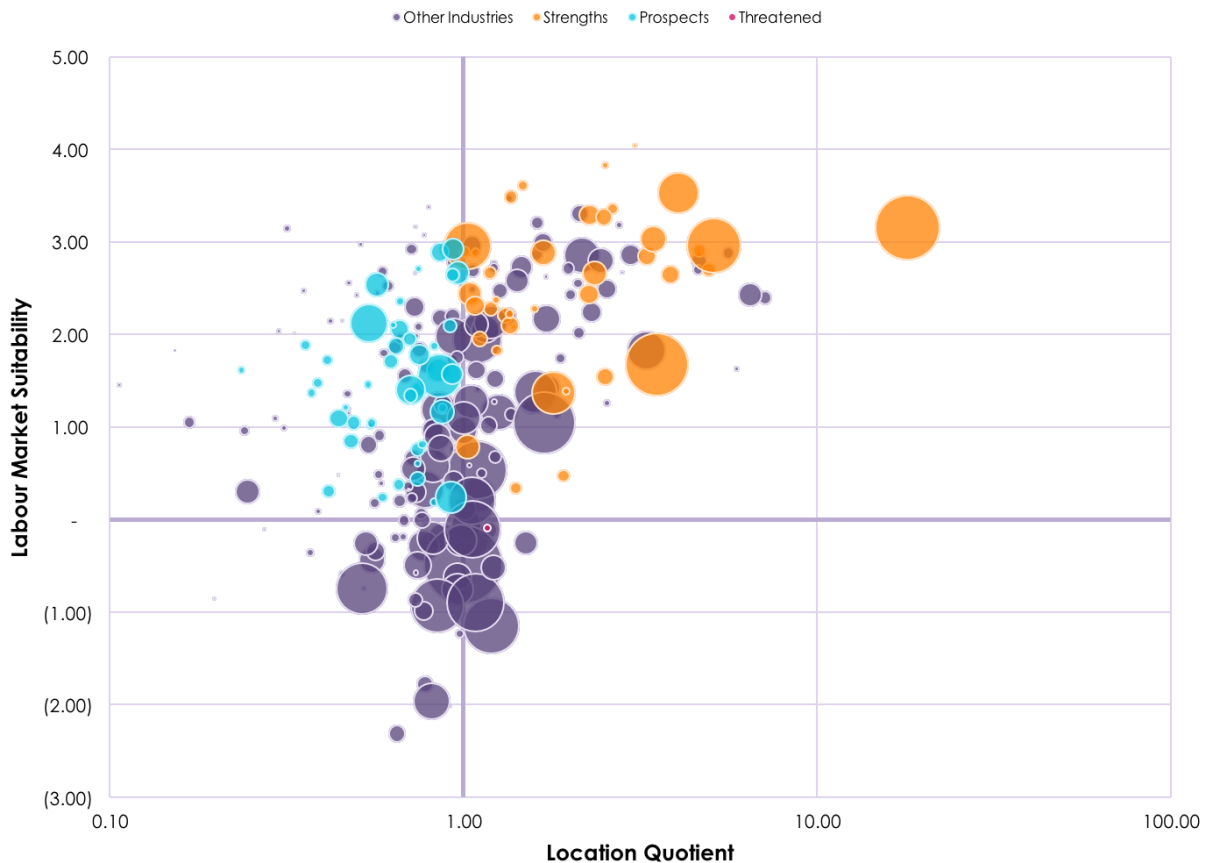


Exhibit 17: Identifying Kitchener-Waterloo's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3342	Communications equipment manufacturing	3.16	17.99	7,620	\$ 78,621
3361	Motor vehicle manufacturing	3.53	4.05	3,120	\$ 74,469
3345	Navigational, measuring, medical and control instruments manufacturing	3.29	2.27	830	\$ 71,520
3339	Other general-purpose machinery manufacturing	3.03	3.44	1,295	\$ 65,625
5112	Software publishers	2.66	2.35	1,160	\$ 87,524
3363	Motor vehicle parts manufacturing	2.96	5.10	5,420	\$ 61,087
5241	Insurance carriers	1.68	3.53	7,235	\$ 68,149
3353	Electrical equipment manufacturing	3.27	2.49	580	\$ 66,550
5415	Computer systems design and related services	2.95	1.03	4,075	\$ 74,156
3333	Commercial and service industry machinery manufacturing	2.85	3.30	690	\$ 64,365

Exhibit 18: Kitchener-Waterloo's top 10 industry strengths

As expected, our system shows various ICT industries in the top ten list of existing strengths (see *Exhibit 18*). Communications equipment manufacturing (NAICS 3342) is far-and-away the strongest local specialization with an LQ of nearly 18, largely due to the presence of Blackberry. Software (NAICS 5112) and computer systems (NAICS 5415) are also overrepresented in the local economy. One of Kitchener-Waterloo's lesser appreciated characteristics is the extent of its economic diversity. Before it was a high-tech powerhouse, the region was a hub of manufacturing. What many don't realize is that much of this function still exists. Auto (NAICS 3361) and parts manufacturing (NAICS 3363) are major local employers as well as machinery manufacturing (NAICS 3339) and commercial machinery manufacturing (NAICS 3333). This diversified manufacturing base is likely an underappreciated aspect of the evolution of Kitchener-Waterloo into a centre of innovation. Going forward, there are many exciting opportunities in the areas where ICT connects with more traditional manufacturing sectors such as auto manufacturing.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
4173	Computer and communications equipment and supplies wholesaler-distributors	2.92	945	\$ 86,316
5239	Other financial investment activities	1.61	1,080	\$100,505
5221	Depository credit intermediation	2.12	2,700	\$ 70,364
5413	Architectural, engineering and related services	1.55	3,475	\$ 78,034
3364	Aerospace product and parts manufacturing	2.89	685	\$ 69,748
5171	Wired telecommunications carriers	2.54	1,075	\$ 69,017
4179	Other machinery, equipment and supplies wholesaler-distributors	2.66	1,005	\$ 67,101
5231	Securities and commodity contracts intermediation and brokerage	1.71	425	\$139,056
5417	Scientific research and development services	1.57	895	\$ 78,658
5416	Management, scientific and technical consulting services	1.40	1,675	\$ 76,211

Exhibit 19: Kitchener-Waterloo's top 10 industry prospects

Many of Kitchener-Waterloo's top prospects that we identify with our system are related to the ICT industry (see *Exhibit 19*) such as wholesale (NAICS 4173 & 4179), science and R&D services (NAICS 5416 & 5417), and wired telecommunications (NAICS 5171). Clearly, Kitchener-Waterloo possesses a highly skilled workforce with a particular edge in ICT, but this talent is fairly concentrated in a subset of industries. The good news is that there are more ICT related sectors that offer additional possibilities for future growth and diversification. A second area of prospects are related to financial services. Depository credit intermediation (NAICS 5221), securities and commodity contracts intermediation and brokerage (NAICS 5231), and other financial investment activities (NAICS 5239) all appear in our top 10 list of industry prospects for Kitchener-Waterloo. Deeper integration with the Toronto economy would likely help spur additional growth and expansion in these economic activities.

4.1.4 - Guelph

Guelph is the quietly successful member of the larger 'supercluster' region (see *Exhibit 20*). It does not have Toronto's scale or Kitchener-Waterloo's reputation for tech, but it consistently scores high on performance measures of the knowledge economy, including the share of the work force in the creative class. In many ways it is ideally located between Toronto, Kitchener-Waterloo, and Hamilton which provides it with more possibilities to create inter-regional linkages. It has a strong manufacturing base, but has also traditionally been a centre for agricultural knowledge, particularly at the University of Guelph. There is increasing anecdotal evidence of Guelph being a preferred "second choice" for young knowledge workers who have been priced out of the Toronto area real estate market. With that in mind, Guelph has a great deal to gain from the possible development of a high-speed rail link between Toronto and Kitchener-Waterloo.

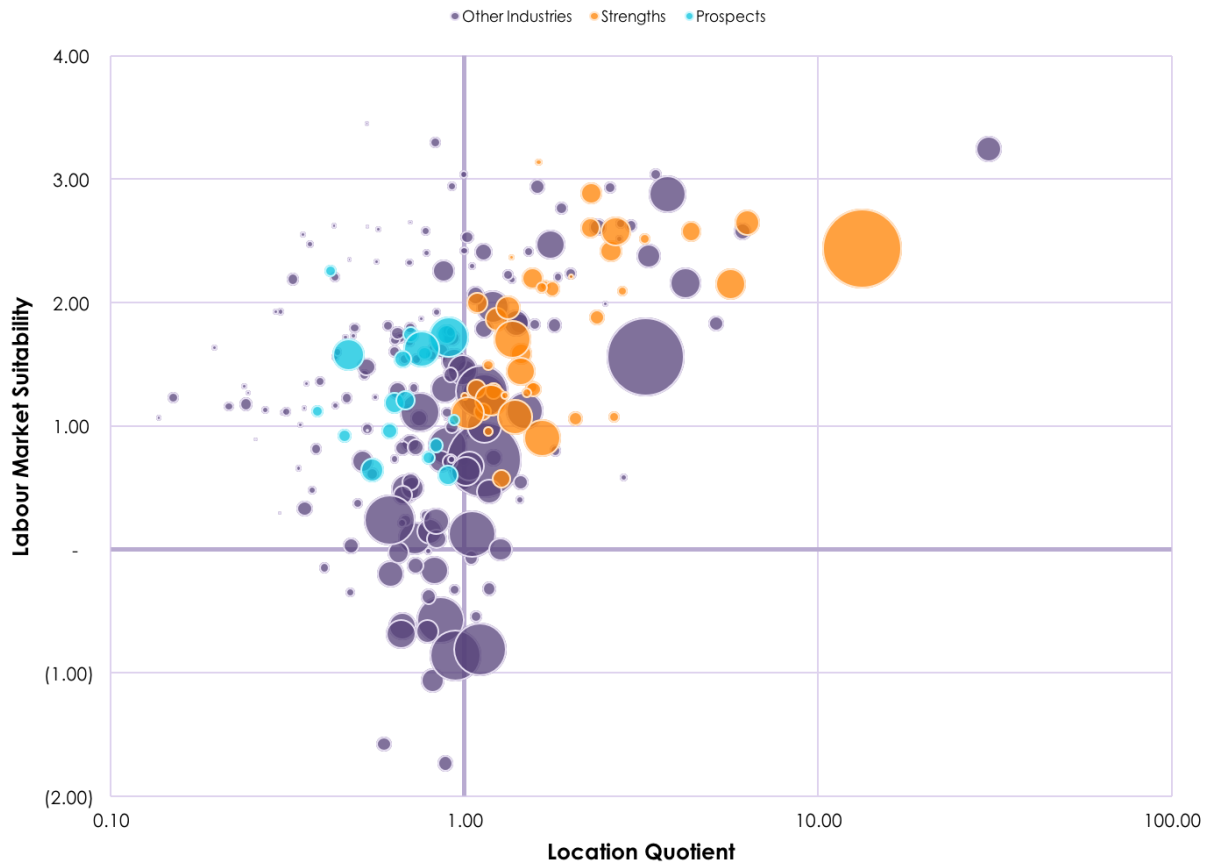


Exhibit 20: Identifying Guelph's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3361	Motor vehicle manufacturing	2.58	2.68	620	\$ 74,469
3353	Electrical equipment manufacturing	2.65	6.30	440	\$ 66,550
3342	Communications equipment manufacturing	2.42	2.60	330	\$ 78,621
3363	Motor vehicle parts manufacturing	2.44	13.30	4,240	\$ 61,087
3254	Pharmaceutical and medicine manufacturing	2.88	2.28	320	\$ 67,927
3339	Other general-purpose machinery manufacturing	2.15	5.66	640	\$ 65,625
3333	Commercial and service industry machinery manufacturing	2.58	4.38	275	\$ 64,365
4145	Pharmaceuticals, toiletries, cosmetics and sundries wholesaler-distributors	2.20	1.56	315	\$ 80,178
3121	Beverage manufacturing	2.60	2.27	275	\$ 65,704
5416	Management, scientific and technical consulting services	1.70	1.36	970	\$ 76,211

