Poised for Development, Ready for Growth

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Small Business Consulting Service

- Small Business Consulting Services (SBCS) is a business operated by Lakehead University Honours Bachelor of Commerce students. The organization has been in existence since 1972 and has been able to successfully utilize student education to serve the needs of the region. The business operates out of the Lakehead University campus and through its non-profit status, is able to provide assistance with affordable fees.

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Executive Summary

In 1993, Thunder Bay Ventures (TBV) initiated a research project intended to increase the understanding of the Northern Ontario Economy. Since that time, the economy of Thunder Bay's Census Metropolitan Area (CMA) has drastically changed in terms of demographics, infrastructure, primary and manufacturing industries, as well as in the service and retail sectors. Additionally, the City of Thunder Bay has been experiencing an increasing population of Aboriginal people, an increase which results in a significant, yet often overlooked, economic benefit.

Accordingly, TBV commissioned the study, *Poised for Development-Ready for Growth*, with the intent to understand the changing nature of Thunder Bay's economy by identifying key economic trends, examining four important economic areas and providing recommendations to facilitate future growth. The four areas analyzed in detail are (1) Economic Contributions of the Aboriginal Community, (2) Direct Investments, (3) The Knowledge Sector, and (4) The Mining Service Sector.

Key Economic Trends

This study develops a single index, the Thunder Bay Economic Activity Index (TBEA Index), which is unique to Thunder Bay's economy and provides insights into the trends exhibited by the economy. The methodology used to develop the index is replicable for other cities in Northwestern Ontario and can be periodically updated in the future to track Thunder Bay's economic development.

In the period from 2003 to 2012, the TBEA Index reached its maximum in 2006, a value which is consistent with the accelerated rebound of the real economy from the recession of the

early 2000s. This was followed by a sharp drop that reflects the contraction of the real economy partially caused by the subprime mortgage crises in the United States (U.S.) and a decline in the forestry industry in Northwestern Ontario. The minimum value was recorded in 2009, and the TBEA Index has been growing steadily until present time.

The following is a summary of the trends in Thunder Bay's economy across other key economic metrics:

- Thunder Bay's GDP has grown by 3.4 percent between 2002 and 2012. This represents a 0.30% cumulative annual growth rate (CAGR). Over the same time period, the Canadian GDP grew by 19.8%, or a 1.92% CAGR. Clearly, Thunder Bay has underperformed over the past ten years in comparison to the Canadian economy. An appreciation of the Canadian dollar and the global credit crisis had a more severe impact on the economy of Thunder Bay than on Canada as a whole.

- Thunder Bay's labour productivity peaked in 2006, which was also the peak year for the total GDP. Labour productivity declined significantly from 2006 to 2009 and has not regained its previous high levels.

- The three most dominant employer sectors are the retail trade industry, construction industry, and health care.

- Thunder Bay's population has essentially experienced zero growth over the forty year period from 1971 to 2011. This is in stark contrast to the growth experienced by the Province of Ontario (66.8%) and Canada (55.2%) over the same time period.

- The composition of Thunder Bay's population has been changing over the past forty years due to an increasing out migration of youth to pursue economic opportunities elsewhere, an aging population as the "baby boom" generation enters its senior years, and an increasing Aboriginal population moving to the city from rural areas and through natural increase. It is worth noting that the Aboriginal population is younger than the general population and has higher birth rate.

- Per capita income for Thunder Bay is $37,000, which is an increase of approximately 6% from 2006 to 2012. This figure is comparable with the Canadian average.

- The real estate market in Thunder Bay is currently very strong. The housing starts index is greater for Thunder Bay than for Canada from 2005 to 2012 and resale prices have reported an annual increase since 2004 with the most significant growth from 2007 to 2012. From 2002 to 2012, the median single family home resale price had increased by approximately 42%.

Economic Contributions of the Aboriginal Population

The Aboriginal community makes a significant contribution to the Thunder Bay economy. Specifically, the contribution of the Aboriginal workforce to Thunder Bay's GDP was estimated to be in the range of 5.09% ($254.38 million) to 7.67% ($383.33 million) in 2012. Although not comprehensively accounted for in the current study, it is important to stress that the Aboriginal community in the surrounding region also has a significant impact on Thunder Bay's economy as community members, students, businesses, community leaders and their staff

frequently travel to the city for business and personal purposes. The Aboriginal economic activities, organizations and businesses provide employment opportunities for both Aboriginal and non-Aboriginal residents in Thunder Bay. Given the population trends and a growing Aboriginal economy, it is expected that the Aboriginal contribution to the City's economy will continue to grow and contribute to urban sustainability as regional economies develop and labour force participation rates continue to rise.

Direct Investment

The average annual direct investment from residential, commercial, industrial, and institutional building permits is approximately $124.1 million. The composition of direct investment from residential, commercial and institutional investors is fairly equal although industrial investments are significantly smaller. Over the past three years, direct investments have been above the historical (2002 to 2012) average, with the largest direct investment occurring in 2012.

The importance of direct investment in an economy is highlighted through the strong relationship between direct investments and changes in employment as identified as follows:

- Total direct investments of $1 million in the trades, transport, equipment operators and related occupations lead to the creation of 10 – 12 direct jobs and 20 to 25 indirect and induced jobs, for a total of 30 to 37 new jobs created.
- Total direct investments of $1 million in the social science, education, government service and religious sectors lead to the creation of 12 – 15 direct jobs and 18 to 22 indirect and induced jobs, for a total of 30 to 37 new jobs created.

- Total commercial investments are associated with changes in employment in management, business, finance and administrative occupations. However, the relationship between these investments and direct job creation was not robust enough to allow for a reliable estimation of direct, indirect, and induced employment changes.

Therefore, it can be concluded that investment is vital to the creation of employment in an economy.

The Knowledge Economy

The knowledge sector is an important part of Thunder Bay's economy that allows for innovations, increases in labour productivity, and diversity from the goods and retail sectors. This report analyzes Thunder Bay's knowledge economy relative to six other Ontario cities for the following indicators: 1) the number of businesses that operate in the knowledge economy, 2) total employment in the knowledge sector, 3) education level of the population, 4) diversity level of the population, 5) patent generation, and 6) infrastructure requirement.

Thunder Bay ranked fifth out of seven Ontario cities with the highest rank of three of the Northern Ontario cities. Ottawa had the highest ranking, followed by Kitchener-Waterloo. In regards to Thunder Bay's performance in the individual rankings, the employment and diversity indicators had the highest rankings. The diversity indicator was driven by the Aboriginal population. Thunder Bay's two lagged indicators are the knowledge generation (i.e. Canadian and U.S. patent filings) and the total number of businesses. Thunder Bay's results are comparable to other Northern Ontario cities (i.e. Sudbury and Sault Ste. Marie).

A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of Thunder Bay's most innovative companies reveals that key institutions, such as the Thunder Bay Regional Research Institute, Lakehead University, and Confederation College, are seen as strengths/opportunities for further development of this sector. The main weaknesses/threats are the ability to attract and retain qualified and skilled employees, and access to capital for product development and/or research and development.

Mining Service Sector

The mining service and supply sector in Ontario is estimated to be $5.65 billion in terms of annual output while employing approximately 23,000 individuals. Thunder Bay's share of the output and employment is 6.2% and 7.0%, respectively. The average output per employee in Thunder Bay's mining service and supply sector is $245,652, which is below the average output for Sudbury and North Bay, but above that of Timmins.

Agglomeration economies or clusters of linked industries and institutions usually enjoy a competitive advantage. Sudbury, the market leader in Ontario's mining service and supply sector has approximately 60% to 70% of the total output and employment. It has promoted the development of an agglomeration economy through the development of a mining service and supply association, i.e. the Sudbury Area Mining Supply and Service Association. The development of a mining association in Thunder Bay, i.e. the Northwestern Ontario Mining Supply and Service Association or NOMSSA, was explored by surveying key companies in Thunder Bay's mining service sector.

The survey indicates that roughly 60% of the respondents view that an organization, such as NOMSSA, would be beneficial for the mining service and supply sector in Thunder Bay, while the remaining 40% of the respondents are unsure. None of the respondents indicated that

NOMSSA would not be beneficial. The Thunder Bay Chamber of Commerce was selected by 32% of the respondents to act as a central planner for NOMSSA, and only 12% indicated that the City of Thunder Bay should take such a role.

Respondents also indicated that the most important activities that should be offered by an organization, such as NOMSSA, are to: 1) help promote the member companies; 2) network with customers, clients, and potential partners; 3) help maximize the sales opportunities of the member companies; and 4) provide a website presence for members.

Recommendations

Based on the analysis in this report, the following recommendations are provided. These recommendations are not specific to any single sector of the industry due to the interdependent nature of an economy. Therefore, a single recommendation will have implications for the economy as whole.

Economic Activity Index

It is important to monitor the health of an economy in order to make the necessary and appropriate policy choices to ensure economic growth and sustainability. This is the first known study to develop an economic activity index customized for the economy of Thunder Bay. The development of this index leads to our first recommendation:

> ***Recommendation #1 Monitor the economy of Thunder Bay on a regular basis using the Thunder Bay Economic Activity (TBEA) Index.***

The regular monitoring of the economy can be achieved through the following:

- Develop a bi-annual newsletter that reports on the TBEA index, led by Thunder Bay Ventures,
- Review the index annually for any required adjustments to the key variables, and
- Encourage other cities in the region to replicate the methodology for their community.

Increase Awareness of Significance of Aboriginal Economic Contributions

Aboriginal people are important players in the socio-economic life of the city and can be a major driver of economic growth, diversity and labour pool supply. Increasing Aboriginal human capital will drive up productivity for business and is the key driver to a better standard of living, decreased government cost, increased government revenue (Sharpe & Arseneault, 2010)

and safer communities. The mutual benefit of investing in Aboriginal education and skill development needs to be recognized. If these individuals do not possess the necessary skills, business will suffer (Sharpe & Arsenault, 2010). This leads to the following recommendation:

Recommendation #2a: Create awareness in the business community and general population of the significance of Aboriginal population's economic contributions to the city of Thunder Bay.

Awareness can be improved through the following:

- Collaboration between the city and the Aboriginal community to develop a strategy for awareness and education through local media, social networks, etc.,
- Facilitate the amalgamation of events between Aboriginal and non-Aboriginal forums, workshops, conferences, events, etc., and
- Training and skill development for Aboriginal workforce.

Creating awareness regarding the contribution of Aboriginal people to the city's economy can be further enhanced by creating a positive experience for all visitors to the city both from the region and internationally. This leads to the following recommendation:

Recommendation #2b: Create a welcoming urban environment

A welcoming urban environment can be achieved by:

- Creating an inclusive and safe community for students arriving from rural and remote communities to attend schools in Thunder Bay, so the city becomes a home away from home,
- Awareness training, education and skills development of the service and supply industry (e.g., retail, restaurants, materials handling, etc.),
- Creating linkages with rural communities that foster mutual benefit through economic activity and contributes to socio-economic development, and

- Determining gaps in service and/or supply that could be offered/developed in Thunder Bay to reduce out-sourcing from the region to other cities.

Further Research on Aboriginal Economic Contributions

This study makes significant strides for understanding the economic contributions of Aboriginal people to the city of Thunder Bay. The results showcase the many and significant contributions of the Aboriginal peoples to the economy. Although this study has forged new ground, the availability of data has limited the scope of the analysis. This leads to the following recommendation:

> ***Recommendation #2c: Undertake a comprehensive study to define the impact of Aboriginal economic activity, led by a coalition of Aboriginal partners in the CMA with the support of the Municipal, Provincial, and Federal governments.***

The following steps are necessary to undertake a comprehensive study:

- Create a task force of key Aboriginal and non-Aboriginal stakeholders to oversee the project,
- Primary data collection is essential for further analysis and will require the development of unique and customized methodologies specific to Aboriginal peoples,
- Primary data collection should be overseen by Aboriginal organizations and leaders, and
- A central database should be developed for future studies.

Mining Service Sector

An important component for the development and sustainability of base economic activities (e.g., mining, forestry, etc.) is the service and supply sector. The mining service and supply sector can be an important driver of future economic growth, given the recent surge in activity in the mining industry. Currently, Sudbury is the hub for mining service and supply in

Northern Ontario while Thunder Bay is lagging behind both Sudbury and North Bay in terms of output per employee within this sector.

In order to reduce the dependency on mining service providers from outside the region and to increase the efficiency and effectiveness of local suppliers, it is vital that a service and supply centre is established for Northwestern Ontario. This leads to the following recommendation:

Recommendation #3: Establishment of a Northwestern Ontario Mining Supply and Service Association (NOMSSA), headquartered in Thunder Bay

The NOMSSA should be developed with the following characteristics:

- Utilize a private-public partnership to organize the NOMSSA concept,
- The NOMSSA mandate should include the following:
    - Promote member companies, including collaboration and partnerships with Aboriginal companies and communities,
    - Network with customers, clients and potential partners,
    - Maximize sales opportunities,
    - Provide web access for members and customers,
    - Create a catalogue of suppliers/products and services,
    - Promote tradeshows,
    - Encourage research and development, and
    - Provide educational opportunities
- Although the coordination and pooling of skilled labour is an important feature of the NOMSSA, the focus should also be placed on research and development as a means of increasing productivity and innovation within this sector, and
- The Aboriginal community should be an important player in the development of the NOMSSA with linkages to rural and urban based supply and service organizations.

Economic Diversity

Thunder Bay's economy has a significant reliance on the public sector. The public sector employs approximately 53% to 64% of Thunder Bay's workforce. A large percentage of the private sector employment is generally in lower-paying and part-time positions. This situation leads to the following recommendation:

Recommendation #4: Diversify the economy by retaining, expanding and attracting private enterprise into Thunder Bay.

The diversity of the economy can be expanded by:

- Encouraging sectors that depend on international markets to diversify export destinations to enhance employment sustainability,
- Providing incentives to attract public and private investments focused on upgrading and expanding the productive capacity of the economy,
- Developing regional policies to attract private investments in technology and infrastructure. The Northern Ontario Policy Institute can be an important player in developing the appropriate regional policies, and
- Encourage Aboriginal entrepreneurship and social enterprise.

Human Capital

The competiveness of an economy is important for long-term economic sustainability and is largely determined by labour productivity. This reality is especially true for regional, export-based economies with internationally determined factors for its export products. Thunder Bay's labour productivity peaked in 2006 and declined significantly from 2006 to 2009 at which point it began to rise until 2011. Increasing productivity will reduce labour unit costs and reduce imports from other countries and provinces, thereby reducing out-shopping and increase

employment in the region. Labour force productivity is dependent upon several factors, education being among the most important. This leads to the following recommendation:

Recommendation #5: Enhance human capital by providing training for skills in demand.

Human capital can be increased by:

- Focusing on skill development, education and training,
- Developing policies and procedures to address the challenges faced by urban-Aboriginal people and support their inclusion into the city and urban labour force,
- Utilizing Lakehead University and Confederation College to provide the necessary training,
- Encouraging a culture of innovation and the development of the knowledge sector, and
- Attracting private and public investment into the economy.

The Knowledge Economy

The knowledge economy can also improve diversity and productivity of the economy. Fostering growth in the knowledge sector will be imperative to the long-term sustainability of the economy. The scarcity of professionals and skilled labour is an issue for the economy. The lack of expertise is a major threat to the economy, especially to those companies that operate in the knowledge sector. This leads to the following recommendation:

Recommendation #6: Increase the availability of professionals and skilled labour

The availability of professionals and skilled labour can be increased through:

- The University and College continuing to develop strong ties with key stakeholders and develop unique, co-op based programs and internships tied to the regional economy,
- The University and College continuing to encourage applied research tied to the regional economy,

- The University and College focusing on attracting and retaining qualified faculty and researchers,
- Fostering the inclusion of Aboriginal graduates into Thunder Bay's labour force, and
- Developing a strategy by the city of Thunder Bay to attract immigrants from outside the region and internationally by
    - Showcasing the city's business and employment opportunities, lifestyle options and urban-cultural amenities to improve the city's profile,
    - Continuing to develop the city's urban-cultural amenities,
    - Further developing the Northwestern Ontario Canada Immigration Portal,
    - Participating in national and international marketing campaigns, and
    - Developing novel advertisements that showcase the city's unique features.

Entrepreneurship

Responses to the knowledge sector survey indicated that Thunder Bay's greater population lacks an entrepreneurial spirit. This sentiment is corroborated by discussions with key city officials and stakeholders. Recently, this sentiment has also been corroborated by the Canadian Federation of Independent Business (2012) that utilized an entrepreneurial index to rank 103 Canadian cities in which Thunder Bay ranked 62, overall. This leads to the following recommendation:

Recommendation #7: Foster an entrepreneurial culture in the city

Fostering an entrepreneurial culture can be accomplished through

- Educational institutions playing a large role in the development of the entrepreneurial culture by:
    1. Further integrating entrepreneurship content into secondary and post-secondary curriculum,
    2. Providing students with opportunities for exposure and exploration of entrepreneurial environments during their studies, and

3. Exposing students to entrepreneurial activities at an early age.

- Establish a Centre of Excellence in Innovation and Entrepreneurship to provide the community with training, education, workshops, research, networking and other opportunities, and
- Continue to support the activities of existing institutions, such as the Northern Ontario Innovation Centre.

Business Expansion

In addition to a lack of skilled labour and entrepreneurial culture, the knowledge sector is confronted with another challenge. Most of the companies in the knowledge sector are relatively young and small in terms of both total revenue and number of employees. Micro-sized companies are faced with significant risks for sustainability due to a lack of diversified revenues, lack of talent within the organization and lack of available financing. This leads to the following recommendation:

Recommendation #8: Focus on moving past business incubation

In order to attract top-level talent and additional capital, small companies must move past business incubation. This can be accomplished by

- Developing government programs and allocating resources to help companies grow into larger, sustainable organizations,
- Supporting and enhancing the initiatives of angel investors, such as Northern Ontario Angel (NOA), and
- Provide the opportunities for business executives to further enhance their marketing and managerial skills.

Table of Contents

List of Figures

List of Tables

Section I - Introduction

In 1993, Thunder Bay Ventures (TBV) initiated a research project intended to increase the understanding of the Northern Ontario Economy. Thunder Bay's Census Metropolitan Area (CMA) economy has drastically changed in the past 20 years. Changes have occurred in terms of demographics, infrastructure, primary and manufacturing industries as well as in the service and retail sectors. In addition, the City of Thunder Bay continues to experience an increase in the population of Aboriginal peoples.

Accordingly, TBV is leading a study on Thunder Bay's Economy. Based on the Request for Proposal document, dated April 30, 2012, we understand that the study, 'Poised for Development-Ready for Growth,' will seek to increase understanding of the changing nature of the economy of the Thunder Bay CMA and identify opportunities that may strengthen Thunder Bay's economy.

The following research study has been prepared in response to TBV's Request for Proposal document.

1.1 Objective of the Study

The following categories and questions have been identified by TBV as both important for the future and subject to significant change over the last twenty years:

1. **Snapshot of Thunder Bay's Economy:** To bring together various statistics on Thunder Bay's economy in a single, cohesive analysis with the intent of providing insights into the trends exhibited by Thunder Bay's economy. Could an index, unique to Thunder Bay, be developed to track the economy?

2. **Aboriginal Population and Its Economic Impact:** The Aboriginal population in Thunder Bay and region continues to grow. Although difficult to determine an exact percentage, it is estimated that Aboriginal residents make up over 15% of Thunder Bay's total population. What is the impact of this trend on the economy and workforce development? What economic impacts do the numerous Aboriginal organizations located in Thunder Bay have? What trends can be anticipated over the next decade?

3. **Private Sector Investment:** What are the direct investment trends in Thunder Bay? How do the direct investment trends vary across residential, commercial, industrial and institutional investments? What is the relationship between direct investment and employment in Thunder Bay? What could the Thunder Bay CMA do to build its strengths to increase private sector investment?

4. **Knowledge Economy**: The knowledge economy has been a growing sector. What is the current status of the knowledge economy in Thunder Bay? How does Thunder Bay's knowledge economy compare to other communities in Ontario? What are the characteristics of the innovators of knowledge in Thunder Bay? What are the strengths, weaknesses, opportunities, and threats regarding the expansion of this important sector?

5. **Mining Service Sector:** Servicing the mining sector is expected to be a key opportunity in the coming years. How can Thunder Bay capitalize on these and other service sector opportunities? What would be the benefits of a supply and service network in Thunder Bay (e.g. Northern Ontario Mining Service and Supply Association – NOMSSA)? If NOMSSA is organized, how should it be designed and what should be its mandate?

1.2 Scope and Organization of the Study

Based on the above objectives, this study will be organized into the following sections:

Section I	Introduction.
Section II	The snapshot of the current indicators (population, employment trends, etc.) of the Thunder Bay CMA economy. Development of an economic indicator index that is unique to Thunder Bay's economy.
Section III	The theoretical assumptions and framework relevant to the regional economic development in the Thunder Bay CMA.
Section IV	An estimate of the trends in the Aboriginal population in the Thunder Bay CMA, and the resulting economic impact.

Section V The structure and trends for private investments in the Thunder Bay CMA, while assessing relationship between direct investment and job creation in the Thunder Bay CMA.

Section VI The current state of the Knowledge Economy sector in the Thunder Bay CMA, relative to other cities in Ontario, and identify opportunities and threats for future development.

Section VII The importance of the mining supply and service sector in the Thunder Bay CMA, and identify opportunities and threats for its future development. Examine the possibility of the development of the Northern Ontario Mining Supply and Service Association (NOMSAA).

Section VIII Summary, conclusion, and recommendations for capacity building.

1.3 Methodology

In order to carry out the project, our study focuses on the following:

- Collection and organization of available data on Thunder Bay's economy
- Structural Analysis – identification of trends in the structure of the region's economy
- Performance Analysis – identification and analysis of major performance indicators
- Comparative Assessment – comparison of structural and performance trends of Thunder Bay's economy with those of Ontario and Canada
- Identification of high and low growth industries
- Identification of sectors in which the Thunder Bay CMA has comparative advantage relative to other regions in Canada.

The methodology employed in this study is based upon the authors' understanding of the objective and scope, as well as the requirements embodied in the request for proposal issued by Thunder Bay Ventures. In order to carry out the proposed study, the authors used both primary and secondary sources of data:

- **Primary Sources of Data.** The following primary data was collected:

    - Personal interviews with various government agencies and private sector stakeholders to obtain information on various elements of the local and provincial economy.

    - Personal interviews with various Aboriginal stakeholders and a survey to urban based organizations and community residents in order to obtain information related to this group's specific opportunities and challenges.

    - A survey of the opportunities and challenges facing many of the knowledge sector companies.

    - A survey of the management of various companies that operate in the mining service and supply sector.

- **Secondary Sources of Data:** Extensive secondary data was gathered from various sources, including statistical databases (e.g. Statistics Canada, Labour Market Information, Conference Board of Canada, etc.) and published papers (e.g. North Superior Workforce Planning Board report on labour dynamics, Economic and Labour Market Guidance report, Custom Labour Market Report - Thunder Bay District, the Ambassadors Northwest regional initiative on mining, etc.). All secondary data sources have been referenced in the body of the report.

Section II –Thunder Bay's Current Economic Indicators

The following section presents an overview of the health of Thunder Bay's economy by assessing various metrics. Section 2.1 presents historical data across five broad categories in order to provide a historical perspective of the changing nature of Thunder Bay's economy over the past ten years. Section 2.1 presents the development of a novel and unique index that combines various individual metrics into a single measure that can track the health of Thunder Bay's economy.

2.1 Overview of Thunder Bay Economy

The following section presents a historical analysis of various key measures of Thunder Bay's economy. This economic overview provides insights into Thunder Bay's economic strengths and weaknesses in order to facilitate recommendations for capacity building.

The overview is presented across the following five broad categories:

1. Gross Domestic Product
2. Employment
3. Population, Personal Income and Spending
4. Real Estate
5. Economic Resilience

These five categories were selected as they provide appropriate breadth across various aspects of an economy in order to assess its overall health.

2.1.1 Gross Domestic Product

Gross Domestic Product (GDP) measures the total value of all final goods and services produced by an economy. It is one of the most important metrics in assessing the health, the scale, and the rate of advancing or declining economy. Thunder Bay's real GDP over the past eleven years is presented in Figure 1.

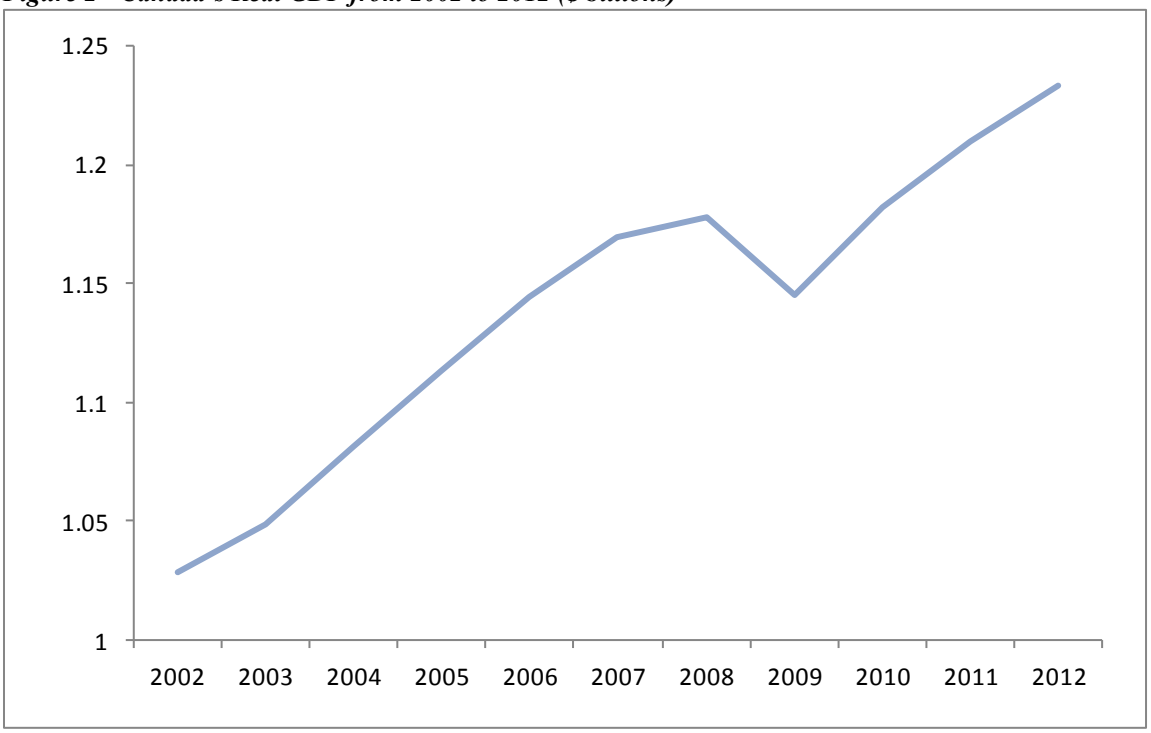
Figure 1 – Thunder Bay's Real GDP from 2002 to 2012 ($ millions)

Source: Statistics Canada; Conference Board of Canada

Between 2002 and 2012, Thunder Bay GDP grew by 3.4 percent, which represents a 0.30% cumulative annual growth rate (CAGR). GDP grew by a CAGR of 0.54% from 2002 to 2008 and then declined significantly from 2006 to 2009, likely as a result of the global credit crisis and the continuing decline of the forestry sector. Thunder Bay's GDP has rebounded in recent years and has been growing at a CAGR of 1.34% from 2009 to 2012; however, it has not reached its 2006 high levels as of yet.

Figure *2* presents Canada's Real GDP from 2002 to 2012 when using 2001 as the base year (index value of 1.0).