Exhibit 21: Guelph's top 10 industry strengths

Like many city-regions in Southern Ontario, Guelph displays a clear strength in auto manufacturing (see *Exhibit 21*). Motor vehicle parts manufacturing (NAICS 3363) is particularly notable with an LQ over 13. Its relatively central location is likely a source of advantage in terms of logistics. For a smaller metropolitan region however, Guelph is quite diverse with additional knowledge economy strengths, including ICT and pharmaceuticals. For its size, Guelph is in a very good position with many existing strengths. In terms of its share of employment in sectors classified as strengths, the city-region comes second behind Toronto. An advantageous location with a solid research university, a highly skilled labour force, and modest house prices make Guelph well-positioned for future growth.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5413	Architectural, engineering and related services	1.72	1,100	\$ 78,034
4173	Computer and communications equipment and supplies wholesaler-distributors	1.74	270	\$ 86,316
5415	Computer systems design and related services	1.62	900	\$ 74,156
2211	Electric power generation, transmission and distribution	1.19	300	\$ 92,566
5239	Other financial investment activities	1.21	260	\$100,505
5221	Depository credit intermediation	1.58	705	\$ 70,364
5411	Legal services	0.64	385	\$ 96,617
5222	Non-depository credit intermediation	1.59	135	\$ 71,972
5414	Specialized design services	1.74	190	\$ 43,918
3364	Aerospace product and parts manufacturing	2.26	100	\$ 69,748

Exhibit 22: Guelph's top 10 industry prospects

Guelph's top 10 prospective industry list shows that the region's current labour force can potentially support growth and diversification in a number of directions (see *Exhibit 22*). Architectural, engineering and related services (NAICS 5413) and specialized design services (NAICS 5414) stand out as a couple of areas of potential that indicate the presence of workers in the Guelph economy that have design skills. Two ICT sectors, computer systems design and related services (NAICS 5415) and computer and communications equipment and supplies wholesaler-distributors (NAICS 4173), also appear near the top of the list. A third area of possible expansion includes financial services with other financial investment activities (NAICS 5221), depository credit intermediation (NAICS 5222), and 'non-depository credit intermediation' (NAICS 5239) all appearing in the top 10.

4.1.5 – Oshawa

Oshawa's economy is usually associated with the automotive manufacturing industry especially in relation to the General Motors assembly plant. However, work in the sector is not as plentiful as it once was. The other major employers of note in the region are the Pickering and Darlington Nuclear Generating Stations, which together provide roughly 40% of the province's electricity. In the near-to-medium term, Pickering is to be shut down while there will be large-scale reinvestment in Darlington. Overall there will likely be a loss of jobs.

The growth of the Oshawa region to the west as well as the Toronto region's growth eastward has essentially closed any clear gap between the two. Indeed, many Oshawa CMA residents commute into the Toronto region on a daily basis, with the converse also being true. It must be noted then, that as the data is from the National Household Survey, it is residence based and thus reflects the economic profile of the local labour force rather than the local business community.

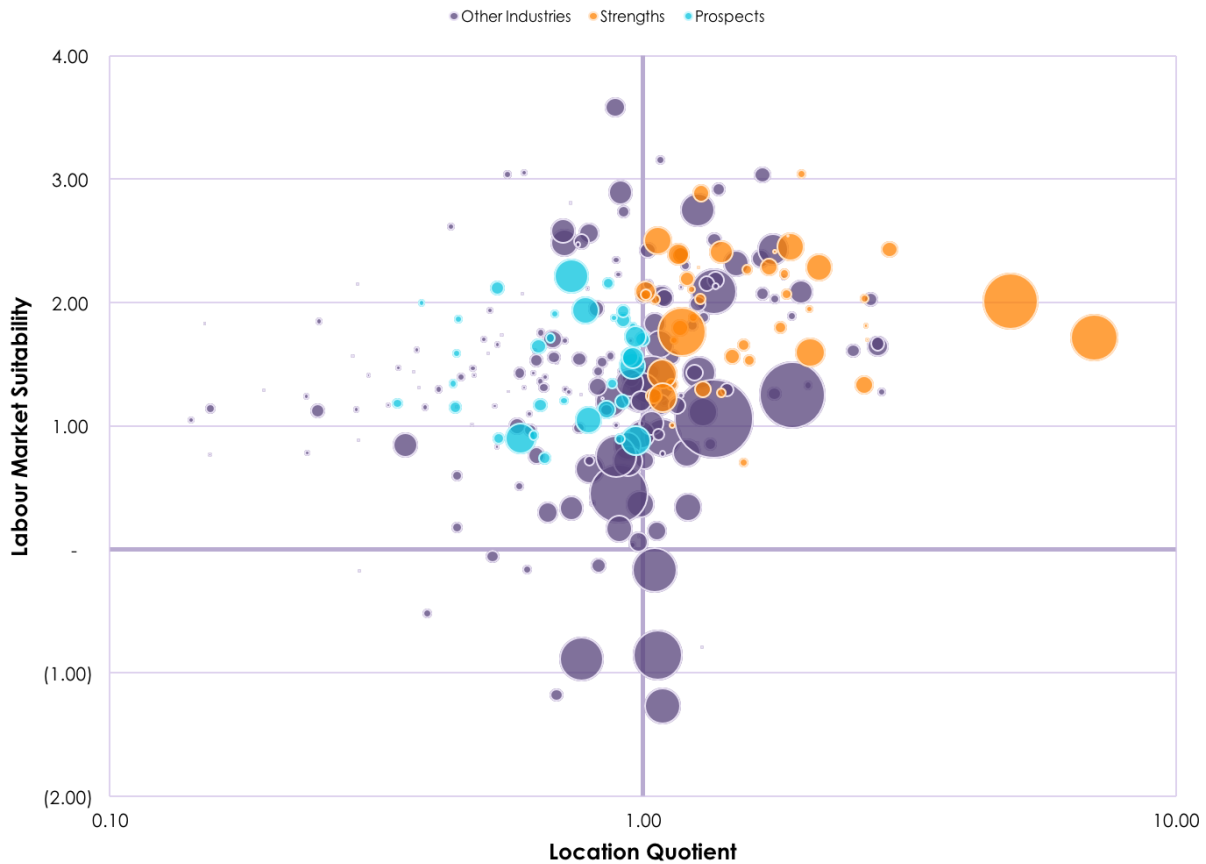


Exhibit 23: Identifying Oshawa's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
2211	Electric power generation, transmission and distribution	2.01	4.89	5,495	\$ 92,566
4173	Computer and communications equipment and supplies wholesaler-distributors	2.45	1.89	1,365	\$ 86,316
3361	Motor vehicle manufacturing	1.72	7.03	3,860	\$ 74,469
4142	Home entertainment equipment and household appliance wholesaler-distributors	3.04	1.98	160	\$ 71,077
4151	Motor vehicle wholesaler-distributors	2.43	2.90	495	\$ 62,080
4851	Urban transit systems	2.28	2.14	1,325	\$ 62,709
5171	Wired telecommunications carriers	2.50	1.07	1,435	\$ 69,017
5172	Wireless telecommunications carriers (except satellite)	2.29	1.73	600	\$ 65,494
4882	Support activities for rail transportation	2.03	2.60	150	\$ 70,763
3341	Computer and peripheral equipment manufacturing	2.23	1.84	205	\$ 69,079

Exhibit 24: Oshawa's top 10 industry strengths

Not surprisingly, both electric power generation (NAICS 2211) and motor vehicle manufacturing (NAICS 3361) show up in the top 10 list of Oshawa's industrial strengths (see *Exhibit 24*). Both have very high LQs (4.89 and 7.03 respectively) and employ thousands of workers. Less expected is the appearance of a number of ICT related sectors in the Oshawa regional economy. Computer and peripheral equipment manufacturing (NAICS 3341), computer and communications equipment and supplies wholesaler-distributors (NAICS 4173), wired telecommunications carriers (NAICS 5171), and wireless telecommunications carriers (NAICS 5172) are all identified as being in the top 10 set of local industrial strengths. The continued growth and maturation of the University of Ontario Institute of Technology, located in Oshawa, can be leveraged a source of support for these sectors.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5415	Computer systems design and related services	2.21	2,075	\$ 74,156
5239	Other financial investment activities	1.72	880	\$100,505
5412	Accounting, tax preparation, bookkeeping and payroll services	1.94	1,360	\$ 69,979
4145	Pharmaceuticals, toiletries, cosmetics and sundries wholesaler-distributors	1.86	440	\$ 80,178
3342	Communications equipment manufacturing	2.16	260	\$ 78,621
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	2.12	390	\$ 71,391
5231	Securities and commodity contracts intermediation and brokerage	1.20	445	\$139,056
5411	Legal services	0.88	1,620	\$ 96,617
5413	Architectural, engineering and related services	0.90	1,705	\$ 78,034
5222	Non-depository credit intermediation	1.70	415	\$ 71,972

Exhibit 25: Oshawa's top 10 industry prospects

The list of top prospective industries for the Oshawa city-region is heavy on ICT and financial services, likely owing to its proximity to the Toronto region (see *Exhibit 25*). Computer systems design and related services (NAICS 5415) and communications equipment manufacturing (NAICS 3342) are the notable ICT sectors while non-depository credit intermediation (NAICS 5222), securities and commodity contracts intermediation and brokerage (NAICS 5231), and other financial investment activities (NAICS 5239) are the financial services industries that appear on the list. If auto manufacturing and power generation employment does indeed wind down over the coming years in Oshawa, an increasing effort to integrate within the larger Greater Toronto and larger 'supercluster' regional economy is likely a strategy worth pursuing.

4.2 – Southwestern Ontario and the Niagara Peninsula

The area of the province that is most closely connected to the Midwestern United States, Southwestern Ontario and the Niagara Peninsula, is in many ways also the area most affected by economic cycles emanating from Ontario's southern neighbours (see *Exhibit 26*). To a degree, this can also be detected culturally as one travels down the 401 from Toronto towards Windsor. Somewhere around London one can spot a shift in pro-sport team allegiances from Toronto's Maple Leafs and Blue Jays to Detroit's Red Wings and Tigers. A similar pattern can be felt in the Niagara region as one approaches Buffalo. These local economies connect into the traditional centre of the US manufacturing heartland. As fortunes have generally soured in what has been called the American 'rustbelt' in recent decades, there has also been similar difficulty in the southernmost parts of Ontario. Many manufacturing industries that have provided an economic base are also ones that are highly cost-sensitive and subject to automation.