Figure 2 - Canada's Real GDP from 2002 to 2012 ($ billions)



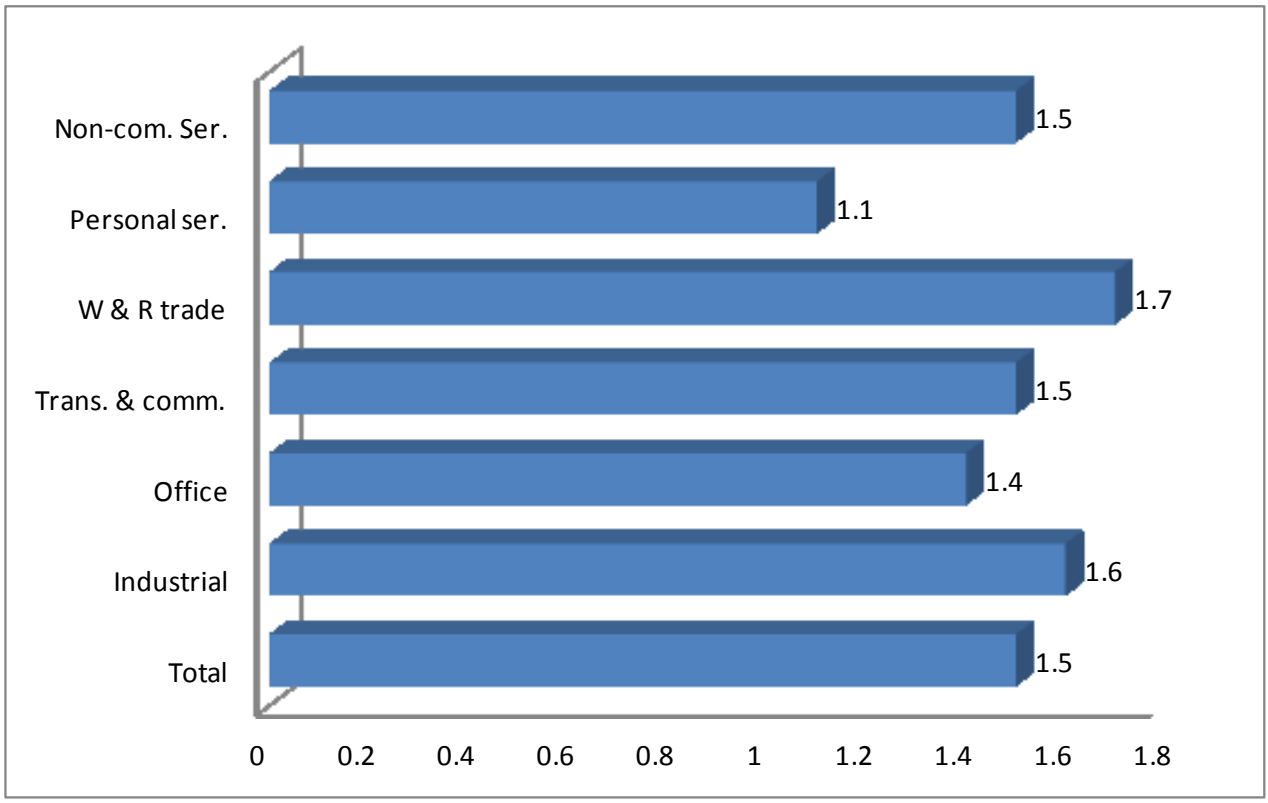
Source: The Conference Board of Canada

Figure *2* reveals a trend of significant growth over the period 2002 to 2012. Between 2002 and 2012, Canada's GDP grew by 19.8%, which represents a 1.92% CAGR over the 11 year period.

Comparing Figure 1 and Figure *2* reveals that Thunder Bay has significantly underperformed when compared to the economy of Canada as a whole. Where the Canadian GDP grew at an average rate of 1.92%, Thunder Bay's GDP grew by 0.30%. The figures also reveal that Thunder Bay was more severely impacted by the 2008 global credit crisis in terms of both a more severe reduction in economic activity (GDP) and a slower economic recovery.

Figure 3 presents the GDP CAGR outlook for 2014 to 2016 by sector for Thunder Bay. The GDP CAGR is the cumulative annual growth rate in the GDP.

Figure 3 – Thunder Bay GDP Outlook by Sector (average CAGR percentage) for 2014 -2016



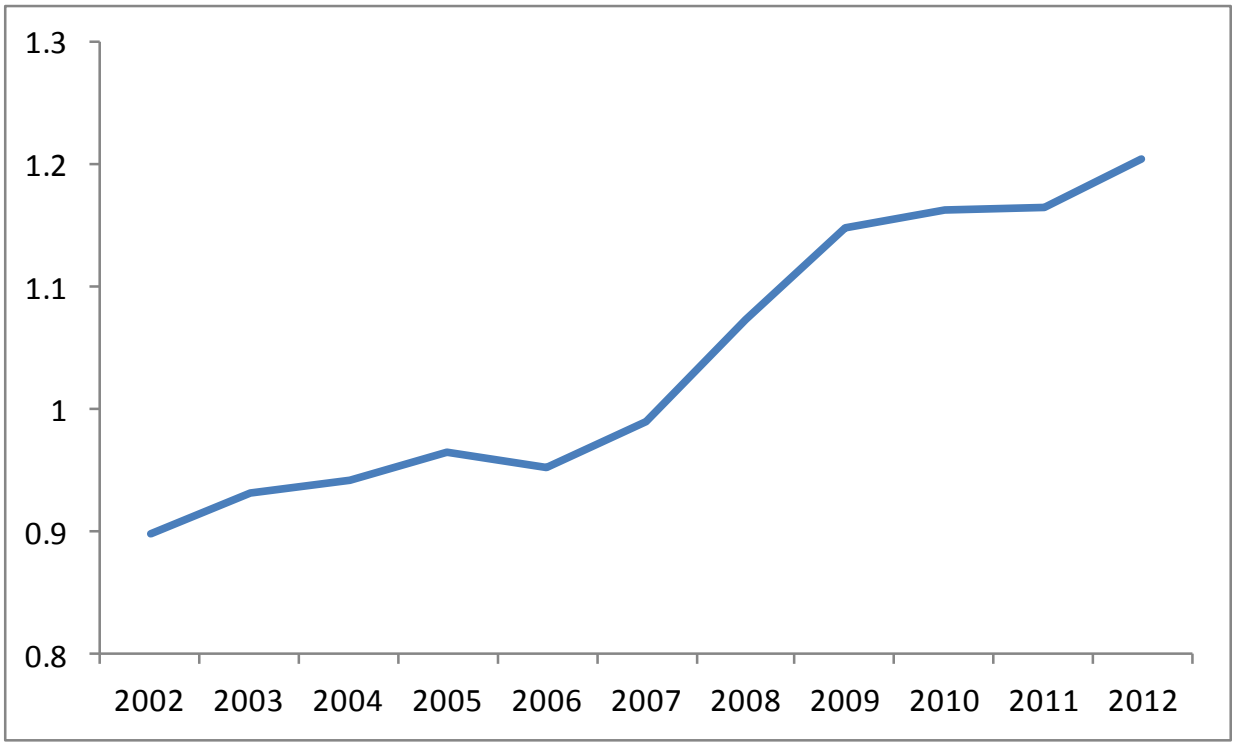
Source: The Conference Board of Canada

Figure 3 reveals that all sectors are expected to experience positive growth over the three year period from 2014 to 2016. The wholesale and retail trade sector is expected to have the largest CAGR over the next three years with the lowest growth expected from the personal services sector. Overall, total GDP is expected to grow at a CAGR of 1.5% from 2014 to 2016.

Unit labour costs (ULC) measure the average cost of labour per unit of output and are calculated as the ratio of total labour costs to real output[1]. In broad terms, unit labour costs show how much output an economy receives relative to wages or labour cost per unit of output. ULCs represent a direct link between productivity and the cost of labour used in generating output. A rise in an economy's ULCs represents an increased reward for labour's contribution to output.

Figure 4 presents ULCs (labour income / real GDP) for Thunder Bay from 2002 to 2012.

Figure 4 - Unit Labour Costs (Labour Income/ Real GDP) for Thunder Bay (2002 to 2012)



Source: The Conference Board of Canada

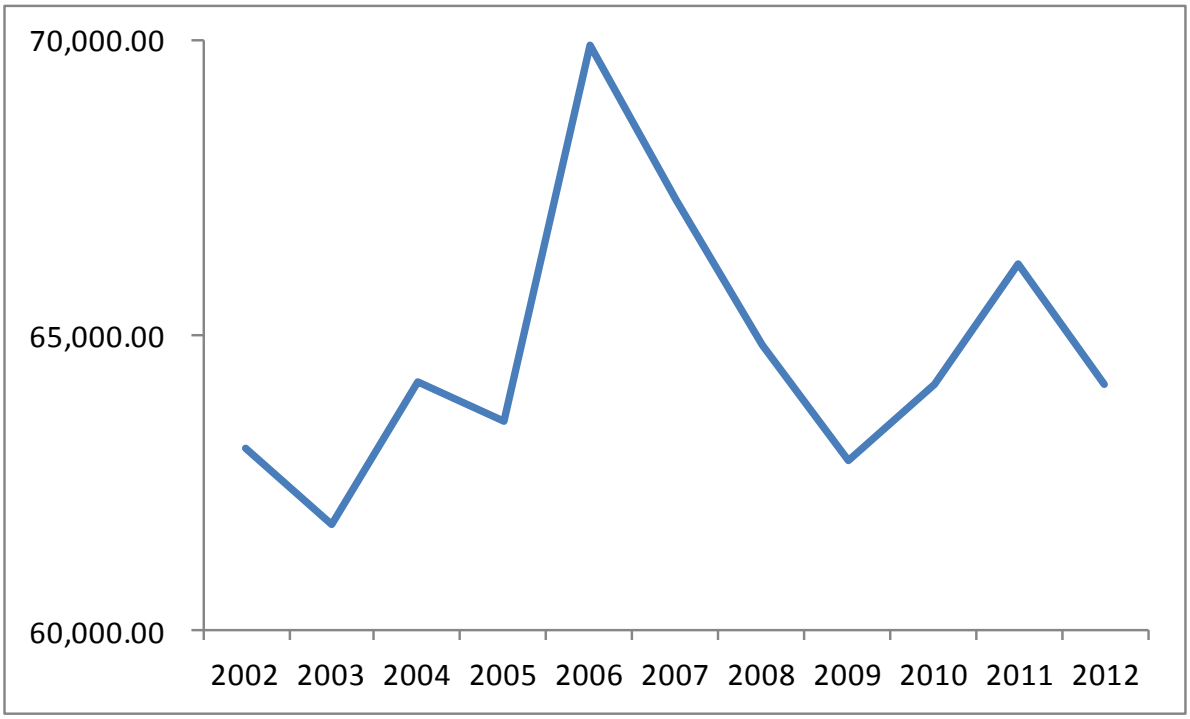
As per Figure 4, the unit labour cost has increased from 0.9 in 2002 to 1.2 in 2012, with much of the increase occurring from 2007 to 2012.

[1] OECD Glossary of Statistical Terms: http://stats.oecd.org/glossary/detail.asp?ID=2809

Economic growth in an economy or a sector can be ascribed either to increased employment or to more effective work by those who are employed. The latter can be described through statistics on labour productivity (Key Indicators of the Labour Market [KLIM], 2002). Labour productivity is defined as output per unit of labour input[2].

Figure *5* presents the Labour Productivity (Real GDP / Employment) for Thunder Bay (2002 to 2012)

Figure 5 – Labour Productivity (Real GDP/Employment) for Thunder Bay (2002 to 2012)



Source: The Conference Board of Canada

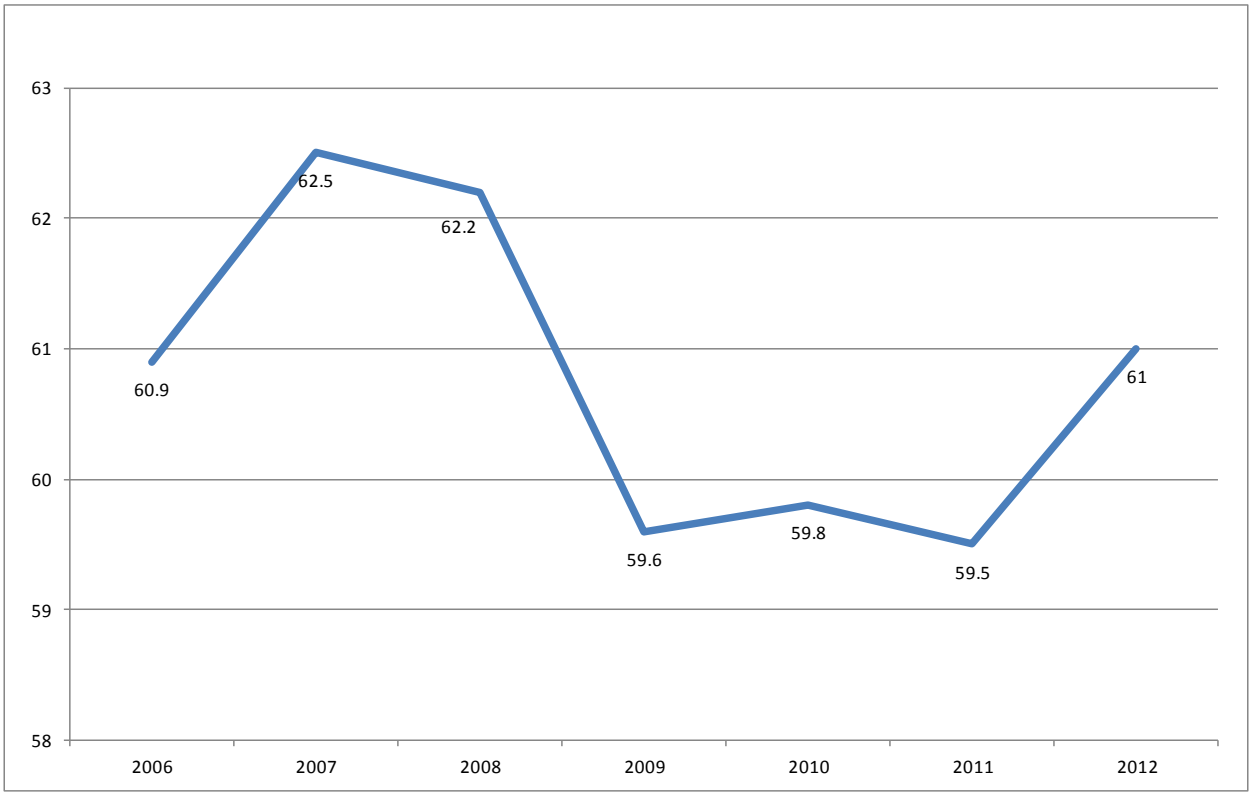
Figure *5* reveals that Thunder Bay's labour productivity peaked in 2006 which is also the peak of total GDP (Figure 1). Labour productivity declined significantly from 2006 to 2009, at which point it began to rise until 2011. However, labour productivity began to decline again with a 3% decline from 2011 to 2012.

[2] OECD Glossary of Statistical Terms: http://stats.oecd.org/glossary/detail.asp?ID=4819

2.1.2 Employment

Figure 6 presents the total employment from 2006 to 2012 for the Thunder Bay CMA. This includes both the goods and services sectors.

Figure 6 – Total Employment in Thunder Bay CMA (in thousands) from 2006 to 2012



Source: Statistics Canada; Conference Board of Canada

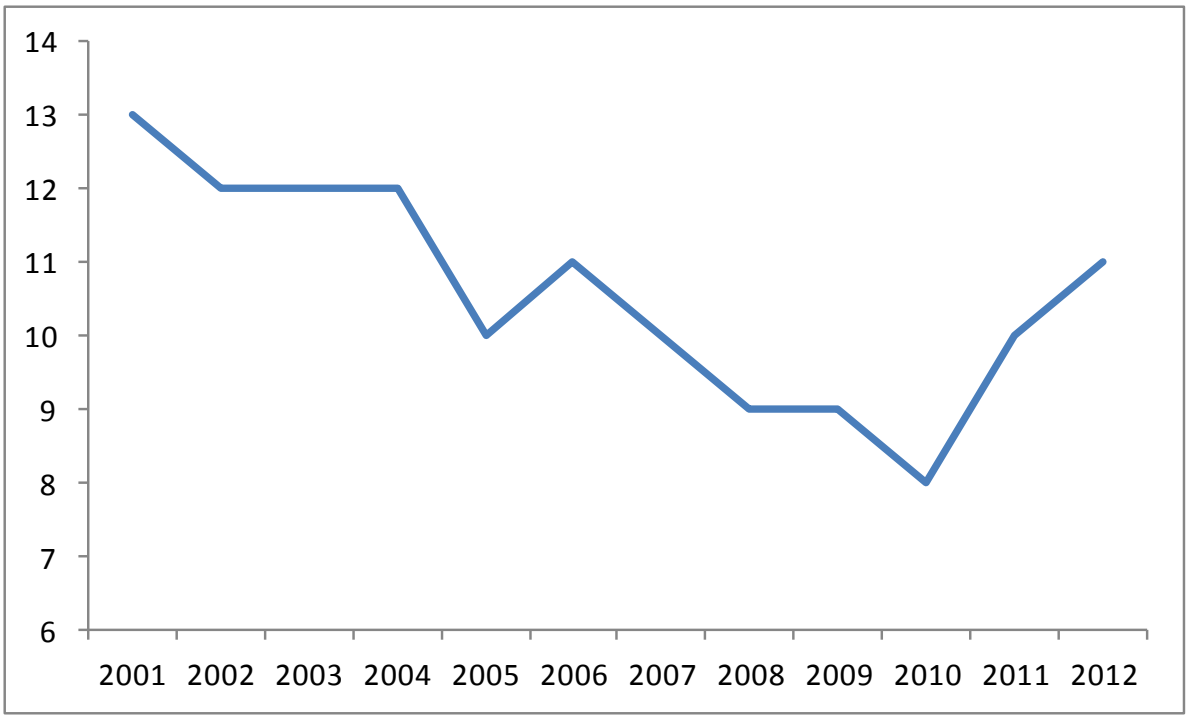
Figure 6 reveals a sharp decline in the total employment from 2007 to 2009. This is commensurate with both the global credit crisis that occurred in 2008 and the decline in the forestry sector (as discussed below). After three years of no growth (2009 to 2011), total employment experienced growth in 2012.

The total employment in both the goods and service sectors is discussed in the following section.

Goods Sector

Employment in the goods sector is categorized by activities in the manufacturing, construction, and primary/utilities industries. Figure 7 presents the total employment in the goods sector from 2001 to 2012.

Figure 7 – Total Employment in Thunder Bay's Goods Sector (in thousands) from 2001 to 2011

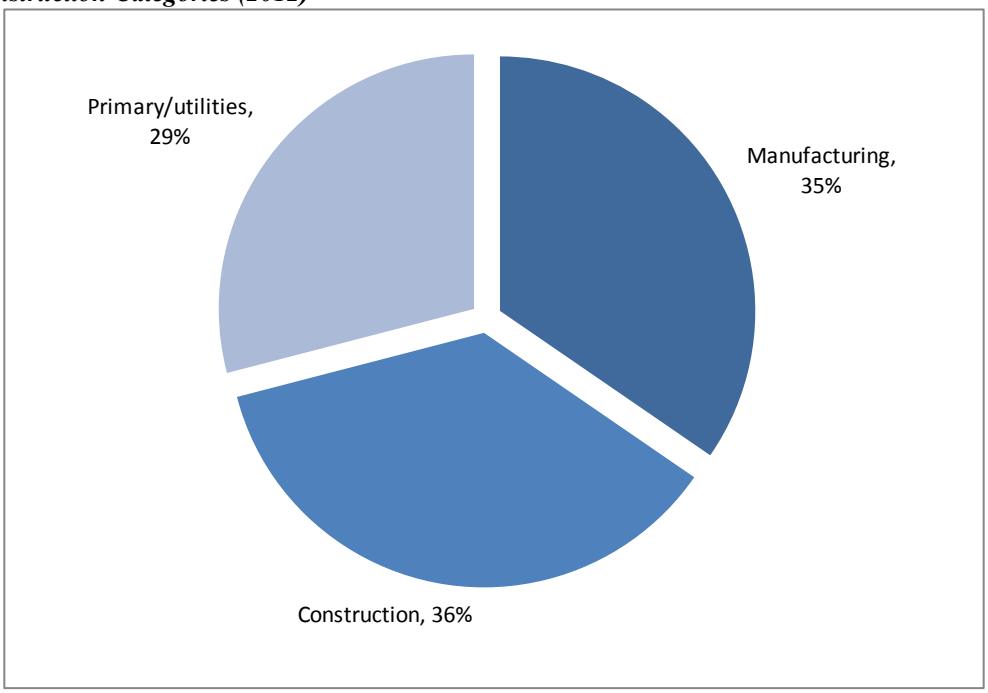


Source: Statistics Canada; Conference Board of Canada

Employment in the goods sector began to grow in the last two years, reversing a long run trend of employment decline. The goods sector is expected to be a leading sector of employment growth due to an increase in output in 2012. A growth rate of between 4 to 4.4% in employment is expected which should bring the unemployment rate closed to 6% (the lowest rate since 1989). The increase in the goods sector employment will contribute to GDP growth.

Figure 8 presents the composition of Thunder Bay's goods sector across these three categories.

Figure 8 – Composition of Thunder Bay's Goods Sector Across Primary, Manufacturing, and Construction Categories (2012)



Source: Statistics Canada; Conference Board of Canada

Figure 8 reveals that the goods sector is well diversified across the three sub-sectors of primary/utilities[3], manufacturing, and construction.

Table 1 summarizes the average annual change in the total goods sector employment from 2001 to 2012 along with the change in each of the three sub-categories.

Table 1 - Average Annual Change in the Goods Sector Employment from 2001 to 2012 (cumulative percentage change)

Total goods sector	-1.3%
Manufacturing	-4.1%
Construction	1.2%
Primary and utilities	5.7%

Source: Statistics Canada; Conference Board of Canada

[3] The primary sector & utilities is a broad sector which consists of agriculture, fishing and trapping, logging and forestry and mining.

Table 1 corroborates the trend presented in Figure *7* by quantifying a cumulative decline of 15% in the goods sector employment from 2001 to 2012. An analysis of the sub-components reveals that declines in manufacturing employment have been the driving force behind the overall decline in goods sector employment. Both construction and primary/utilities sectors have experienced growth over the same period, suggesting a shift in the goods sector from manufacturing employment to employment in the construction and primary/utilities sector.

The following sections provide some detailed discussion on the manufacturing, construction and primary sectors.

Manufacturing

Thunder Bay's manufacturing employment declined by 59% between 2005 and 2010 at an average annual rate of -11.8 percent. However, since the year 2010 this sector has shown significant improvement. In 2011, the growth rate for this sector was 28%, and in 2012 it increased to 37%. It is expected the employment in this sector for the year 2013 will not exceed 3,300 which is far below the same figure of 7,300 for the year 2001. A major reason behind the large decline in the total employment is the decline of the forestry sector.

Construction

Construction employment growth was approximately 15% over the two year period of 2010 to 2012, compared to the historical average of the annual growth of 1.54 % during the 10 years prior to 2009. Housing starts gained a significant increase in 2011 with 374 units which represent the highest level since 1995. The figure for 2012 is expected to be about 270 units. Multiple units also increased in 2011 to 186, but the same growth rate is not expected for 2012.

Primary Sector

Two of the major industries in the primary sector are mining and forestry. Table 2 presents the industries with the greatest gains and losses in the small and medium enterprise (SME) employment from 2008 to 2011 for the Thunder Bay CMA. It reveals a shift in employment from the forestry sector to the mining sector.

Table 2 – Industries with the Greatest Gains and Losses of SME Employment from 2008 to 2011 for the Thunder Bay CMA

Growth	**2008**	**2011**	**Absolute Change**	**Percent Change (%)**
324 - Petroleum and Coal Product Manufacturing	9	68	59	653.24
326 - Plastics and Rubber Products Manufacturing	15	45	30	207.92
115 - Supportive Activities for Agriculture and Forestry	222	439	217	97.55
212 - Mining and Quarrying (except Oil and Gas)	93	169	76	81.73
623 - Nursing and Residential Care Facilities	590	943	353	59.92
485 - Transit and Ground Passenger Transport	275	379	104	37.6
213 - Support Activities for Mining and Oil and Gas	134	156	22	16.57
Loss	**2008**	**2011**	**Absolute Change**	**Percent Change (%)**
211 - Oil and Gas Extraction	16	2	-15	-90.27
114 - Fishing, Hunting and Trapping	21	5	-16	-76.05
483 - Water Transportation	16	4	-12	-74.22
322 - Paper Manufacturing	113	41	-71	-63.47
518 - Data Processing, Hosting, and Related Sector	35	17	-18	-52.12
334 - Computer and Electronic Product Manufacturing	61	30	-31	-50.11
321 - Wood Product Manufacturing	304	157	-146	-48.22
113 - Forestry and Logging	1172	739	-433	-36.95
484 - Truck Transportation	1311	1155	-156	-11.90

Source: Statistics Canada, 2011; Canada Business Patterns and Northern Superior Workforce Planning Board, 2012
Note: this table excludes the private sector

In regards to the mining industry, Table 2 shows that from 2008 to 2011employment in the industries of Mining and Quarrying and Support Activities for Mining and Oil and Gas have grown significantly by 82% and 17%, respectively. This increase in the mining industry is consistent with other studies (e.g. The North Superior Workforce Planning Board, 2012).

Conversely, major employment losses have been experienced by the forestry and logging industry with the continued downsizing of Paper Manufacturing, Wood Product Manufacturing, and Forestry and Logging industries. For example, Table 2 shows that from 2008 to 2011, these three industries experienced a combined decline of 41%, resulting in the loss of 652 positions (1,589 positions in 2008 and 937 positions in 2011). The Support Activities for Agriculture and Forestry experienced an increase of 217 positions, resulting in a net loss of 435 positions from the broadly defined forestry sector.

Although Table 2 is only an approximation of the total forestry and mining sectors, it supports the general conclusion that the forestry sector has been downsizing while the mining industry has experienced growth. Currently, it is unclear if the losses in the forestry industry have been offset by gains in the mining industry (Dadgostar, Garofalo, Gradojevic, Lento and Peterson, 2012).

The losses in the forestry sector are not specific to Thunder Bay but are consistent with the Provincial trend. From 2005 to 2008, roughly 60,000 workers in Ontario lost their jobs while capital investments in mills (i.e. building and equipment) declined significantly. Over the same time period, the amount of wood harvested dropped by almost half. The causes of the decline are complex and include various key factors, such as the appreciation of the Canadian dollar

relative to the U.S. dollar, high energy costs, the softwood lumber agreements, well as lower demand for pulp and newsprint (Ontario Ministry of Natural Resources, 2012).

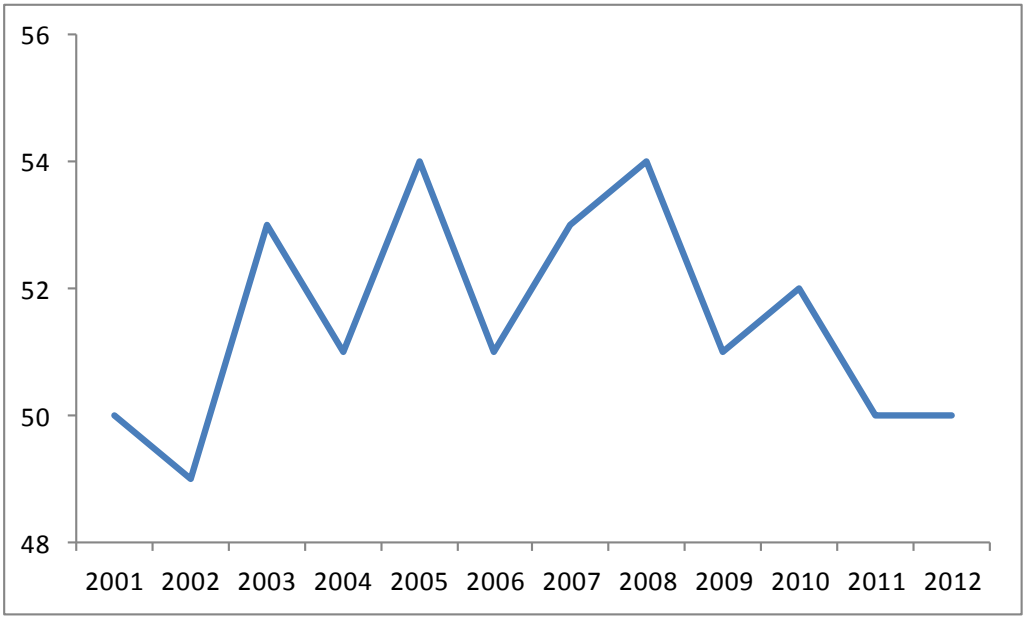
The mining service sector is expected to generate significant employment growth in the future. Estimated new positions in Northwestern Ontario are in the range of 13,150 (5,720 from construction and 7,430 from mining operations) (Dadgostar et al., 2012).

Service Sector

The service sector is comprised of transportation and communication, information and cultural industries, wholesale and retail trade, financial services, commercial services, non-commercial services, and public administration.

Figure 9 presents the total employment in the service sector from 2001 to 2012.