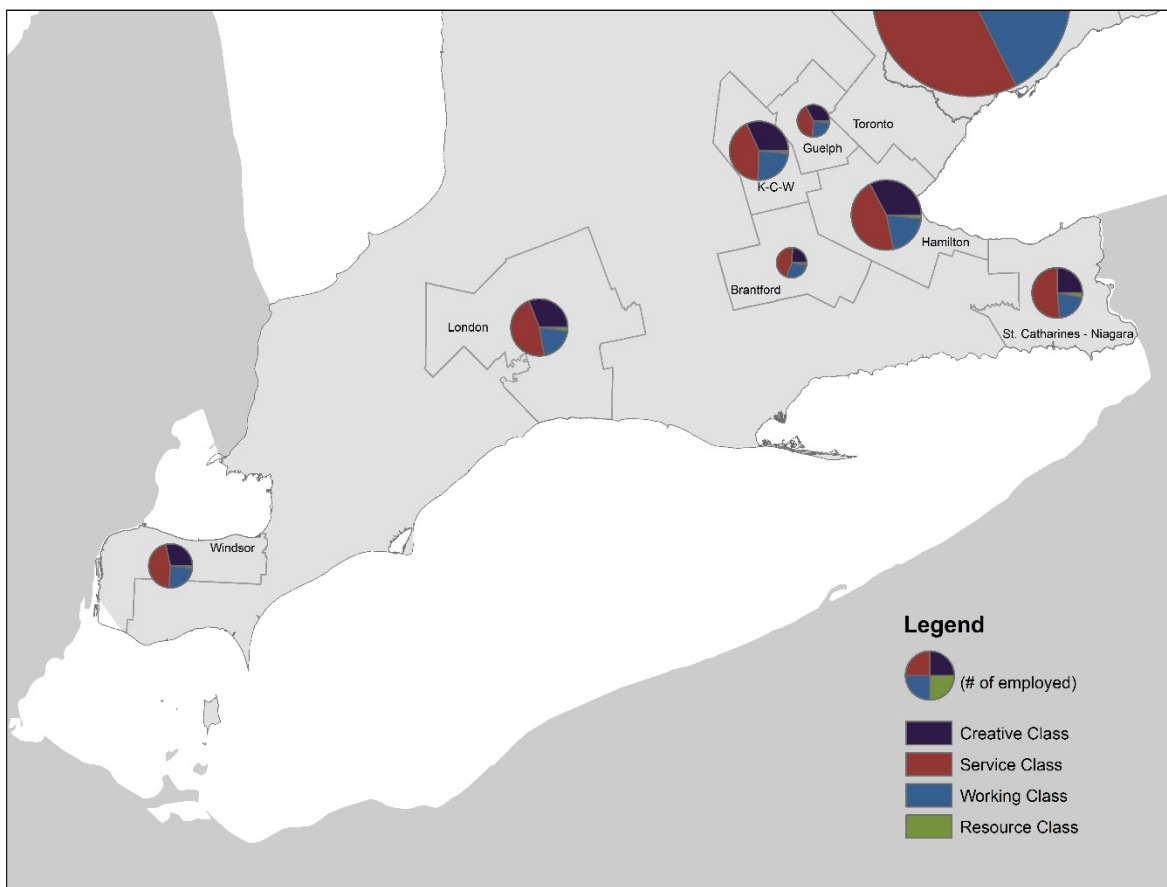
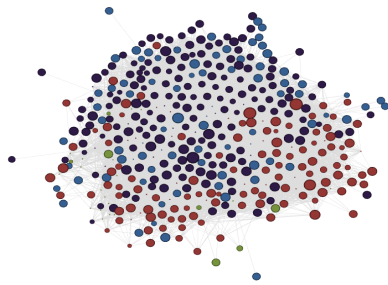
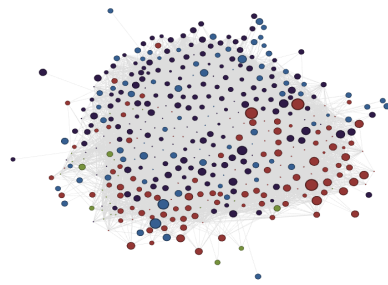


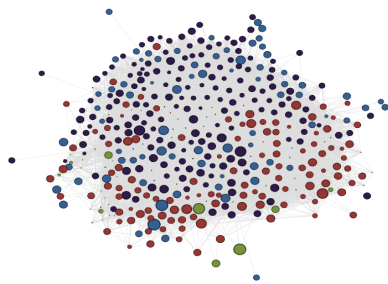
Exhibit 26: Southwestern Ontario city-regions



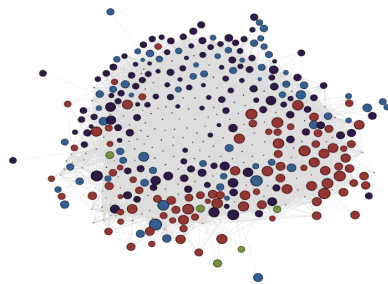
London



Windsor



St. Catharines-Niagara



Brantford

Exhibit 27: Occupational profiles of Southwestern Ontario regions

4.2.1 – London

London is the largest city-region in Southwestern Ontario. The metropolitan area has a current population of roughly half a million. Its location could arguably be described as the geographic center of the automotive manufacturing industry in the province. It has also historically been a hub for insurance industry employment. As both of these key industries have been under strain in recent decades, there is extra pressure on London to take steps to adapt the fundamental structure of its economy. An encouraging aspect is the relatively high number of 'prospect' industries in the region (see *Exhibit 28* above).

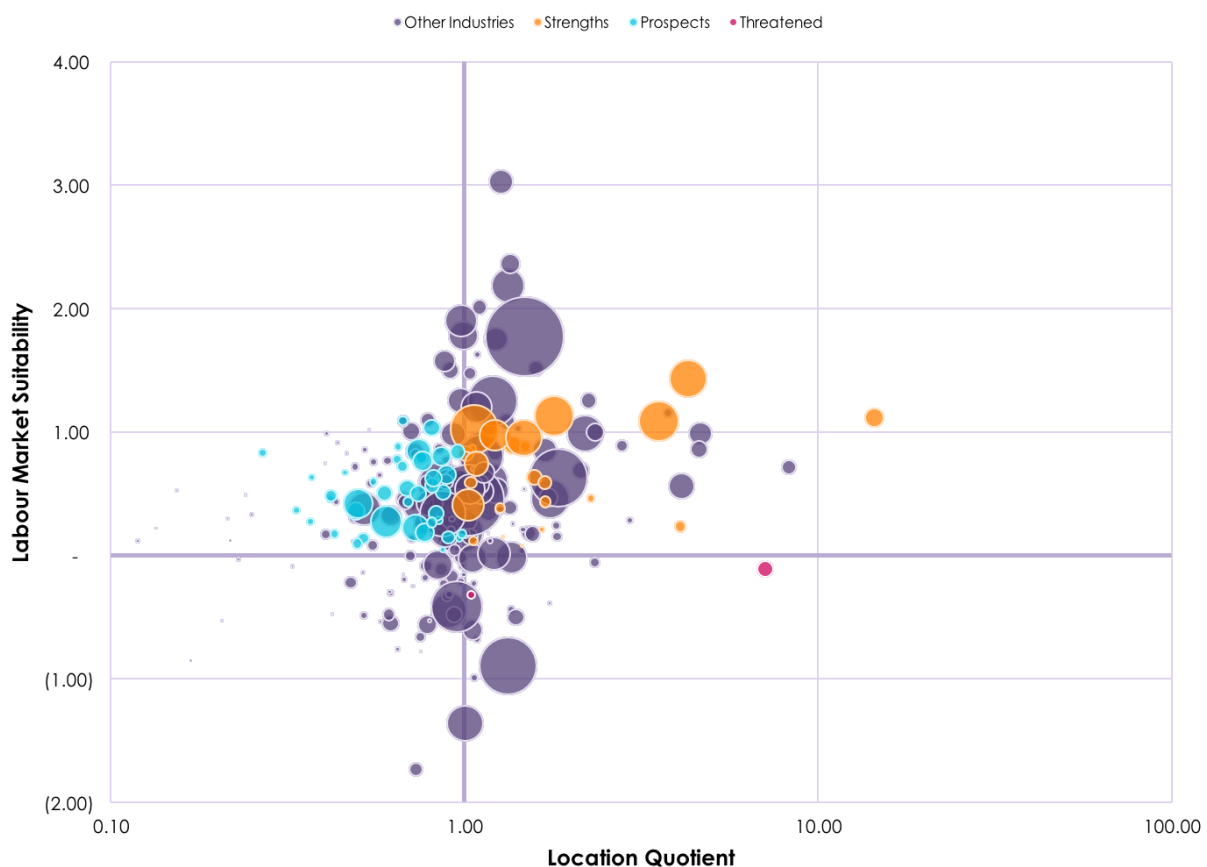


Exhibit 28: Identifying London's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3361	Motor vehicle manufacturing	1.43	4.29	3,085	\$ 74,469
5241	Insurance carriers	1.13	1.79	3,425	\$ 68,149
3369	Other transportation equipment manufacturing	1.11	14.43	845	\$ 65,688
3363	Motor vehicle parts manufacturing	1.09	3.54	3,510	\$ 61,087
5221	Depository credit intermediation	1.02	1.07	4,975	\$ 70,364
5222	Non-depository credit intermediation	0.89	1.37	745	\$ 71,972
3314	Non-ferrous metal (except aluminum) production and processing	0.24	4.07	335	\$ 88,360
3121	Beverage manufacturing	0.63	1.58	595	\$ 65,704
5242	Agencies, brokerages and other insurance related activities	0.97	1.22	2,160	\$ 63,561
7139	Other amusement and recreation industries	0.95	1.47	2,830	\$ 39,482

Exhibit 29: London's top 10 industry strengths

The profile of London's top industrial strengths highlights the two pillars of auto manufacturing and insurance and related financial services (see *Exhibit 29* above). Other transportation equipment manufacturing (NAICS 3369) is the region's (which includes St. Thomas) most pronounced specialization with a location quotient of 14.4. Auto manufacturing (NAICS 3361) and auto parts manufacturing (NAICS 3363) are identified as being in the top four of London's industrial strengths. There have been a number of major plant closures in recent years which have likely had a negative effect on employment numbers. However, it is important to keep in mind that even though jobs may have disappeared, most of the people who have been working in them remain. New jobs need to be created that fit the skills profile of the labour force. Whether these are directly in auto manufacturing or in closely related industries is an open question.

The insurance industry is one of London's longstanding economic strengths. Insurance carriers (NAICS 5241) has a location quotient of 1.79 and employs 3,425 people. Depository credit intermediation (NAICS 5221), non-depository credit intermediation (NAICS 5222), and agencies, brokerages and other insurance related activities (NAICS 5242) are additional areas of strength in the financial services industry employing

thousands of workers. The larger financial services industry has similarly gone through a degree of downsizing and reorganization as much of the growth has tended towards Toronto and other larger urban centres. However, the skillsets of workers in service industries are often more flexible and adaptable than those in manufacturing.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5239	Other financial investment activities	0.76	905	\$100,505
5171	Wired telecommunications carriers	0.85	1,305	\$ 69,017
5417	Scientific research and development services	0.63	735	\$ 78,658
4179	Other machinery, equipment and supplies wholesaler-distributors	0.80	835	\$ 67,101
5413	Architectural, engineering and related services	0.42	1,895	\$ 78,034
2211	Electric power generation, transmission and distribution	0.36	725	\$ 92,566
4173	Computer and communications equipment and supplies wholesaler-distributors	0.50	560	\$ 86,316
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	0.54	660	\$ 71,391
4851	Urban transit systems	1.03	655	\$ 62,709
5415	Computer systems design and related services	0.27	2,225	\$ 74,156

Exhibit 30: London's top 10 industry prospects

A number of the top prospect industries for London are related to information and communications technologies and research and development. Wired communications carriers (NAICS 5171), scientific research and development services (NAICS 5417), computer and communications equipment and supplies wholesaler-distributors (NAICS 4173), and computer systems design and related services (NAICS 5415) are all identified as top 10 prospects. These industries would seem to have a lot of potential generally in the province. The question is why they haven't begun to thrive as part of the London economy. The Kitchener-Waterloo region has a similar industrial history to London and both boast significant research intensive universities. Yet, tech industries are only flourishing in the former. London would benefit from developing a deeper

understanding as to why this is. A robust tech industry, potentially tied to its financial services industry, could be a very promising development for the region.

4.2.2 – Windsor

Windsor is known as one of Canada's main centres of auto manufacturing as well as being the gateway to Detroit and the Midwest US manufacturing belt. Roughly half way between Toronto and Chicago, it is a key point in supply chains between the two countries. Thus, the addition of a second bridge across the Detroit River is an important piece of infrastructure for many manufacturing industries in Ontario. Because Windsor is highly specialized and tightly connected with the US it has historically been a boom-bust city and a harbinger of turns in economic cycles. The region's specialized nature is a prime example of the related pitfalls and it generally lacks a wide range of pathways to a more knowledge-based economy (see *Exhibit 31* below).