Figure 9 - Total Employment in Thunder Bay's Service Sector (in thousands) from 2001 to 2012

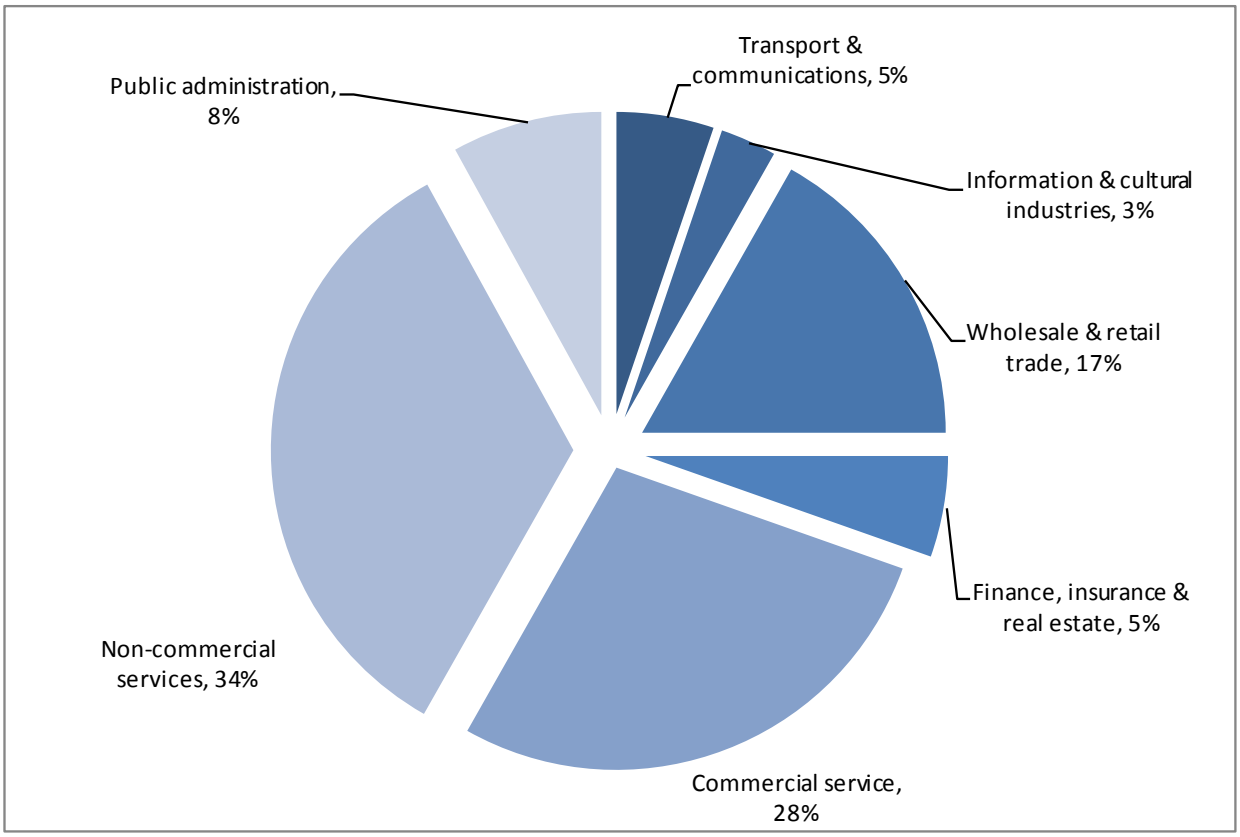


Source: Statistics Canada; Conference Board of Canada

Figure 9 reveals that the service sector did not grow from 2011 to 2012. The average growth rate in this sector was not significant in the last decade and enjoyed an average rate of about 0.7 percent. From 2008 to 2012, the service sector has shed approximately 4,000 positions.

Figure 10 presents the composition of Thunder Bay's service sector across various sub-categories.

Figure 10 - Composition of Thunder Bay's Service Sector Across Seven Sub-categories (2012)



Source: Statistics Canada; Conference Board of Canada

The service sector is distributed across various sub-categories, the largest of which are commercial services and non-commercial services[4].

[4] Non-commercial services include the education and hospitals sector.

Table 3 summarizes the change in the total service sector employment from 2001 to 2012 along with the change in each of the seven sub-categories. Table 3 complements Figure 9 by quantifying the absence of growth in the total service sector for the period of 2001 to 2012. Although the service sector employment did not grow, there has been a shift from the sub-sectors of transportation and communications, wholesale and retail trade, and public administration to the sub-sector of non-commercial services (the only sub-sector that experienced growth over the period).

Table 3 - Change in the Service Sector Employment from 2001 to 2012 (cumulative percentage change)

Service sector	0%
Transport & communications	-35%
Information & cultural industries	n/a
Wholesale & retail trade	-11%
Finance, insurance & real estate	-7%
Commercial service	-5%
Non-commercial services	18%
Public administration	-7%

Source: Statistics Canada; Conference Board of Canada

Table 4 presents a summary of the shifts in the goods and services employment sub-sectors by displaying the rates of change from 2001 to 2005, 2006 to 2012, and the forecasted 2013-2016 period.

Table 4 – Shifts in Employment Sectors from 2001 to 2005, 2006 to 2012, and Forecasted 2013 to 2016

	2001 - 2005	2006 - 2012	2013f - 2016f
Goods Sector			
Manufacturing	-29%	-27%	-16%
Construction	-6%	34%	-3%
Primary/utilities	32%	68%	16%
Service Sector			
Transport & communications	13%	-49%	15%
Information & cultural industries	n/a	0%	7%
Wholesale & retail trade	3%	-25%	21%
Finance, insurance & real estate	-3%	29%	-7%
Commercial service	-1%	-10%	0%
Non-commercial services	5%	4%	14%
Public administration	-9%	0%	8%

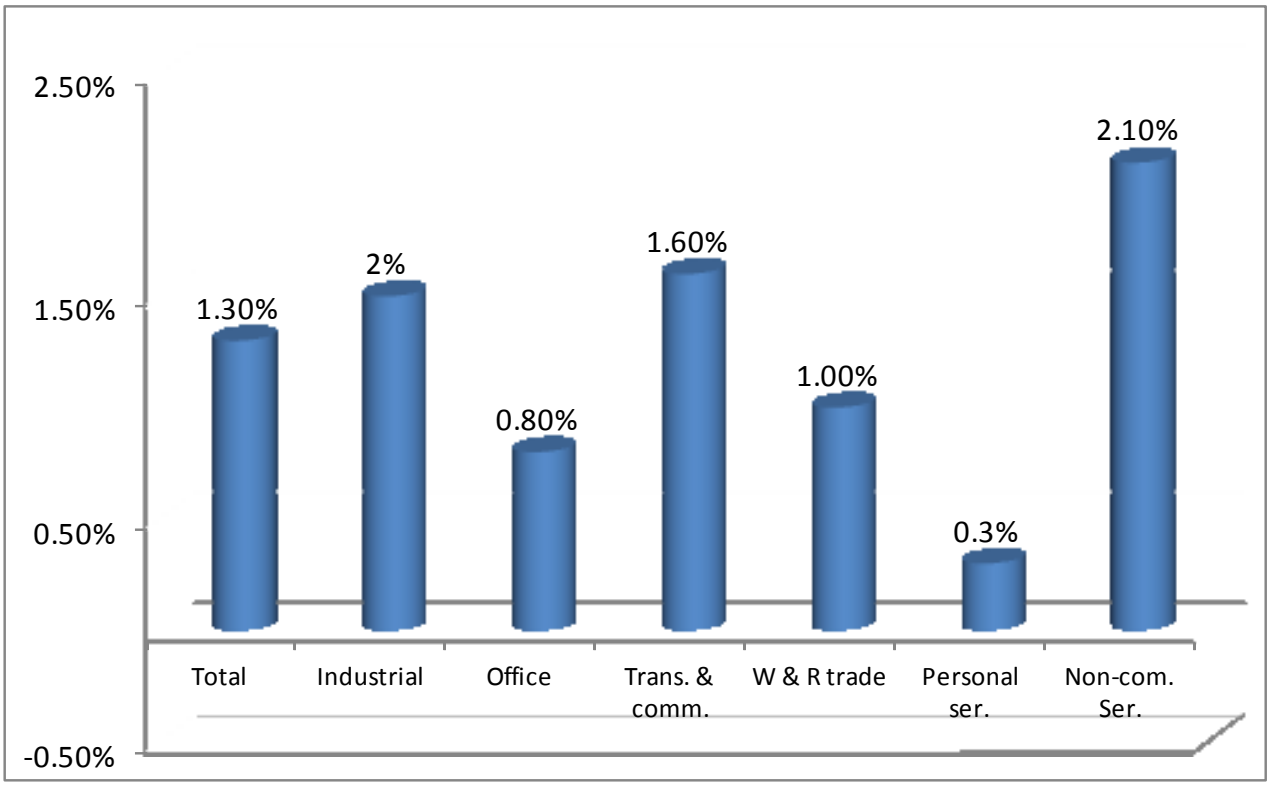
Source: Statistics Canada; Conference Board of Canada

Table 4 confirms the shift in the goods sector from the manufacturing sector to primary industries and utilities. The forecast predicts that this shift will continue from 2013 to 2016. The historical trend of service sector employment shifting towards finance and insurance is not expected to continue into the future; rather, wholesale and retail trade and transportation and communication are expected to experience employment growth in the forecast period.

Transportation and warehousing experienced a decline since the decrease in softwood forest products shipment. However, this sector will likely grow faster given the end of the Canadian Wheat Board monopoly on export of certain grains. It is expected that more grain will be exported and handled by Thunder Bay Port. Additionally, the mining sector in Northwestern Ontario is expected to boom and will have a positive impact on the port activity.

Figure 11 presents the employment outlook in terms of the cumulative annual growth rate for 2013 to 2016 across various sub-sectors.

Figure 11 – Employment Outlook (Forecasted CAGR) for 2013 to 2016



Source: Conference Board of Canada

Public and Private Sector Employment

Table *5* presents the dominant industries (by North American Industry Classification Codes (NAICS) code) in terms of total employment numbers for Thunder Bay.

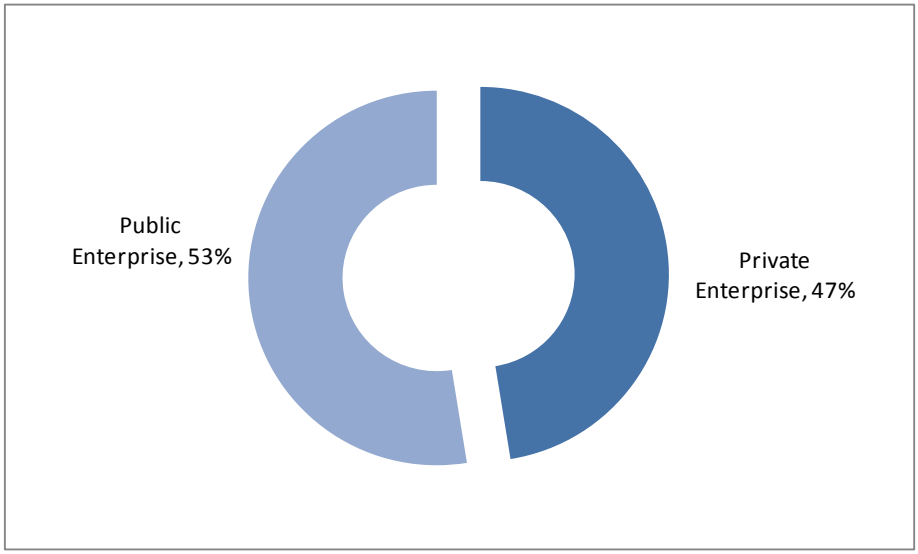
Table 5 – Dominant Employment Industries by NAICS Code (2011)

Class	Industry	Employees (in thousands)
4411 - 4543	Retail Trade	7.0
2311 - 29	Construction	4.4
6220	Hospitals	3.8
6111	Primary & secondary schools	3.4
7221 - 24	Food & beverage services	3.0
6211 - 9	Ambulatory health care services	3.0
4111 - 91	Wholesale trade	2.2
6241 - 44	Social assistance	2.1
6230	Nursing & residential care facilities	2.1
6112 - 17	Post-secondary education	2.0
9130, 9141, 9191	Local, municipal, & regional pub. Admin.	2.0

Source: Statistics Canada; Conference Board of Canada

Table *5* reveals that the three most dominant employers are retail trade industry, construction and hospitals. Figure 12 presents the composition of the employers from the private[5] and public sectors and reveals a fairly equal distribution across the sectors.

Figure 12 – Proportion of Dominant Industry Employment from Private and Public Enterprises



In order to gain further insights into the mix of public versus private sector employment, an analysis of the 55 largest employers in Thunder Bay was conducted (see Appendix 1 for the listing[6]). The 55 largest employers employ approximately 27,600, or approximately 45% of the total employment in Thunder Bay. This suggests that small business enterprises constitute a significant portion of Thunder Bay's total employment.

Table 6 presents the top ten employers in Thunder Bay, and reveals that nine of the top ten largest employers are from the public sector.

[5] Private enterprises were defined as retail trade, construction, food and beverage services, and wholesale trade. This analysis does not consider any public investments that lead to construction positions, etc.
[6] Obtained from the Thunder Bay CEDC at the following URL: http://www.thunderbay.ca/CEDC/Major_Employers.htm

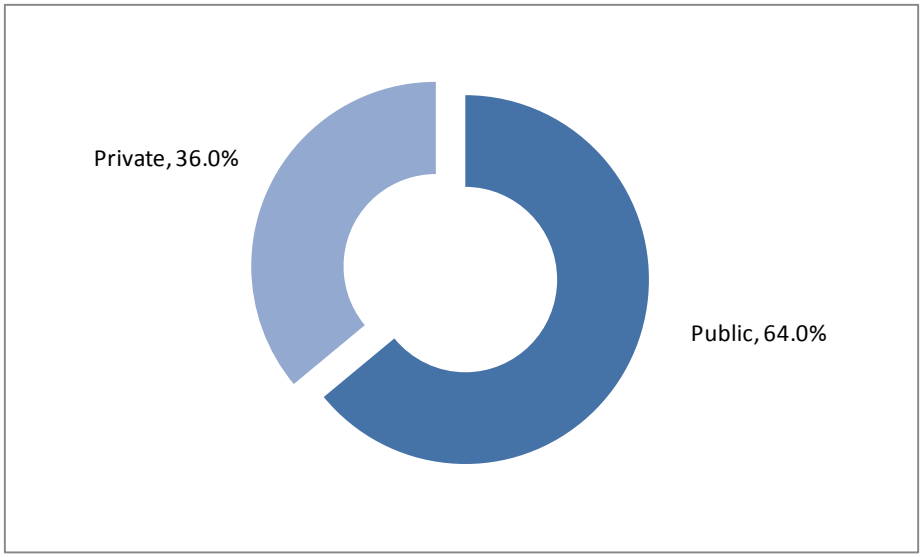
Table 6 – Top 10 Largest Employers in Thunder Bay

	Employers	Employees	Private or Public Sector
1	Thunder Bay Regional Health Sciences Centre	2,694	Public
2	Lakehead District School Board	2,200	Public
3	Lakehead University	2,100	Public
4	City of Thunder Bay	1,855	Public
5	Government of Ontario	1,849	Public
6	St. Joseph's Care Group	1,700	Public
7	Thunder Bay Catholic District School Board	1,500	Public
8	Bombardier Transportation	1,300	Private
9	Confederation College	785	Public
10	Government of Canada	653	Public

Source: Thunder Bay CEDC

Figure 13 presents the proportion of the 55 largest employers in Thunder Bay across the private and public sector and reveals that approximately 36% of the largest employers are from the private sector, with 64% from the public sector. Drawing on both the industry (Figure 12) and employer (Figure 13) analyses, it can be concluded that the private sector employs approximately 36% to 47% of Thunder Bay's workforce, while the public sector employs approximately 53% to 64% of Thunder Bay's workforce.

Figure 13 - Proportion of 55 Largest Employers from Private and Public Enterprises



Although approximately 36% to 47% of Thunder Bay's workforce is from the private sector, it is important to note that a large percentage of this employment is from the retail trade and restaurant sectors. Table 7 presents the sectors of the private sector employers from the 55 largest employers in Thunder Bay, and reveal that retail and restaurants comprise of 40% of the private sector employment from the largest employers.

Table 7 – Private Sector Employment from the 55 Largest Employers in Thunder Bay

Sector	Total employment	% of Total Private Sector Employment
Retail	2,272	22.8
Manufacturing	1,980	19.9
Restaurants	1,669	16.8
Transportation	1,340	13.5
Long-Term Care	793	8.0
Call Centre	500	5.0
Hotels	348	3.5
Financial Institutions	331	3.3
Nurses	150	1.5
Utilities	150	1.5
Security	115	1.2

Media	100	1.0%
Skiing	100	1.0%
Telecommunication	98	1.0%

It is important to note that the retail trade and restaurant sectors are secondary industries that are heavily dependent upon many of the wages earned by the large number of individuals employed in the public sector. In addition, it is generally understood that the employment positions from the retail trade and restaurant private sectors have a much lower salary and benefits package than the employment positions from the public sector.

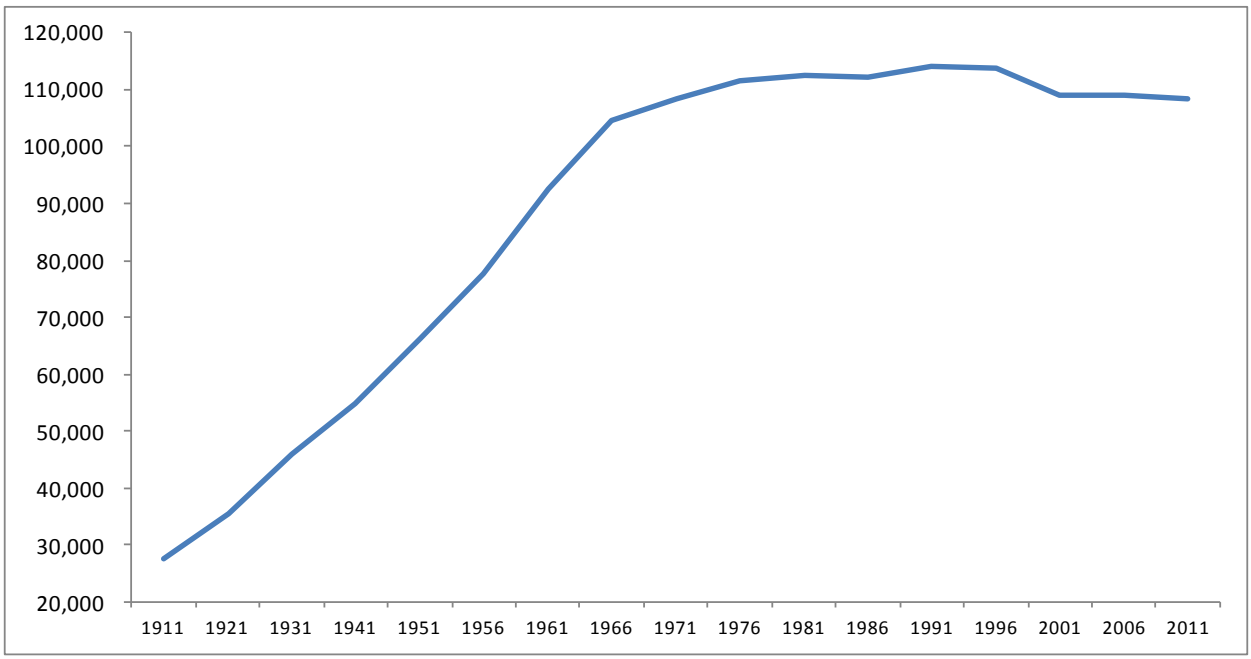
Overall, it becomes apparent that the employment in Thunder Bay is heavily dependent upon public sector activities. This conclusion is based on the following:

- Nine of the ten largest employers in Thunder Bay are from the private sector,
- The public sector employs approximately 53% to 64% of Thunder Bay's workforce, and
- A larger percentage of the employment in the private sector is from retail trade and restaurants, which have lower total compensation packages than public sector employment.

2.1.3 Population, Personal Income and Spending

Figure 14 presents the population of the City of Thunder Bay from 1911 to 2011.

Figure 14 – Population of the City of Thunder Bay (1911 to 2011)



Source: Statistics Canada; City of Thunder Bay website

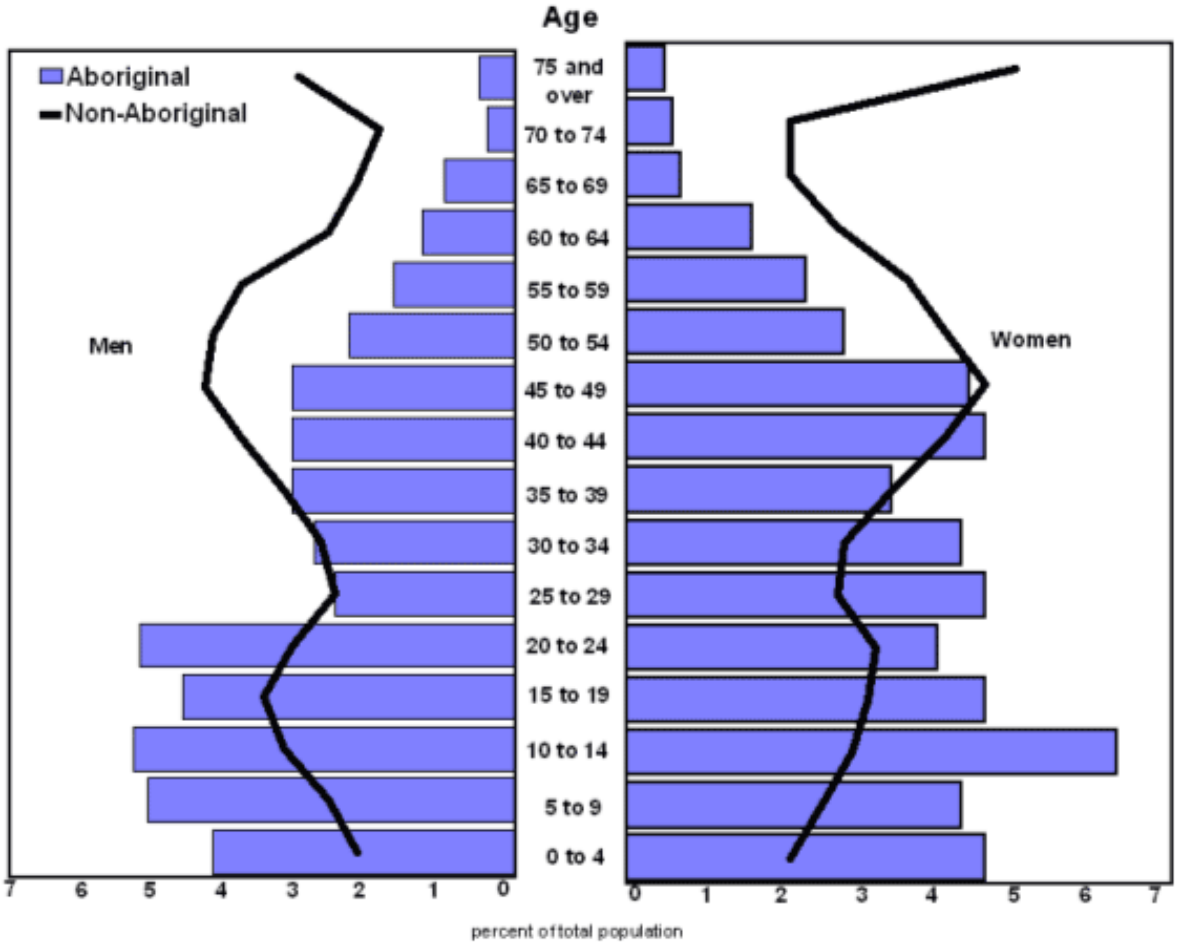
Figure 14 reveals that Thunder Bay's population has been stagnant from 1971 to the present day, essentially increasing from approximately 108,000 in 1971 to a peak of approximately 114,000 (1991 to 1996) only to decline to approximately 108,000 in 2011. Thunder Bay's population has essentially experienced zero growth over the 45-year period of 1971 to 2011.

From 1971 to 2011, Canada's population grew from 21.568 million people to 33.476 million people (Statistics Canada, Census data). This represents an overall growth rate of 55.2%. Ontario also experienced significant population growth during the period of 1971 to 2011, growing from 7.7 million people to 12.8 million (Statistics Canada, Census data). This

represents a growth of 66.8%. Clearly, Thunder Bay is lagging behind the province and the country in terms of population growth.

Figure 15 presents a population pyramid as at 2006 for Aboriginal and Non-Aboriginal populations in the City of Thunder Bay in terms of percentages.

Figure 15 – Thunder Bay Population Pyramid (2006) for Aboriginal and Non-Aboriginal Peoples

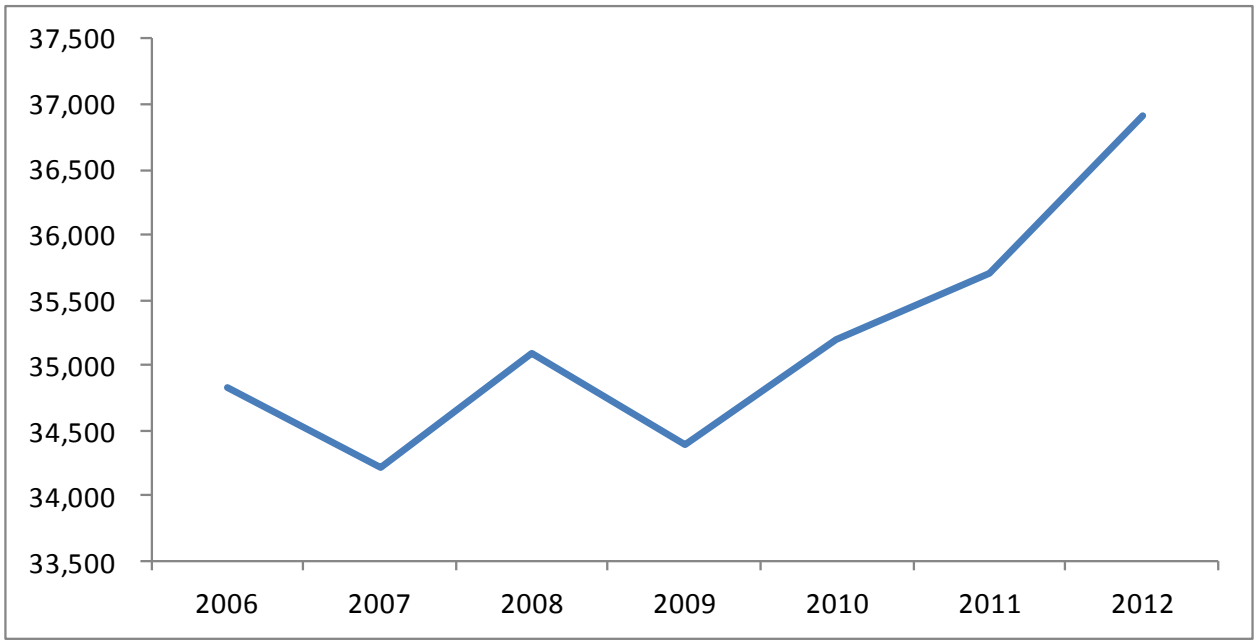


Source: Statistics Canada, Catalogue Number 89-638-XWE

Figure 15 reveals that the Aboriginal population is much younger than the Non-Aboriginal population in Thunder Bay. The percentage of people in the age groups from 0 to 24 is the largest, relative to the Non-Aboriginal population.

Figure 16 presents the per capita income for the Thunder Bay population from 2006 to 2012. Essentially, per capita income is the income per person in a population group.

Figure 16 – Per Capita Income for Thunder Bay's Population from 2002 to 2012

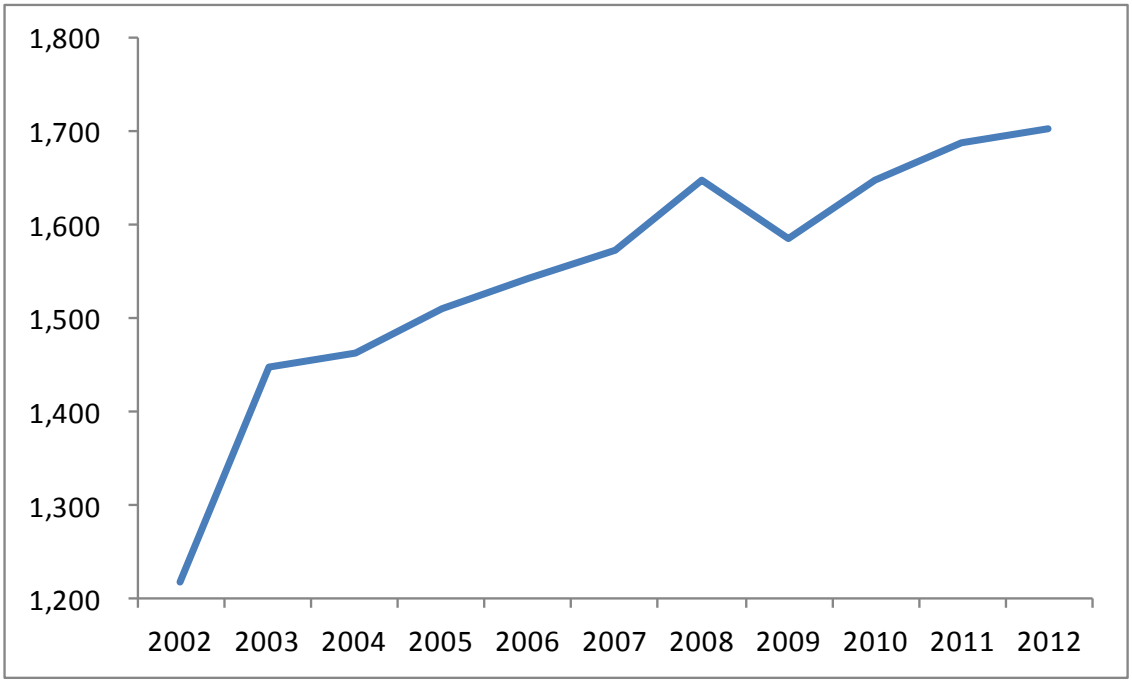


Source: Statistics Canada; Conference Board of Canada

Figure 16 reveals that Thunder Bay's per capita income has been increasing over the past four years and has experienced an increase in each year since 2009. Over the period of 2006 to 2012, per capita income has increased by 5.96%. The per capita income for Thunder Bay was approximately $37,000 in 2012. This is consistent with Canada's income per capita, which is approximately $36,500 in 2012 (Conference Board of Canada).