Exhibit 31: Identifying Windsor's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3361	Motor vehicle manufacturing	1.93	15.94	6,825	\$ 74,469
3363	Motor vehicle parts manufacturing	1.94	8.47	4,995	\$ 61,087
3254	Pharmaceutical and medicine manufacturing	0.51	3.95	1,025	\$ 67,927
3339	Other general-purpose machinery manufacturing	1.05	3.85	805	\$ 65,625
3332	Industrial machinery manufacturing	1.18	3.26	310	\$ 62,791
2123	Non-metallic mineral mining and quarrying	0.84	1.75	220	\$ 80,731
3121	Beverage manufacturing	0.57	2.56	575	\$ 65,704
3112	Grain and oilseed milling	0.24	3.43	180	\$ 65,913
7139	Other amusement and recreation industries	1.36	1.43	1,635	\$ 39,482
3312	Steel product manufacturing from purchased steel	1.16	2.28	140	\$ 63,687

Exhibit 32: Windsor's top 10 industry strengths

Not surprisingly, the top two industries identified as local strengths are Motor vehicle manufacturing (NAICS 3361) and Motor vehicle parts manufacturing (NAICS 3363) with location quotients of 15.94 and 8.47 respectively. Together these industries directly employ nearly 12,000 people in the Windsor CMA. Industries with similar labour profiles that are also strongly represented locally include other general-purpose machinery manufacturing (NAICS 3339) and industrial machinery manufacturing (NAICS 3332). Other notable sources of economic strength include pharmaceutical and medicine manufacturing (NAICS 3254), salt mining (NAICS 2123), the historic headquarters of Hiram Walker (NAICS 3121), and a major casino (NAICS 7139).

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
2211	Electric power generation, transmission and distribution	0.31	510	\$ 92,566
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	0.91	290	\$ 71,391
5413	Architectural, engineering and related services	0.19	1,460	\$ 78,034
4161	Electrical, plumbing, heating and air-conditioning equipment and supplies wholesaler-distributors	0.73	385	\$ 63,140
3364	Aerospace product and parts manufacturing	0.99	130	\$ 69,748
4145	Pharmaceuticals, toiletries, cosmetics and sundries wholesaler-distributors	0.30	230	\$ 80,178
5415	Computer systems design and related services	0.12	940	\$ 74,156
2373	Highway, street and bridge construction	0.45	220	\$ 71,896
4179	Other machinery, equipment and supplies wholesaler-distributors	0.61	260	\$ 67,101
3251	Basic chemical manufacturing	0.63	100	\$ 85,857

Exhibit 33: Windsor's top 10 industry prospects

Due to the specialized nature of the Windsor economy, the region has relatively few clear prospects for branching into new industries. The top 10 list of prospects does not offers a distinct set of messages that could inform an industrial strategy. Most of the sectors listed draw upon engineering knowledge that may be abundant in auto manufacturing. This includes activities such as construction, aerospace, and engineering services. Rather than pursuing a diversification strategy, Windsor may be better served by aiming to build on its existing strengths, particularly with respect to emerging technologies in the auto sector.

4.2.3 – St. Catharines-Niagara

The St. Catharines-Niagara region is comprised of a collection of cities, towns, and some highly productive countryside. Niagara Falls are a world famous tourist destination that gives the region a degree of global name brand recognition. The border with the US also serves as an important gateway to upstate New York and destinations beyond. Like many areas of Southern Ontario, auto manufacturing plays an important role in the St. Catharines-Niagara economy. That being said, the region is more diversified than many other CMAs of similar size. The natural environment plays a significant part in the economy, providing unique agricultural and tourism related activities. Additionally, the Welland Canal provides an important shipping route between Lake Erie (and all of the upper Great Lakes), Lake Ontario, and the St. Lawrence Seaway.

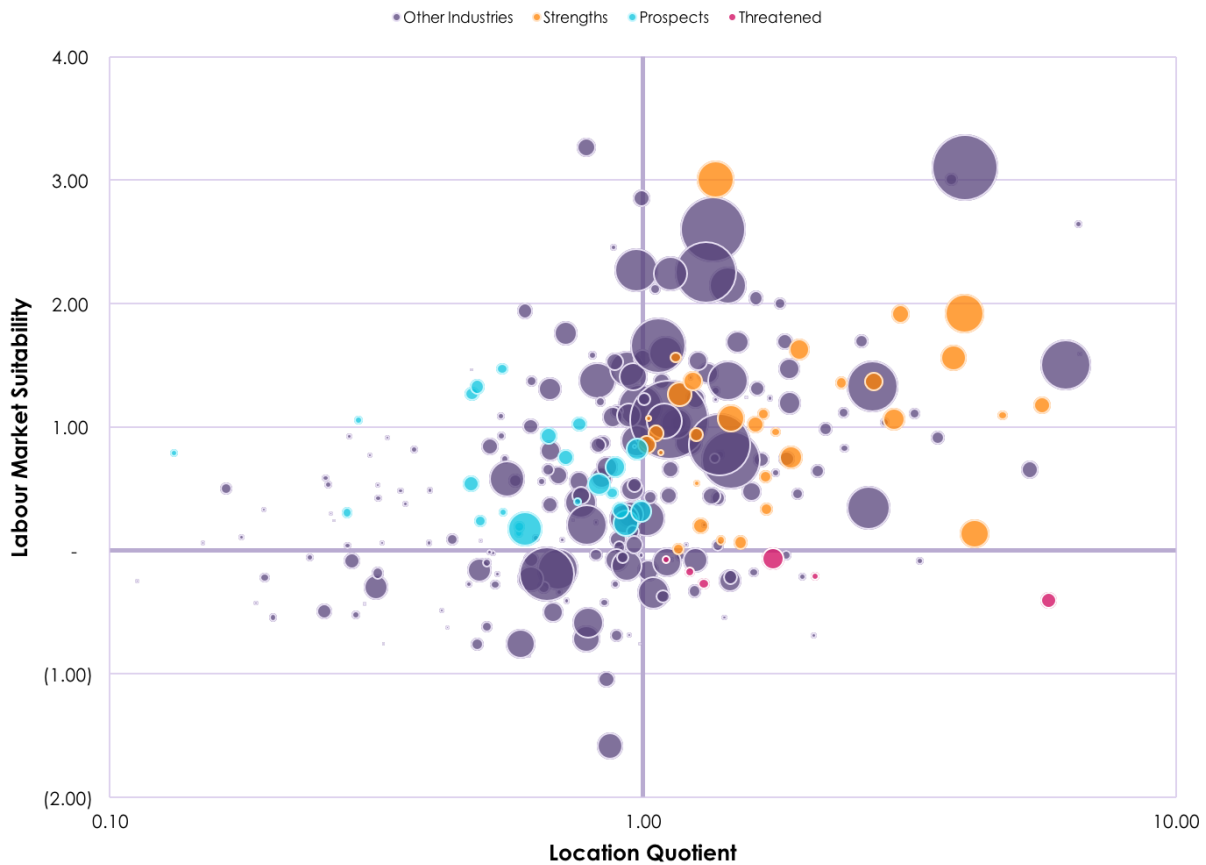


Exhibit 34: Identifying St. Catharines-Niagara's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3361	Motor vehicle manufacturing	1.92	4.01	2,270	\$ 74,469
3311	Iron and steel mills and ferro-alloy manufacturing	1.06	2.95	755	\$ 68,221
7121	Heritage institutions	1.56	3.83	1,025	\$ 52,441
4162	Metal service centres	1.37	2.72	545	\$ 64,164
3312	Steel product manufacturing from purchased steel	1.18	5.62	455	\$ 63,687
2362	Non-residential building construction	1.27	1.17	940	\$ 74,494
2373	Highway, street and bridge construction	1.37	1.24	585	\$ 71,896
3121	Beverage manufacturing	0.14	4.19	1,245	\$ 65,704
7112	Spectator sports	1.91	3.04	525	\$ 47,523
4831	Deep sea, coastal and great lakes water transportation	1.36	2.36	225	\$ 66,999
7111	Performing arts companies	1.63	1.97	650	\$ 42,578

Exhibit 35: St. Catharines-Niagara's top 10 industry strengths

As it does in many mid-sized Southern Ontario communities, motor vehicle manufacturing (NAICS 3361) tops the list of local industrial strengths. The largest employer is a General Motors plant in St. Catharines. Overall, the location quotient is 4.01 with a total of 2,270 jobs paying on average \$74,469 per year. The second area of strength is steel and metal manufacturing. Iron and steel mills and ferro-alloy manufacturing (NAICS 3311), metal service centres (NAICS 4162), and steel product manufacturing from purchased steel (NAICS 3312) are all in the top five of identified strengths. A third major area of the local economy is tourism. Niagara Falls is the best known asset, but the region boasts many others. The local climate supports the growing of soft skinned fruit, including grapes which supports a vibrant wine making industry (NAICS 3121). The historic town of Niagara-on-the-Lake holds the annual Shaw Festival, which sustains a highly successful live theatre scene (NAICS 7111). The area is home to numerous heritage sites (NAICS 7121) which also act to draw visitors. Despite having built a robust tourism industry there is likely still much room to grow the local cultural economy, especially in response to changing tastes and expectations of travelers.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	0.82	735	\$ 71,391
4821	Rail transportation	1.47	195	\$ 76,014
2211	Electric power generation, transmission and distribution	0.22	1,075	\$ 92,566
4179	Other machinery, equipment and supplies wholesaler-distributors	0.67	680	\$ 67,101
3364	Aerospace product and parts manufacturing	0.75	420	\$ 69,748
5413	Architectural, engineering and related services	0.18	1,790	\$ 78,034
4851	Urban transit systems	1.27	305	\$ 62,709
2131	Support activities for mining and oil and gas extraction	0.79	105	\$ 93,079
5121	Motion picture and video industries	1.33	340	\$ 56,839
3345	Navigational, measuring, medical and control instruments manufacturing	0.47	235	\$ 71,520

Exhibit 36: St. Catharines-Niagara's top 10 industry prospects

The top 10 list of St. Catharines-Niagara's industry prospects does not present a singular narrative. Industries with skill profiles similar to ones that are identified as current strengths include various transportation related activities as well as motion picture and video industries (NAICS 5121) which is similar to performing arts (NAICS 7111). Some of these industries can be interpreted as false positives. Skills are not the only factor that support the probability of future industrial success, and in some cases such as film and video, urban transit systems (NAICS 4851), or support activities for mining and oil and gas extraction (NAICS 2131), they are not likely present in St. Catharines-Niagara. In addition to focusing strategies on existing strengths, shifting towards services related to current skills in manufacturing, is a more credible way to expand the industrial profile of the region.

4.2.4 – Brantford

Brantford is a city with a rich manufacturing history. It has gone through extreme swings in its economic fortunes having reached an unemployment rate of 25% in the mid-1980s. The region has bounced back on more than one occasion while remaining true to its manufacturing heritage. Brantford's industrial history is connected to the city's role as a transportation hub (rail and water) and its proximity to a countryside with highly productive agriculture. Some of the most significant early manufacturing firms, such as Massey-Ferguson, produced farming equipment. The current stock of firms tends towards more advanced manufacturing.