Figure *17* presents the retail sales for Thunder Bay, adjusted for inflation, from 2002 to 2012. Retail sales capture in-store sales as well as catalog and other out-of-store sales and are a major component of GDP.

Figure 17 – Retail Sales for Thunder Bay (2002 to 2012)

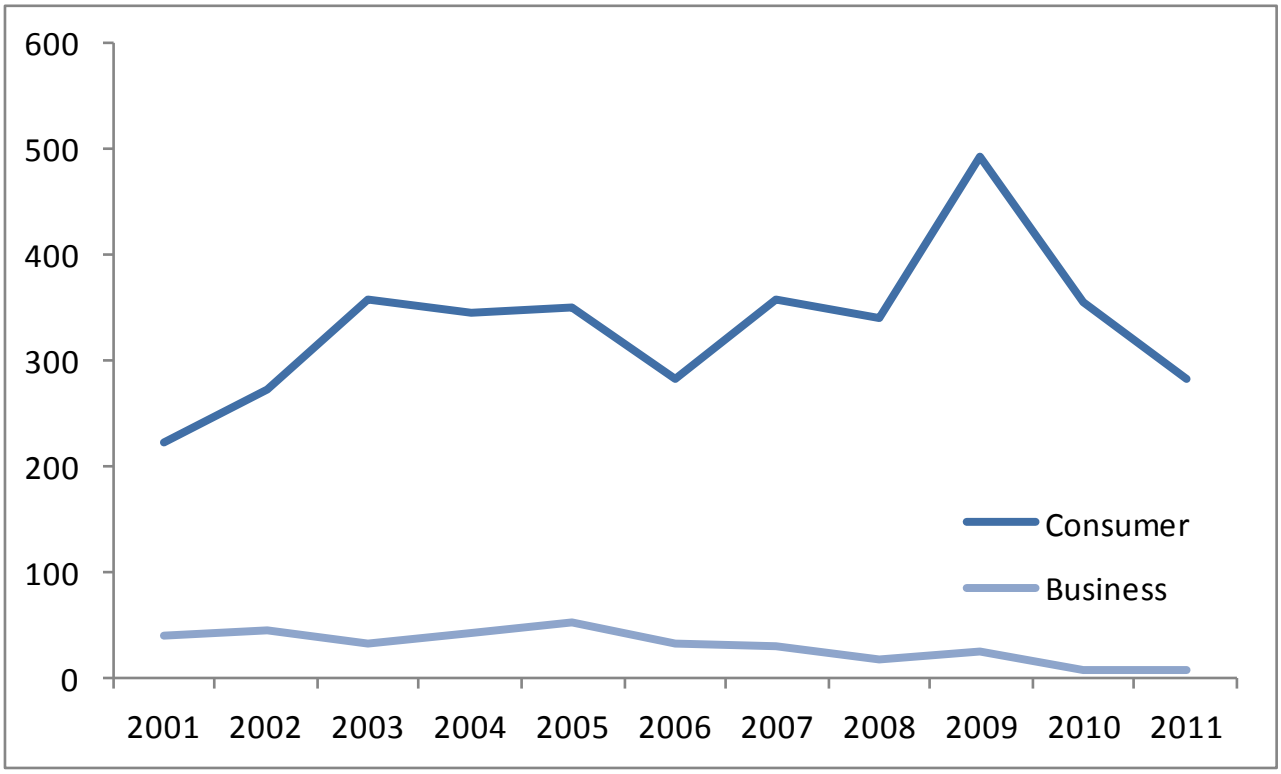


Source: Conference Board of Canada

Figure *17* reveals that retail sales have been steadily increasing from 2002 to 2012. Since the drop off around the time of the global credit crisis and recession in 2008, retail sales have been steadily increasing in Thunder Bay.

Figure 18 presents the number of bankruptcies for consumers and businesses from 2001 to 2011.

Figure 18 – Consumer and Business Bankruptcies from 2001 to 2011



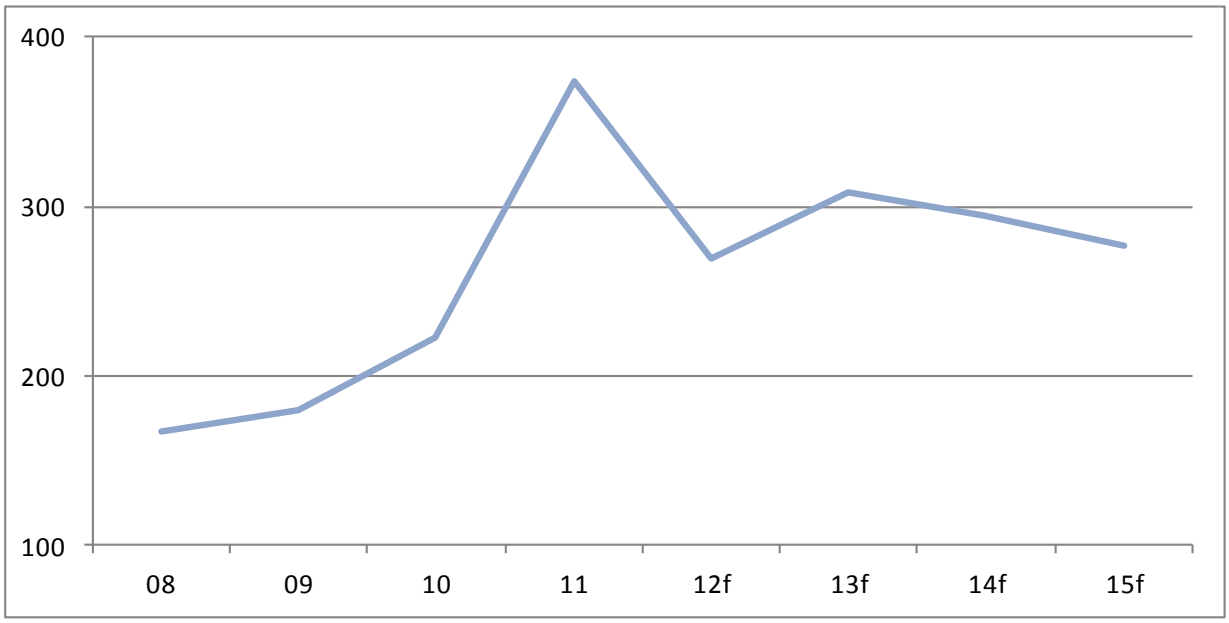
Source: Conference Board of Canada

Figure 18 reveals a declining trend of bankruptcies for businesses in Thunder Bay and a slightly increasing trend in personal/consumer bankruptcies from 2001 to 2011. Again, the impacts of the 2008 global credit crisis and decline in the goods sector employment are manifested in the spike in consumer bankruptcies in 2009 to a ten-year high of approximately 500. However, since 2009, personal bankruptcies have been steadily declining.

2.1.4 Real Estate

Housing starts are generally considered to be leading indicators of economic activity as construction growth usually picks up at the beginning of the business cycle. Figure 19 presents an index of housing starts for Thunder Bay from 2008 to the forecasted level for 2015 (2015f).

Figure 19 – Housing Starts Index (2008 to 2015f)

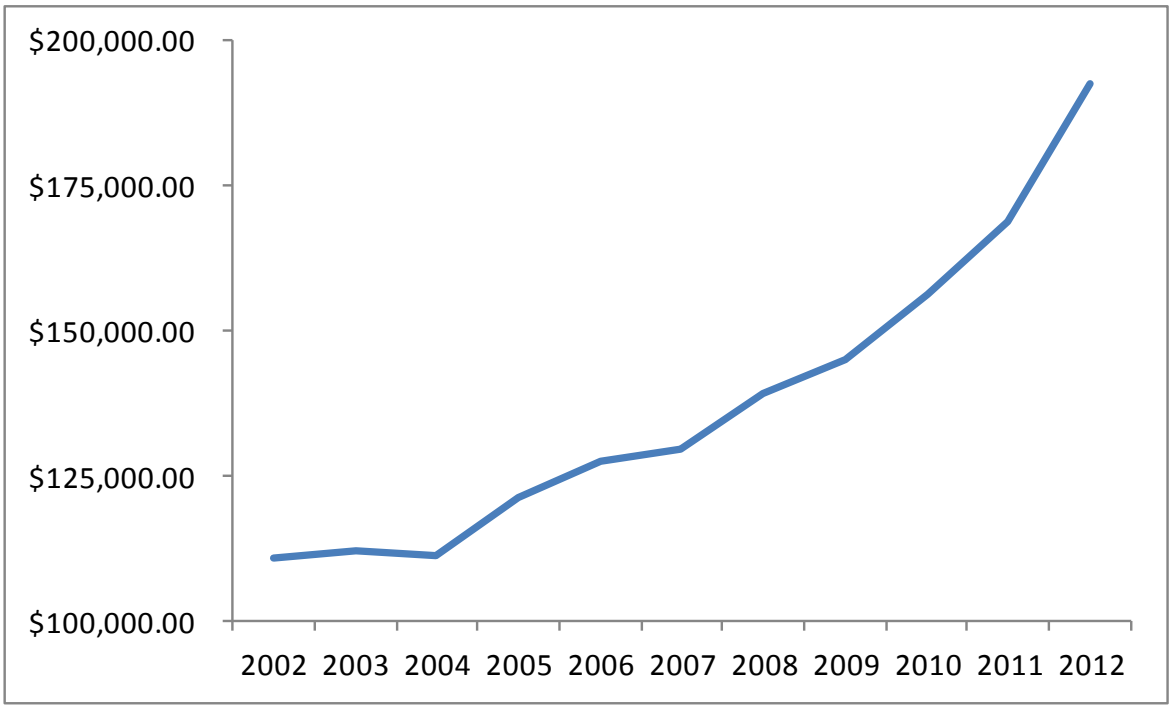


Source: Statistics Canada; CMHC Housing
f = forecast

Figure 19 reveals that the housing starts in Thunder Bay have been trending upward from 2008 to 2011, but it is forecasted that housing starts will level off from 2012 to 2015.

Figure 20 presents the median single family resale price of a home in Thunder Bay, and the trend has seen a steady increase. Since 2004, resale prices have increased in each year, with the most significant growth occurring in the more recent years of 2007 to 2012. From 2002 to 2012, the median single family home resale price has increased by approximately 42%.

Figure 20 - Median Single Family Home Resale Price in Thunder Bay



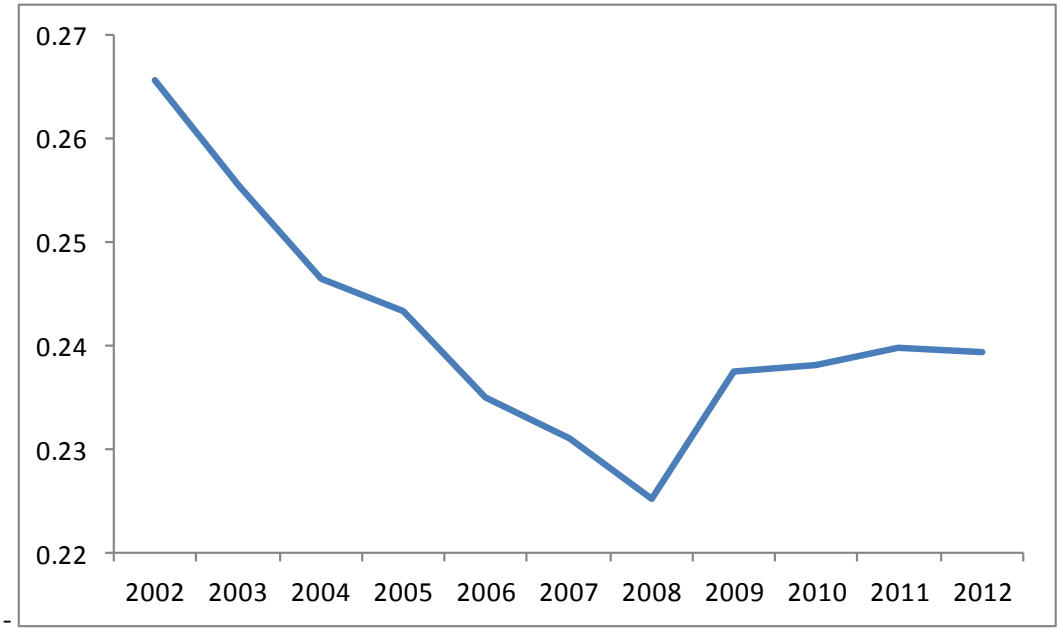
Source: Conference Board of Canada; CMHC Housing

Rising resale prices are indicators of economic growth and can be caused by a number of factors. The exact driver of the increase in Thunder Bay's resale prices is unknown. In general, the supply and demand dynamics of the real estate market are at the core of the price determination. In the case of Thunder Bay, the demand side received a significant stimulus from the historically low mortgage interest rates (thereby making housing more affordable for more people), while the supply side (i.e. construction of new homes) did not match the increase in demand, thus generating a price increase. However, as resale prices increase, home ownership becomes less affordable.