Exhibit 37: Identifying Brantford's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3361	Motor vehicle manufacturing	2.17	4.39	890	\$ 74,469
3311	Iron and steel mills and ferro-alloy manufacturing	1.97	3.50	320	\$ 68,221
3254	Pharmaceutical and medicine manufacturing	1.35	3.50	430	\$ 67,927
3122	Tobacco manufacturing	0.72	29.62	215	\$ 84,873
3113	Sugar and confectionery product manufacturing	1.90	8.91	395	\$ 56,167
3331	Agricultural, construction and mining machinery manufacturing	1.85	4.05	350	\$ 62,774
3324	Boiler, tank and shipping container manufacturing	2.13	3.10	145	\$ 64,323
3339	Other general-purpose machinery manufacturing	1.76	2.53	250	\$ 65,625
3363	Motor vehicle parts manufacturing	2.18	1.34	375	\$ 61,087
3332	Industrial machinery manufacturing	2.07	1.89	85	\$ 62,791
4179	Other machinery, equipment and supplies wholesaler-distributors	1.22	1.42	390	\$ 67,101

Exhibit 38: Brantford's top 10 industry strengths

Motor vehicle manufacturing (NAICS 3361) is identified as the top local strength, although the local manufacturing base is more diversified than many other regions in Southern Ontario (see *Exhibit 38*). Tobacco manufacturing (NAICS 3122) is the region's top specialization with a location quotient of 29.62. A number of the other top identified strengths are connected to Brantford's history with farm machinery production. For example, agricultural, construction and mining machinery manufacturing (NAICS 3113), boiler, tank and shipping container manufacturing (NAICS 3324), and other general-purpose machinery manufacturing (NAICS 3339) are all related industries with similar occupational profiles. The top nine identified strengths are manufacturing industries — an unprecedented total compared to other all other Ontario CMAs.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	1.46	240	\$ 71,391
2211	Electric power generation, transmission and distribution	0.53	255	\$ 92,566
2373	Highway, street and bridge construction	1.06	160	\$ 71,896
5411	Legal services	0.12	430	\$ 96,617
5413	Architectural, engineering and related services	0.11	525	\$ 78,034
3342	Communications equipment manufacturing	1.03	105	\$ 78,621
5418	Advertising, public relations, and related services	0.91	210	\$ 60,968
7139	Other amusement and recreation industries	0.56	505	\$ 39,482
5414	Specialized design services	1.18	185	\$ 43,918
5111	Newspaper, periodical, book and director publishers	0.87	190	\$ 57,953

Exhibit 39: Brantford's top 10 industry prospects

The top three identified prospects for the Brantford region are all related to construction and utilities (see *Exhibit 39*). Considering the manufacturing base of the region is so pronounced, it comes as somewhat of a surprise that half of the identified prospects are service industries. Advertising, public relations, and related services (NAICS 5418), Specialized design services (NAICS 5414), and newspaper, periodical, book and director publishers (NAICS 5111) stand out in particular. This suggests that there may be some functional specialization within the key manufacturing industries in Brantford. More detailed analysis is needed to uncover what the specific sources these specializations are.

4.3 – Specialized in Central, Eastern and Northern Ontario

The metro regions in Central, Eastern, and Northern Ontario are typically highly specialized, albeit in different industries. As they all have fairly narrow ranges of current economic strengths, these cities may pose the most significant challenges to Ontario's overall knowledge economy strategy. Ottawa-Gatineau has one of the most highly skilled labour forces in the country, but it is highly concentrated in the public sector. There is a significant technology cluster that is in the process of adjusting after the collapse of Nortel, its flagship company. Kingston is also heavily dependent on public sector employment. Queen's University, healthcare, and a large military presence dominate the local economy. While it is generally knowledge-intensive, it is not export-oriented. Kingston is generally able to attract young people for educational opportunities, but has a difficult time retaining them as the bigger centres of Toronto, Montreal, and Ottawa are only a few hours away. Peterborough and Barrie are just on the edge of the Greater Toronto Area's orbit and currently do not tend to enjoy significant spillover effects. They have relatively lower knowledge-based economies and a fairly narrow range of industries. Sudbury is Northern Ontario's largest mining city and its economy is thus highly specialized. Its economic fortunes are strongly tied to global commodity prices. Thunder Bay is also a resource-based economy. Forestry is the main industry which has been struggling in recent times.

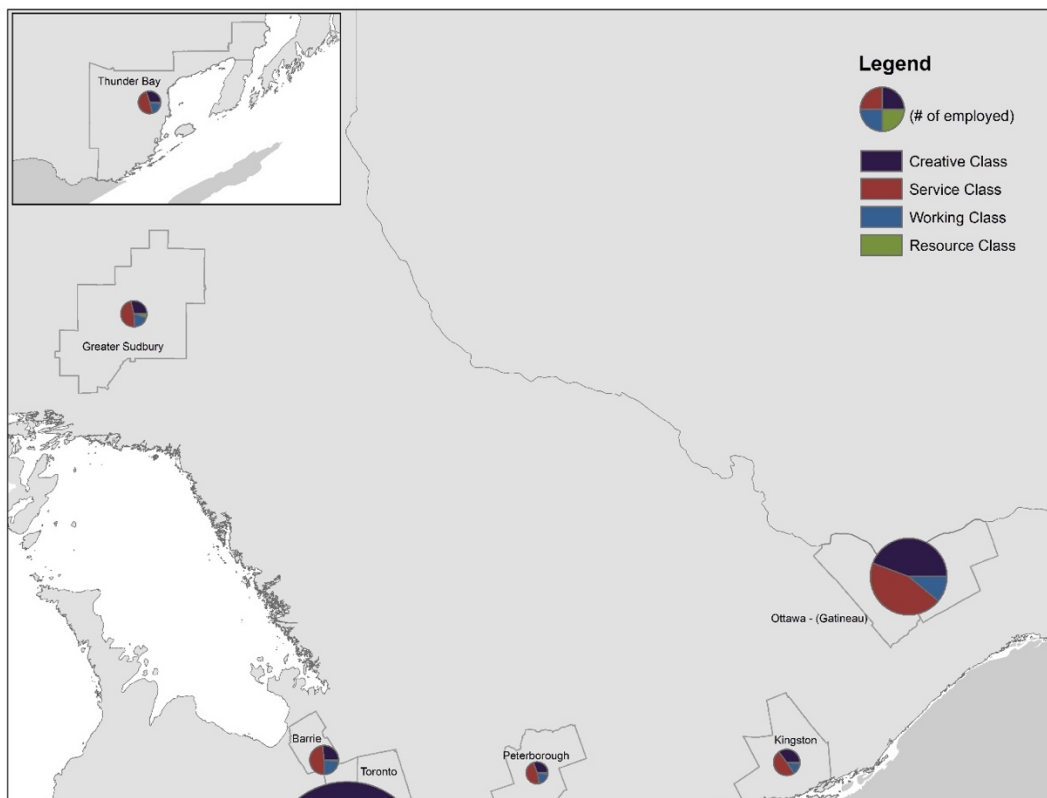
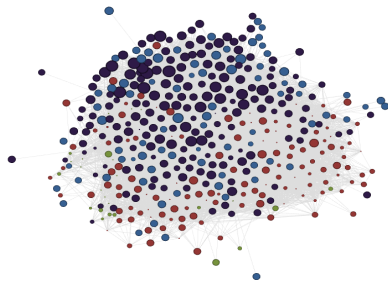
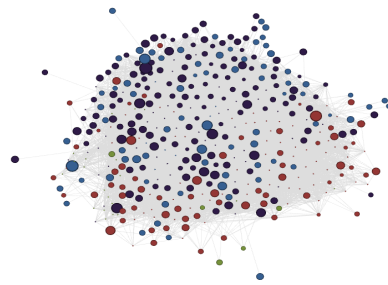


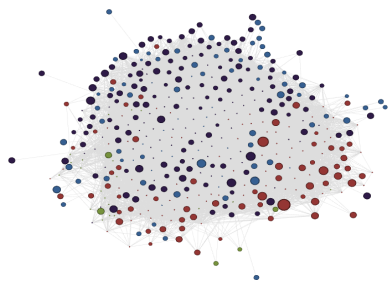
Exhibit 40: Eastern, Central, and Northern Ontario



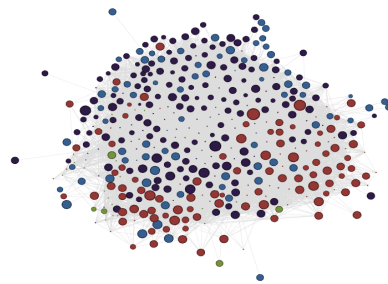
Ottawa-Gatineau



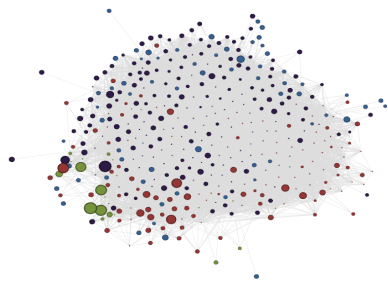
Kingston



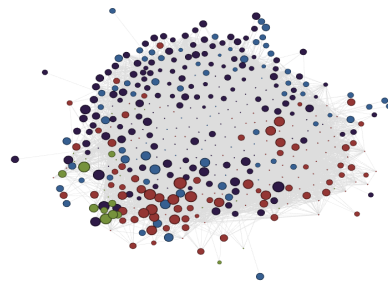
Peterborough



Barrie



Sudbury



Thunder Bay

Exhibit 41: Occupational profiles of Central, Eastern and Northern Ontario regions

4.3.1 – Ottawa-Gatineau

As the nation's capital, Ottawa-Gatineau's economy is highly skewed by the presence of the federal government. It has a highly knowledge-intensive occupational profile, but within an atypical set of industries. This is a similar trait of other national capitals of highly developed countries that do not double as financial/business capitals. The presence of the federal civil service can be a double-edged sword in that it provides many high-paying knowledge-based jobs that tend to be resistant to economic cycles, but it can also dampen local economic dynamism. The one industry that stands out in this regard is the information and communications technology sector which has a strong and longstanding presence in the region. While some of the best-known domestic firms such as Nortel and JDS Uniphase (Fitel) have come and gone, the ICT cluster remains vibrant. Many of the world's largest digital networking companies have a significant R&D footprint in the Ottawa-Gatineau region, largely the result of a highly skilled and sought after workforce.

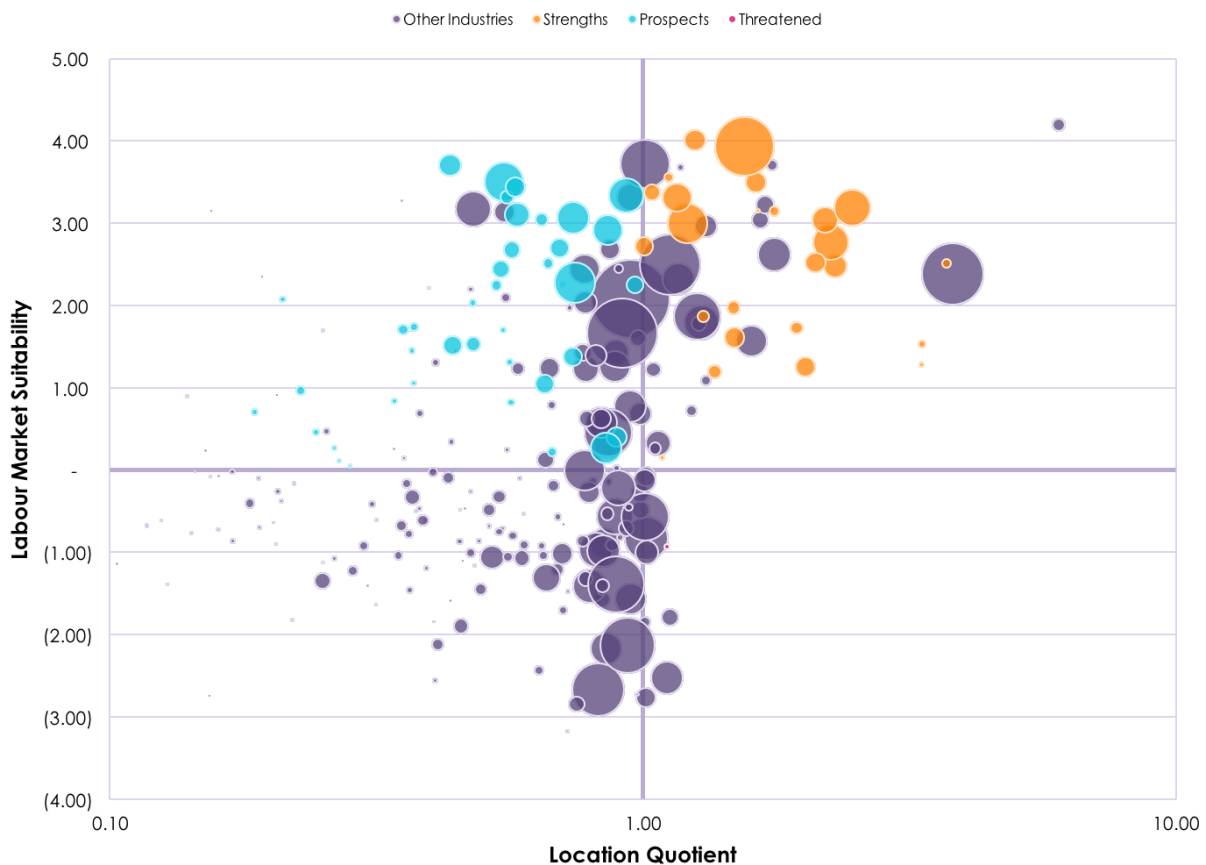


Exhibit 42: Identifying Ottawa-Gatineau's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
5417	Scientific research and development services	3.19	2.47	6,280	\$ 78,658
5415	Computer systems design and related services	3.94	1.55	16,230	\$ 74,156
4173	Computer and communications equipment and supplies wholesaler-distributors	2.77	2.25	6,005	\$ 86,316
5112	Software publishers	3.50	1.63	2,120	\$ 87,524
5222	Non-depository credit intermediation	3.04	2.20	3,380	\$ 71,972
3342	Communications equipment manufacturing	2.48	2.30	2,565	\$ 78,621
5416	Management, scientific and technical consulting services	2.99	1.21	7,580	\$ 76,211
5191	Other information services	4.01	1.25	2,255	\$ 59,666
5174	Satellite telecommunications	2.51	3.72	470	\$ 69,189
3345	Navigational, measuring, medical and control instruments manufacturing	1.25	2.02	1,945	\$ 71,520

Exhibit 43: Ottawa-Gatineau's top 10 industry strengths

Most of the top 10 identified strengths of the Ottawa-Gatineau economy are related to the ICT sector (see *Exhibit 43*). Computer systems design and related services (NAICS 5415), computer and communications equipment and supplies wholesaler-distributors (NAICS 4173), software publishers (NAICS 5112), and communications equipment manufacturing (NAICS 3342) are the most prevalent examples. In all, ICT related industries account for tens of thousands of jobs in the region. The sector's co-location is not unconnected to the presence of the federal government. Many public R&D and scientific labs have historically contributed to the formation and growth of the industry. Computer systems design and related services (NAICS 5417) and management, scientific, and technical consulting services (NAICS 5416) reflect the concentration of research and consulting services in the Ottawa-Gatineau economy.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5411	Legal services	3.34	5,760	\$ 96,617
5239	Other financial investment activities	3.44	1,940	\$100,505
5221	Depository credit intermediation	3.50	7,235	\$ 70,364
5231	Securities and commodity contracts intermediation and brokerage	3.31	1,000	\$139,056
5412	Accounting, tax preparation, bookkeeping and payroll services	3.07	4,785	\$ 69,979
5413	Architectural, engineering and related services	2.28	7,995	\$ 78,034
5241	Insurance carriers	3.70	2,350	\$ 68,149
5171	Wired telecommunications carriers	2.92	4,280	\$ 69,017
5242	Agencies, brokerages and other insurance related activities	3.11	2,915	\$ 63,561
2211	Electric power generation, transmission and distribution	1.51	1,830	\$ 92,566

Exhibit 44: Ottawa-Gatineau's top 10 industry prospects

The industrial prospects for Ottawa-Gatineau tend to be knowledge-intensive professional and financial services. This is a reflection of many of the functions that are taking place within the civil service that do not have corresponding strong presence in the local private sector. Legal services (NAICS 5411), depository credit intermediation (NAICS 5221), and accounting, tax preparation, bookkeeping and payroll services (NAICS 5412) are examples of industries that employ people with similar skills who are currently working within the federal civil service. It should be noted that the Labour Market Suitability Index scores for these and other prospective industries are quite high. This is indicative of the high degree of skills and qualifications found in the local labour force.

4.3.2 – Kingston

Kingston is similar to Ottawa-Gatineau in that its economy is dominated by public sector employment. Higher education, healthcare, and the military are among the largest sectors in the region. The key difference, however, is that these types of public sector jobs tend to be less administrative in nature and more geared toward specific delivery of service. This is important because many of the occupations such as teachers, nurses, and military personnel are more specialized and thus less transferable to similar private sector industries. So while the local labour force is relatively well qualified, the local private sector has not gained much traction. This, in turn, is an issue for the many students that come to the area for their higher education in that most do not remain in the area after graduating due to a general lack of employment opportunities. Similarly, entrepreneurs and knowledge-intensive start-ups that initially establish themselves in the Kingston region often end up decamping to the nearest largest urban centres such as Toronto, Montreal, and Ottawa-Gatineau as they face difficulties scaling-up.

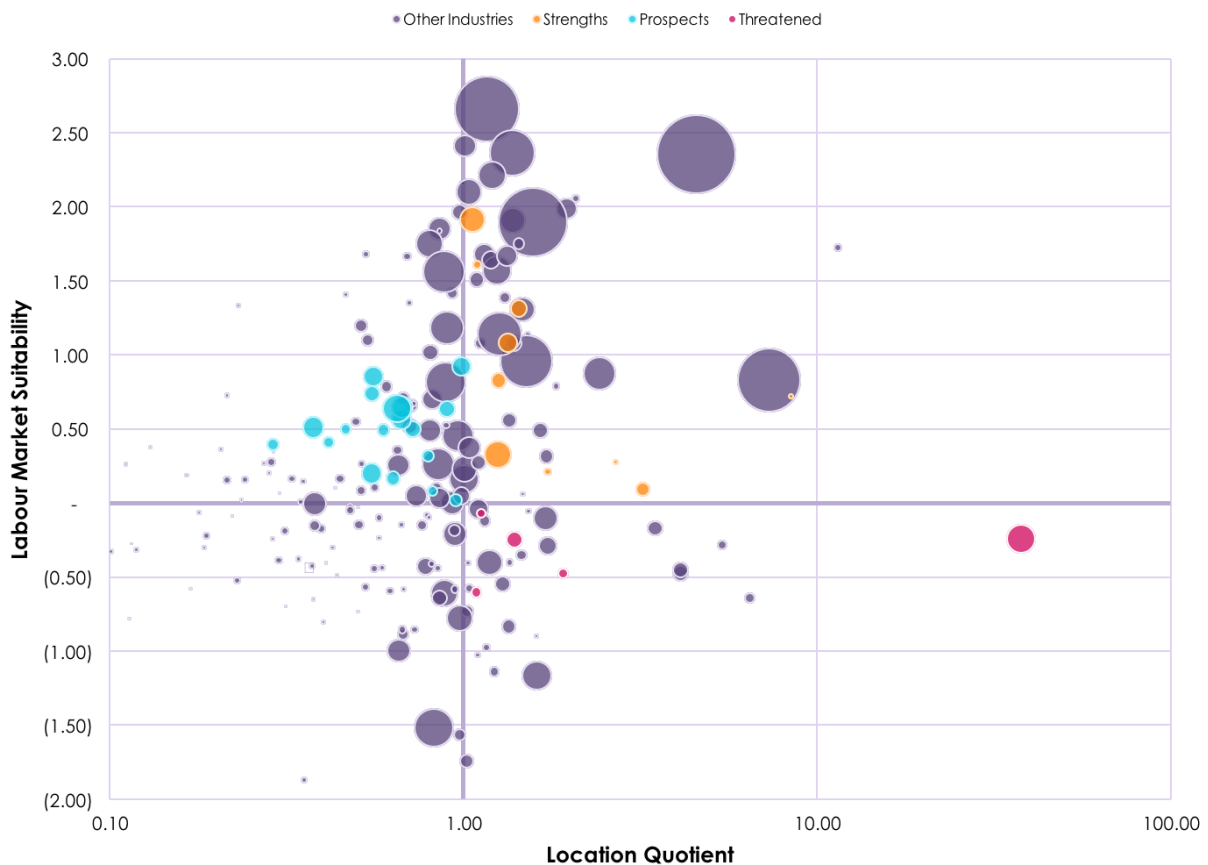


Exhibit 45: Identifying Kingston's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
5417	Scientific research and development services	1.08	1.33	400	\$ 78,658
5191	Other information services	1.31	1.43	305	\$ 59,666
5242	Agencies, brokerages and other insurance related activities	0.33	1.25	740	\$ 63,561
2213	Water, sewage and other systems	0.09	3.21	200	\$ 67,221
4832	Inland water transportation	0.72	8.41	35	\$ 59,105
7139	Other amusement and recreation industries	1.91	1.06	680	\$ 39,482
5179	Other telecommunications	0.21	1.73	70	\$ 62,729
7112	Spectator sports	1.61	1.09	80	\$ 47,523
3271	Clay product and refractory manufacturing	0.28	2.70	35	\$ 51,049
7115	Independent artists, writers and performers	0.83	1.26	235	\$ 29,917

Exhibit 46: Kingston's top 10 industry strengths

The list of private sector industrial strengths in Kingston is quite thin (see *Exhibit 46*). It is not a particularly coherent set of industries that offers a specific narrative or set of related skills. Scientific research and development services (NAICS 5417) and other information services (NAICS 5191) are generally desirable industries that appear at the top of the list, but they only account for approximately 700 jobs combined. Agencies, brokerages and other insurance related activities (NAICS 5242) is third on the list and employs 740 people, however there is little evidence of strengths in any related industries that could potentially be the beginning of a local cluster. The identified set of local strengths does not offer clear advice for local economic development policy in Kingston. It highlights the severe lack of private sector knowledge-based economic activity in the region. Finding ways to leverage its public sector assets, especially Queen's University, is likely the most promising path forward.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5411	Legal services	0.65	490	\$ 96,617
5413	Architectural, engineering and related services	0.64	820	\$ 78,034
5416	Management, scientific and technical consulting services	0.85	410	\$ 76,211
2211	Electric power generation, transmission and distribution	0.74	270	\$ 92,566
5415	Computer systems design and related services	0.51	465	\$ 74,156
5239	Other financial investment activities	0.50	285	\$100,505
5241	Insurance carriers	0.56	425	\$ 68,149
5419	Other professional, scientific and technical services	0.92	405	\$ 55,029
5412	Accounting, tax preparation, bookkeeping and payroll services	0.20	420	\$ 69,979
5111	Newspaper, periodical, book and director publishers	0.63	280	\$ 57,953

Exhibit 47: Kingston's top 10 industry prospects

The top 10 list of industry prospects for Kingston is not dissimilar to that of Ottawa-Gatineau in that it is heavily skewed towards knowledge-intensive services (see *Exhibit 47*). As with the Ottawa-Gatineau case, it is likely that this reflects high-skill functions taking place within various public sector activities that do not currently have related private sector industries of significant scale. The top three identified prospects are Legal services (NAICS 5411), architectural, engineering and related services (NAICS 5413), and management, scientific and technical consulting services (NAICS 5416) are all prime examples of knowledge-intensive services that have not reached a critical mass in the Kingston economy but have the potential to do so. It should be noted that another distinction with the Ottawa-Gatineau example is that the Labour Market Suitability scores for the prospective industries are significantly lower in Kingston. So though these are the top possibilities for knowledge-intensive economic diversification, the labour market is not nearly as strong.

4.3.3 – Peterborough

Peterborough is historically a manufacturing city, not dissimilar to many others found in Southwestern Ontario. The problem in this respect is that Peterborough's location, to the northeast of Toronto, positions it further from the US border and therefore more distant to key supply routes. This disadvantage has likely grown as the Canadian and American economies have become more integrated. Compounding this issue is the rapid growth of the Greater Toronto Area and the related increase in congestion which has made travel times to the south even longer. Overall, Peterborough's economic base is not particularly strong, with much of its employment in the public sector or low-wage industries (see *Exhibit 48*).



Exhibit 48: Identifying Peterborough's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3353	Electrical equipment manufacturing	0.82	6.44	330	\$ 66,550
2211	Electric power generation, transmission and distribution	0.76	1.95	675	\$ 92,566
3345	Navigational, measuring, medical and control instruments manufacturing	0.69	3.42	275	\$ 71,520
3336	Engine, turbine and power transmission equipment manufacturing	0.77	5.87	120	\$ 66,891
3361	Motor vehicle manufacturing	0.59	2.24	380	\$ 74,469
3251	Basic chemical manufacturing	0.44	3.70	175	\$ 85,857
3112	Grain and oilseed milling	0.54	10.35	215	\$ 65,913
4161	Electrical, plumbing, heating and air-conditioning equipment and supplies wholesaler-distributors	0.93	2.13	330	\$ 63,140
4184	Chemical (except agricultural) and allied product wholesaler-distributors	0.26	3.50	155	\$ 69,992
2123	Non-metallic mineral mining and quarrying	0.24	2.62	130	\$ 80,731

Exhibit 49: Peterborough's top 10 industry strengths

Peterborough's manufacturing economy stands out from other cities in Ontario. Rather than being another auto manufacturing hub, its current and historical specialization is electrical machinery (see *Exhibit 49*). Electrical equipment manufacturing (NAICS 3353), electric power generation, transmission and distribution (NAICS 2211), engine, turbine and power transmission equipment manufacturing (NAICS 3336), and electrical, plumbing, heating and air-conditioning equipment and supplies wholesaler-distributors (NAICS 4161) are all identified as top 10 industrial strengths and together account for roughly 1,500 jobs. Key anchor firms in these sectors include General Electric and Siemens.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5413	Architectural, engineering and related services	0.45	770	\$ 78,034
5411	Legal services	0.35	295	\$ 96,617
5416	Management, scientific and technical consulting services	0.44	315	\$ 76,211
2362	Non-residential building construction	0.52	150	\$ 74,494
5171	Wired telecommunications carriers	0.46	195	\$ 69,017
4173	Computer and communications equipment and supplies wholesaler-distributors	0.44	125	\$ 86,316
5419	Other professional, scientific and technical services	0.62	225	\$ 55,029
5415	Computer systems design and related services	0.22	245	\$ 74,156
5121	Motion picture and video industries	0.44	165	\$ 56,839
4179	Other machinery, equipment and supplies wholesaler-distributors	0.42	145	\$ 67,101

Exhibit 50: Peterborough's top 10 industry prospects

Though most of Peterborough's current industrial strengths are related to manufacturing, its top 10 prospects list is predominantly populated by knowledge-intensive services (see *Exhibit 50*). The top three include architectural, engineering and related services (NAICS 5413), legal services (NAICS 5411), and management, scientific and technical consulting services (NAICS 5416). Like many cities in Southern Ontario, the pathway to a more knowledge-based economy will rely on turning traditional manufacturing strengths into service oriented ones. Many manufacturing jobs continue to be lost to lower-cost jurisdictions, but also to automation of routine tasks. What needs to be recognized widely across much of the province is that new jobs need to focus on *achieving* automated processes. This is the way to a more knowledge-intensive and productive manufacturing sector.

4.3.4 – Barrie

Barrie is one of the fastest growing urban areas in Canada. One part commuter town for the northern reaches of the Greater Toronto Area and one part gateway to central Ontario, Barrie has yet to firmly establish its economic identity. One of the key dangers in this respect is that local employment growth does not keep pace with local housing growth, putting a significant strain on the transportation infrastructure needed to support longer than average commuting distances. Travelling to the northern edges of the Greater Toronto Area for work may start to become increasingly dysfunctional as the population expands and congestion increases. It is imperative that Barrie's local economy find ways not only to grow in size, but to grow in ways that are knowledge-intensive.



Exhibit 51: Identifying Barrie's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
3361	Motor vehicle manufacturing	1.68	6.39	1,870	\$ 74,469
4821	Rail transportation	1.98	1.65	305	\$ 76,014
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	2.02	1.31	510	\$ 71,391
4882	Support activities for rail transportation	2.09	3.58	110	\$ 70,763
2211	Electric power generation, transmission and distribution	0.79	1.43	855	\$ 92,566
3363	Motor vehicle parts manufacturing	1.48	2.94	1,185	\$ 61,087
4151	Motor vehicle wholesaler-distributors	2.63	1.93	175	\$ 62,080
3339	Other general-purpose machinery manufacturing	1.31	2.20	315	\$ 65,625
4179	Other machinery, equipment and supplies wholesaler-distributors	2.15	1.09	430	\$ 67,101
4851	Urban transit systems	2.00	1.29	425	\$ 62,709

Exhibit 52: Barrie's top 10 industry strengths

Though technically just outside the boundaries of the Census Metropolitan Area, the Honda assembly plant in Alliston draws many of its workers from the Barrie region. This largely explains the presence of motor vehicle manufacturing (NAICS 3361), motor vehicle parts manufacturing (NAICS 3363), and motor vehicle wholesaler-distributors (NAICS 4151) in the top 10 identified local industrial strengths. Barrie is also a logistics hub with a range of strengths in transportation and distribution. Rail transportation (NAICS 4821), support activities for rail transportation (NAICS 4882), and urban transit systems (NAICS 4851) are all identified in the top 10 list of Barrie's industrial strengths.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
2362	Non-residential building construction	1.45	390	\$ 74,494
5411	Legal services	0.66	645	\$ 96,617
5418	Advertising, public relations, and related services	1.85	405	\$ 60,968
5413	Architectural, engineering and related services	0.33	835	\$ 78,034
5171	Wired telecommunications carriers	1.22	635	\$ 69,017
5415	Computer systems design and related services	0.56	690	\$ 74,156
5416	Management, scientific and technical consulting services	0.45	650	\$ 76,211
4173	Computer and communications equipment and supplies wholesaler-distributors	1.07	230	\$ 86,316
5111	Newspaper, periodical, book and director publishers	1.67	375	\$ 57,953
2373	Highway, street and bridge construction	1.50	225	\$ 71,896

Exhibit 53: Barrie's top 10 industry prospects

The top 10 list of industrial prospects for Barrie is dominated by knowledge-intensive services (see *Exhibit 53*). Legal services (NAICS 5411), advertising, public relations, and related services (NAICS 5418), architectural, engineering and related services (NAICS 5413), and computer systems design and related services (NAICS 5415) are all prime examples of the types of well-paying service industries that show some potential for the Barrie economy. It is important to keep in mind that this data is based on the place of residence of the labour force. For Barrie's development it will be crucial to build these industries within the region rather than rely on commuting to jobs in the northern edges of the Greater Toronto Area.

4.3.5 – Sudbury

Sudbury is a mining town. Virtually all of its industrial strengths are in mining or related activities (see *Exhibit 54*). As a resource economy, it is susceptible to boom and bust cycles in relation to swings in global commodity prices. Canada has many communities that are highly dependent on natural resources. It also has a lot of experience with seeing such communities struggle after the local natural resource has either been depleted or fallen out of demand. In Northern Ontario, Elliot Lake is a prime example. Built on uranium mining, it went from boom-to-bust once more accessible and cheaper sources were discovered. Currently, Elliot Lake is trying to rebrand itself as an affordable retirement community. This is but one example that acts a warning to highly specialized resource-based economies. Economies that are specialized in manufacturing or services are able to adapt what they make or provide. This is not the case with resource economies. The imperative for Sudbury is to diversify its economy before an external shock forces its hand. Mining is often seen by others as a ‘dirty’ industry. Yet, there is a great deal of knowledge involved in locating, extracting, and processing metals. This knowledge needs to be at the centre of a development strategy.

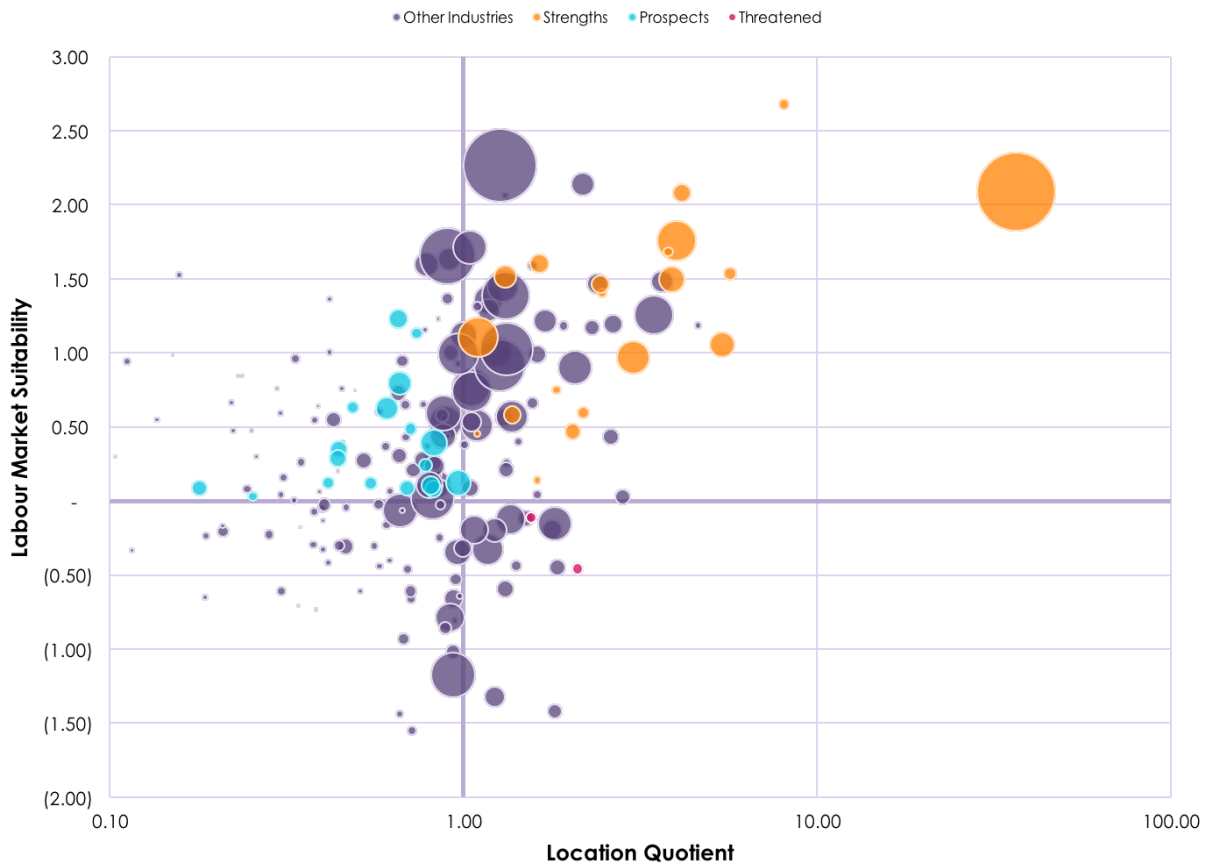


Exhibit 54: Identifying Sudbury's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
2122	Metal ore mining	2.09	36.59	5,110	\$105,885
2131	Support activities for mining and oil and gas extraction	1.76	4.00	1,345	\$93,079
2121	Coal mining	2.68	8.06	110	\$100,013
2123	Non-metallic mineral mining and quarrying	2.08	4.14	290	\$80,731
3314	Non-ferrous metal (except aluminum) production and processing	1.54	5.67	155	\$88,360
4821	Rail transportation	1.50	3.87	585	\$76,014
4172	Construction, forestry, mining, and industrial machinery, equipment and supplies wholesaler-distributors	0.97	3.02	960	\$71,391
2373	Highway, street and bridge construction	1.60	1.63	325	\$71,896
5413	Architectural, engineering and related services	1.11	1.10	1,385	\$78,034
3331	Agricultural, construction and mining machinery manufacturing	1.05	5.39	550	\$62,774
4882	Support activities for rail transportation	1.68	3.79	95	\$70,763

Exhibit 55: Sudbury's top 10 industry strengths

Not surprisingly, the top five identified industrial strengths for Sudbury are all directly related to mining (see *Exhibit 55*). Metal ore mining (NAICS 2122), support activities for mining and oil and gas extraction (NAICS 2131), coal mining (NAICS 2121), non-metallic mineral mining and quarrying (NAICS 2123), and non-ferrous metal (except aluminum) production and processing (NAICS 3314) account for roughly 7,000 jobs in the Sudbury economy. Metal ore mining is by far the main local specialization with a location quotient of 36.59. Other top strengths include mining equipment wholesale (NAICS 4172), engineering services (NAICS 5413), mining equipment manufacturing (NAICS 3331), and rail transportation (NAICS 4821 & 4882). All are driven by the mining sector.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5411	Legal services	0.80	480	\$ 96,617
2211	Electric power generation, transmission and distribution	1.23	320	\$ 92,566
5416	Management, scientific and technical consulting services	0.63	445	\$ 76,211
5412	Accounting, tax preparation, bookkeeping and payroll services	0.39	625	\$ 69,979
5417	Scientific research and development services	0.63	145	\$ 78,658
2371	Utility system construction	1.13	125	\$ 76,134
5171	Wired telecommunications carriers	0.35	260	\$ 69,017
5241	Insurance carriers	0.29	280	\$ 68,149
5242	Agencies, brokerages and other insurance related activities	0.12	570	\$ 63,561
4173	Computer and communications equipment and supplies wholesaler-distributors	0.12	130	\$ 86,316

Exhibit 56: Sudbury's top 10 industry prospects

The good news for Sudbury is that the top 10 list of industry prospects consists of a range of knowledge-intensive services that provide scope for future development (see *Exhibit 56*). Management, scientific and technical consulting services (NAICS 5416) and scientific research and development services (NAICS 5417) offer particularly intriguing possibilities in that they likely connect to mining-related expertise that could be exported to other jurisdictions. A closer look at the precise composition of mining services in Sudbury and how they tie into a local innovation ecosystem, including Laurentian University, is a good starting point.

4.3.6 – Thunder Bay

Thunder Bay is an important point in the country's east-west transportation routes. Key road and rail connections pass through the region, which also links south to the upper Midwestern United States. Its location on Lake Superior has historically made it a vital marine transportation hub serving the upper Great Lakes. Thunder Bay is a gateway to many Northern Ontario communities that lack direct road access to the south. The development of the 'ring of fire' mineral deposit would likely have significant spillover effects to the local economy which is already specialized in natural resources (see *Exhibit 57*). In addition to mining, forestry is a major component of Thunder Bay's economy.



Exhibit 57: Identifying Thunder Bay's industry strengths and prospects

NAICS Code	Industry Description	Labour Market Suitability	Location Quotient	Labour Market Size	Average Full-time Employment Income
2122	Metal ore mining	1.36	3.43	355	\$ 105,885
3221	Pulp, paper and paperboard mills	1.17	7.07	690	\$ 75,167
4821	Rail transportation	1.16	5.35	600	\$ 76,014
2123	Non-metallic mineral mining and quarrying	1.54	2.89	150	\$ 80,731
2371	Utility system construction	1.40	1.83	230	\$ 76,134
2373	Highway, street and bridge construction	1.24	1.93	285	\$ 71,896
2211	Electric power generation, transmission and distribution	1.04	1.38	500	\$ 92,566
1153	Support activities for forestry	2.34	6.14	135	\$ 53,140
5413	Architectural, engineering and related services	0.86	1.23	1,145	\$ 78,034
4811	Scheduled air transportation	1.30	1.70	325	\$ 64,385
7121	Heritage institutions	1.73	1.85	155	\$ 52,441

Exhibit 58: Thunder Bay's top 10 industry strengths

Like Sudbury, metal ore mining (NAICS 2122) is the top industry strength identified for Thunder Bay (see *Exhibit 58*). The region differs in many other respects however, as the processing and manufacture of forestry products is also a major component of the local economy. Pulp, paper and paperboard mills (NAICS 3221) and support activities for forestry (NAICS 1153) have location quotients of 7.07 and 6.14 respectively. Transportation related activities represent a third area of strength with rail transportation (NAICS 4821), highway, street and bridge construction (NAICS 2373), and scheduled air transportation (NAICS 4811) each being in the top 10 identified industries. Another positive sign is that engineering services (NAICS 5413) is a clear asset with over 1,000 jobs. This suggests that the local economy is capitalizing on its knowledge-base and not just relying on its natural resources.

NAICS Code	Industry Description	Labour Market Suitability	Labour Market Size	Average Full-time Employment Income
5411	Legal services	1.48	440	\$ 96,617
2362	Non-residential building construction	1.55	190	\$ 74,494
5416	Management, scientific and technical consulting services	0.61	225	\$ 76,211
5419	Other professional, scientific and technical services	0.81	190	\$ 55,029
7139	Other amusement and recreation industries	0.66	330	\$ 39,482
3364	Aerospace product and parts manufacturing	0.38	180	\$ 69,748
5241	Insurance carriers	0.21	180	\$ 68,149
4161	Electrical, plumbing, heating and air-conditioning equipment and supplies wholesaler-distributors	0.13	110	\$ 63,140
7115	Independent artists, writers and performers	0.05	105	\$ 29,917

Exhibit 59: Thunder Bay's top 10 industry prospects

The list of Thunder Bay's top 10 industry prospects includes a range of activities that present future development possibilities (see *Exhibit 59*). Management, scientific and technical consulting services (NAICS 5416) and other professional, scientific and technical services (NAICS 5419) offer particularly intriguing opportunities as they likely capture the knowledge component of local natural resource industries. Like many similar jurisdictions in Canada that heavily rely on resource extraction, Thunder Bay's economic development strategy needs to move to higher value-added activities while building from its current knowledge base. Fortunately, the region has multiple options in this respect (forestry and mining) and is well-positioned geographically as an important transportation and logistics hub.

5 – Charting pathways to a knowledge economy for Ontario

As the Province of Ontario continues to build and refine its economic development policies, it needs to maintain a keen understanding of its current assets and how they may be leveraged for future growth. An essential aspect of this understanding is that Ontario's regions have starkly different economic identities. The key implication is that “one-size-fits-all” policies are unlikely to be effective in all parts of the province. Instead, policies must reflect local realities and be nuanced enough to make positive impacts in places where they are intended to and be sure to avoid making negative impacts in places where they are not. With this in mind, the most effective policies are the ones that are informed by local communities. Ontario's commitment to cluster-driven policy is a solid way to deliver on this as it recognizes the need for policy to reflect local circumstances.

As Ontario's economy responds to rapidly changing global circumstances, local economies will need to adapt and evolve to meet these challenges. The province and its communities cannot primarily compete on a low-cost model, but rather need to increasingly move to a more knowledge-intensive and high-value-added approach. With this in mind, it should be recognized that whole economies cannot be reinvented from scratch. Instead, they follow evolutionary trajectories based on their traditional strengths. The Province and its local partners need to understand and recognize what these particular strengths are, and then find ways to chart pathways to developing them with innovation as the core value.

This report presents a method for identifying the core strengths of Ontario's regional economies based on the skills present in their current labour market. Our analysis reveals the differing structural realities of the province's regions and therefore suggests differing pathways forward. The three broad groupings of city-regions offer a framework for discussing these pathways in general terms.

The Greater Toronto and Hamilton Area, including the Kitchener-Waterloo, Guelph, and Oshawa regions, is the current centre of Ontario's knowledge-driven economy. A diverse range of high-value-added services and an impressive mix of advanced manufacturing, puts this part of the province in an enviable position to be a major competitor in the global economy. These industries are supported by a world-class knowledge infrastructure anchored by leading research intensive universities. Key challenges going forward include accessing global markets, a local infrastructure deficit, and quality of life issues — especially problems with growing inequality and decreasing affordability.

Southwestern Ontario, which includes London, Windsor, St. Catharines-Niagara, and Brantford, is dominated by auto manufacturing and related industries. The future of this part of the province largely depends on adapting the manufacturing base. Within this constraint are a number of non-mutually exclusive options going forward. As the auto manufacturing sector is at a point of major disruption, leading that shake-up is one

possible pathway. Driverless technology and a shift towards electric vehicles are two major sources of innovation that present both a threat and a major opportunity. Another option is moving into other advanced manufacturing sectors that require similar skillsets. There are likely a number of opportunities with this option but many of the same disruptive threats exist across many sectors. A third option is evolving into service oriented industries that build upon the knowledge-base from the automotive sector. One of the key drawbacks of this strategy is that the number of jobs will not likely be sufficient to replace traditional industry jobs. Changing technology and lower cost competitors are factors forcing major change on Ontario's automotive industry. How the province responds will likely have a long term legacy one way or another. It is crucially important that the auto motive sector is not seen as just one component of the overall economy, but as the primary base of many communities. If it is lost and nothing replaces it, the disruption will be as much social as it is economic.

Eastern, Central, and Northern Ontario present a more mixed picture. Ottawa-Gatineau and Kingston are heavily skewed towards public sector employment. In bad economic times this provides a degree of resiliency, but in better times it tends to dampen dynamism. The ICT sector in the Ottawa-Gatineau region provides a solid example of private sector industry that thrives alongside a strong government presence. Similar cases in both regions need to be developed. Peterborough and Barrie exist on the edge of the Greater Toronto Area and are generally lower-knowledge intensive economies. The big challenge for these regions is to develop local niches that tie into the larger region while avoiding being predominantly long-distance commuting locations. Sudbury and Thunder Bay are regions built on natural resources. Mining and forestry are the main drivers of their economies and thus they are subject to swings in global commodity prices. Buffering themselves from these external forces depends on diversifying the economic base while drawing on their existing stock of knowledge. Mining and forestry services are good places to start. Environmental technologies are also likely a source of future development.

The aim of this report is to provide a tool for assessing the most promising targets for development. However, it is important to recognize that is but one way at looking at the potential for regional economies in Ontario to adapt. As the report takes a labour market approach which depends on current statistical classification systems, it does not directly account for new and emerging technologies that may eventually lead to whole new industries and occupations. By also examining trends in patenting we are also able to spot key technological developments that are signaling local economic changes and evolving capabilities.

It is also important to note that large-scale technological change often comes from outside sources. As the system presented in this report only looks at internal structure it is essential to also keep one eye on global forces that are likely to have significant local impacts. For example, it may be that the era of the internal combustion engine is coming to an end. As battery technologies improve and governments make stronger commitments to reducing carbon emissions this shift could have profound implications

to Ontario's auto manufacturing sector. Although the province was well-placed to be a major contributor to the previous era there is no guarantee that it will be so for the next one. Tesla's high profile "Gigafactory" is already being established in Nevada.^{xv} If this is a signal of shifting geographies of the entire sector towards the southwest it will have major implications for Ontario.

As the global economic landscape continues to rapidly evolve, the province of Ontario needs to adapt in order to remain a highly prosperous jurisdiction. The large-scale changes that are occurring will impact different parts of the province in varying ways and to varying degrees. This report points to specific economic activities that are viable pathways for local economic development and diversification. Toronto and neighbouring regions that already possess diverse and knowledge-intensive economic profiles are likely to continue to thrive in the coming decades. Affordability, inequality, and general quality of life will be the most pressing issues. The southwestern regions are highly dependent on the auto manufacturing industry. Its fate will play a major role in the future fortunes of this part of the province. Diversification into related activities should proceed with great haste. The Eastern, Central, and Northern regions are typically highly specialized. For Ottawa and Kingston diversification means finding ways to grow private sector economic activities out of public sector strengths. For Central Ontario it means building stronger connections to the GTA economy while not predominantly becoming commuter communities. While northern cities need to find ways to leverage the knowledge-intensive components of their resource focused economies.

While the specific industrial pathways may differ between Ontario's regions, the mechanisms for developing more knowledge-intensive economies are similar. The key message for every community is to build upon existing strengths. This can mean enhancing what places already possess or evolving into activities that are closely related. The knowledge component needs to be increased no matter what industry or function. Tighter integration between local institutions of higher education and the local economy is essential^{xvi}. This can mean being more responsive to the needs of local employers, targeting research into areas that have local economic applications, or hosting start-up incubators and accelerators. Such actors can also be used to help nudge local economic development down related paths rather than recreate what has come before. Clusters are also high potential agents of change. Local organizations of industry, government, and related institutions can help focus policies and aggregate demand for infrastructure and other collective needs. Such organizations can help facilitate coordination with higher levels of government by presenting private sector requests with a unified voice. If Ontario and its regions are to face the challenges of a knowledge-driven global economy, all those involved will need to recognize both the overall picture as well as the local nuances.

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