Figure ***21*** presents the Housing Affordability Index (HAI) for Thunder Bay from 2002 to 2012 and reveals that the affordability of housing in Thunder Bay steadily declined from 2002 to 2008, meaning that housing has become less affordable. Housing became more

affordable from 2008 to 2009 and remained relatively unchanged from 2009 to 2012. The steady decline in the HAI between 2002 and 2012 suggests that the rising real estate values have more than offset any benefits in affordability from the current low interest rate environment.

Figure 21 – Housing Affordability Index (Thunder Bay, 2002 to 2012)

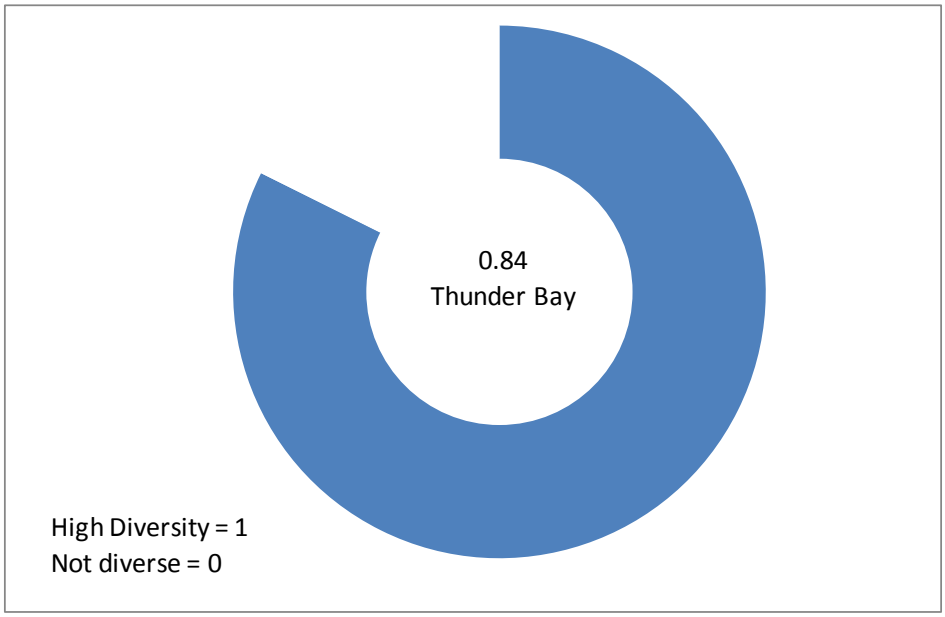


Source: CMHC Housing Time Series Database; Conference Board of Canada

2.1.5 Economic Resilience

Figure ***22*** presents a measure of the diversity of Thunder Bay's economy as calculated by the Conference Board of Canada.

Figure 22 – Economic Structure and Diversity Measure, 2012

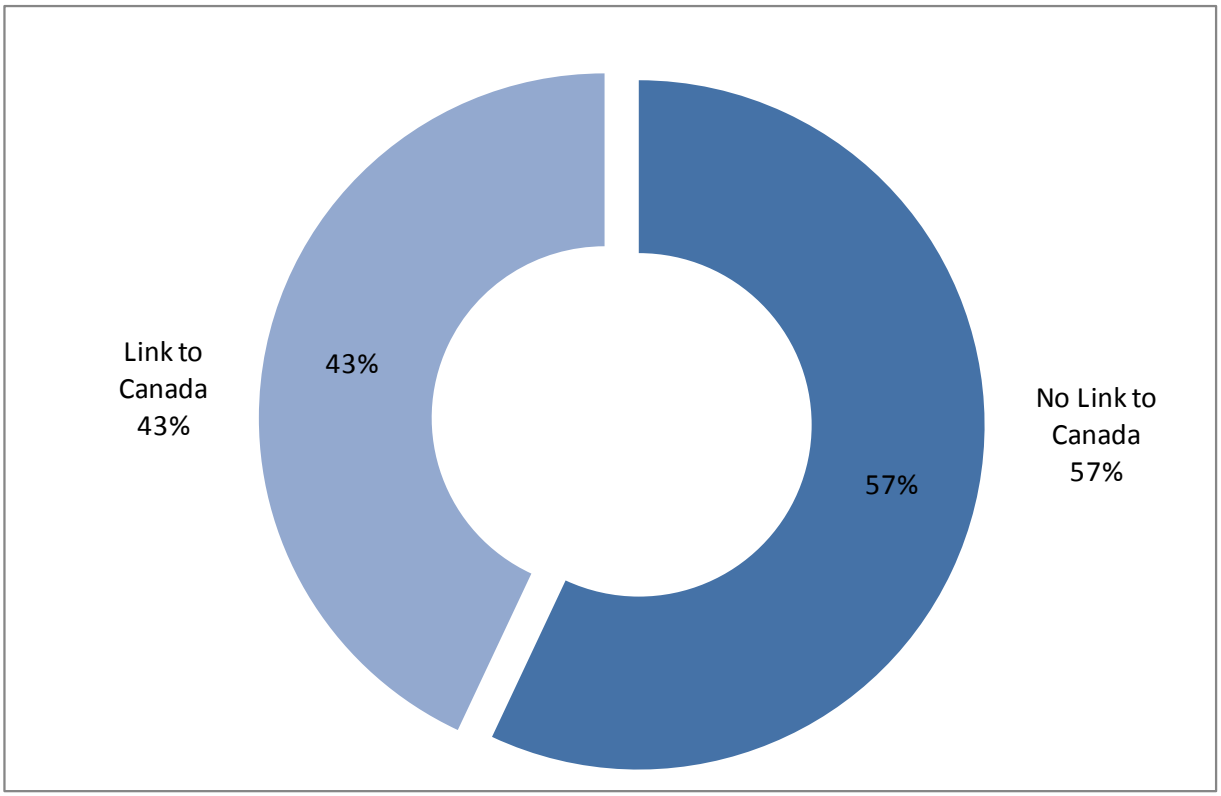


Source: Statistics Canada; Conference Board of Canada

The measure of 0.84 suggests that Thunder Bay's economy is fairly diverse, considering that the scale ranges from 0 (not diverse) to 1 (highly diverse). This is consistent with the diverse amount of employment in the various sub-categories of the goods and service sector. Relative to other areas, Thunder Bay's economic diversity is consistent with other cities such as Kingston (0.84) and Sudbury (0.75).

Figure 23 presents a measure of Thunder Bay's employment variability and suggests that 43% of the fluctuations in Thunder Bay's labour market are based on variations in Canada's greater economy, while 57% of fluctuations are a result of factors inherent to Thunder Bay.

Figure 23 – Employment Market Variability

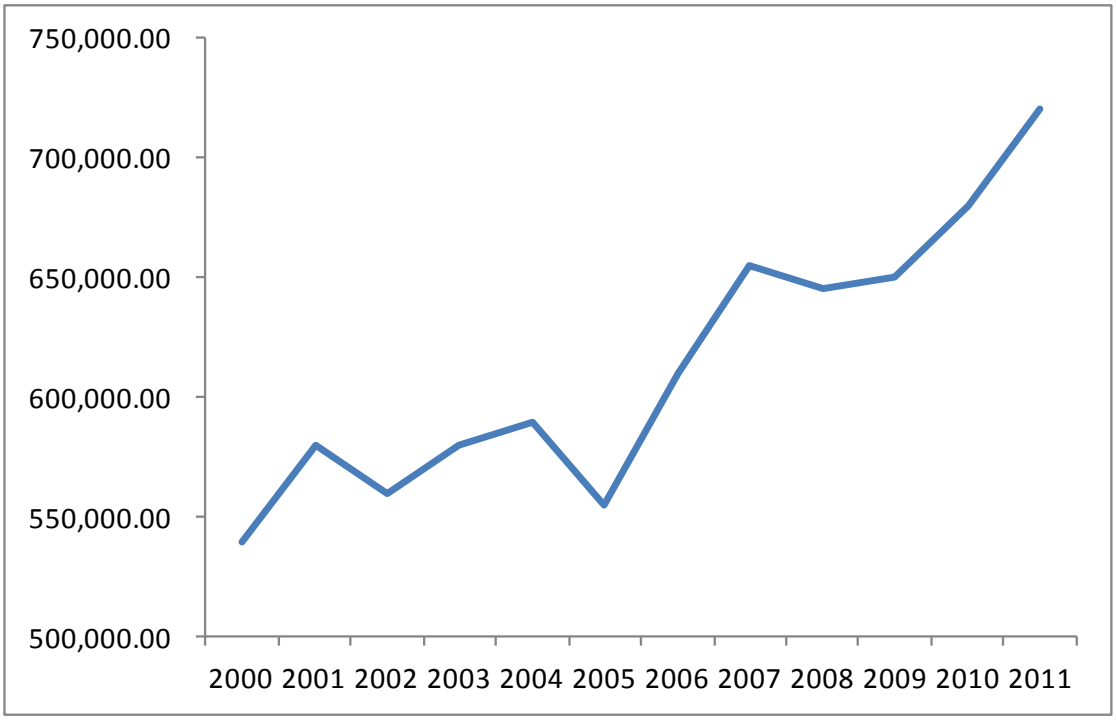


Source: Statistics Canada; Conference Board of Canada

Thunder Bay's employment market variability is consistent with other cities such as Kingston (56% not linked to Canada) and Sudbury (55% not linked to Canada).

Figure *24* presents the number of air passengers at the Thunder Bay airport for 2002 to 2012.

Figure 24 – Number of Passengers in Thunder Bay's Airport (2002 to 2012)



Source: Statistics Canada; Conference Board of Canada

Figure *24* reveals a steady increase in the number of passengers using the Thunder Bay Airport from 2002 to 2012. The increased airport activity can be seen as an indication of increasing economic activity in the city and region.

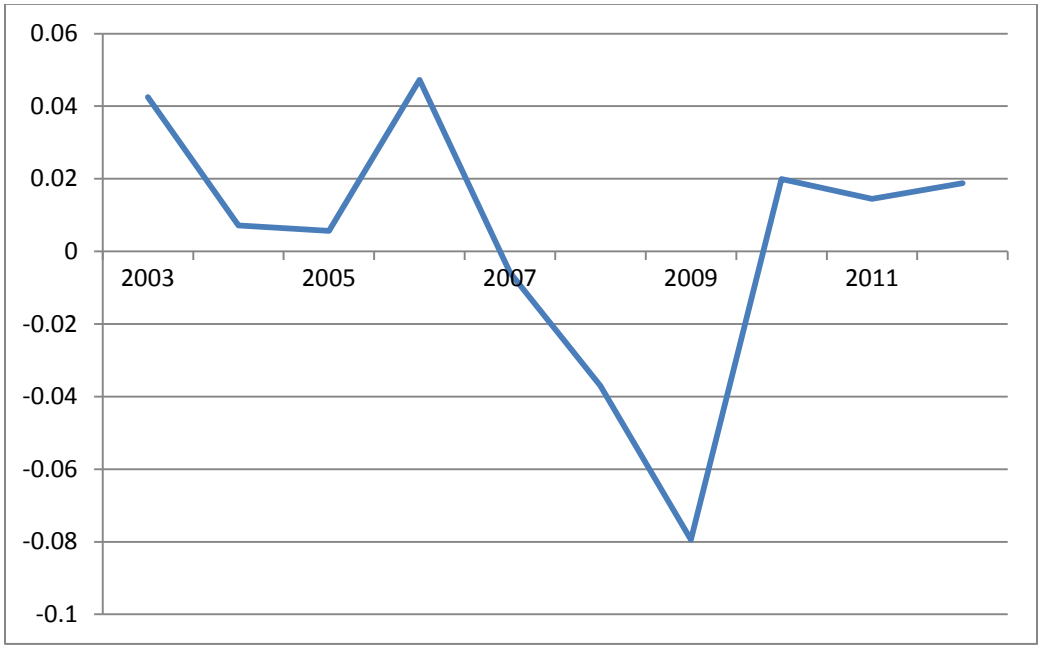
2.2 Thunder Bay's Economic Activity (TBEA) Index

A specific index can be utilized to examine the health of any economic. Frequently, GDP or GNP measures are used to determine the health of an economy. However, these measures are not representing the full scope of economic activity in an economy. Therefore, a unique, customized index has been created in order to better reflect the reality and dynamic of Thunder Bay's economy. This index is called the Thunder Bay Economic Activity (TBEA) index.

In order to develop the TBEA index, five economic indicators for the Thunder Bay CMA have been utilized. The following are the components of the TBEA: 1) employment; 2) retail sales; 3) employment benefits; 4) affordability of housing; and 5) home sales.

The above five variables have been chosen based on economic theory, data availability, and the magnitude of the correlation coefficient relative to the *real GDP growth* variable (Figure 25) for the Thunder Bay CMA (source: Conference Board of Canada).

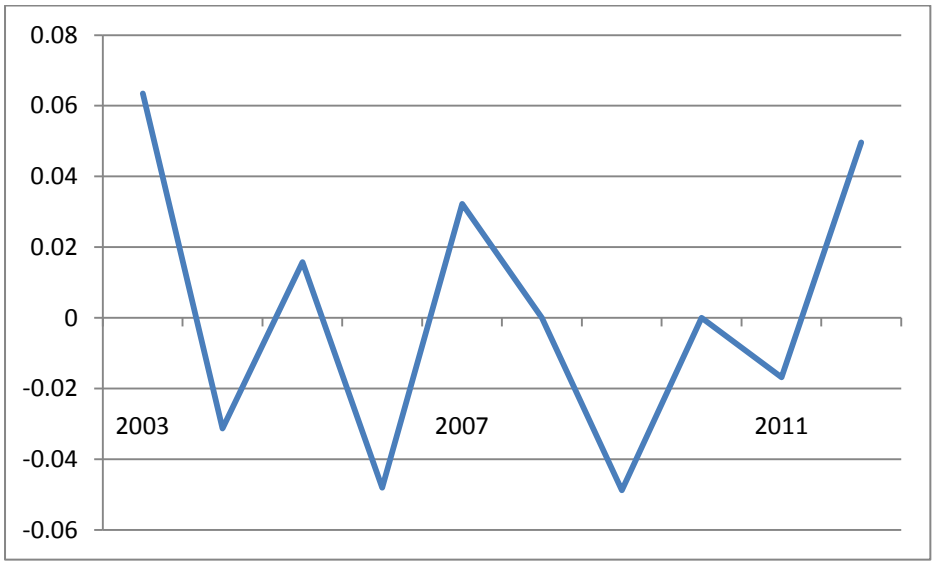
Figure 25 - Annual Growth Rates of Real GDP



The following figures show the trend of each component.

1) *Employment*

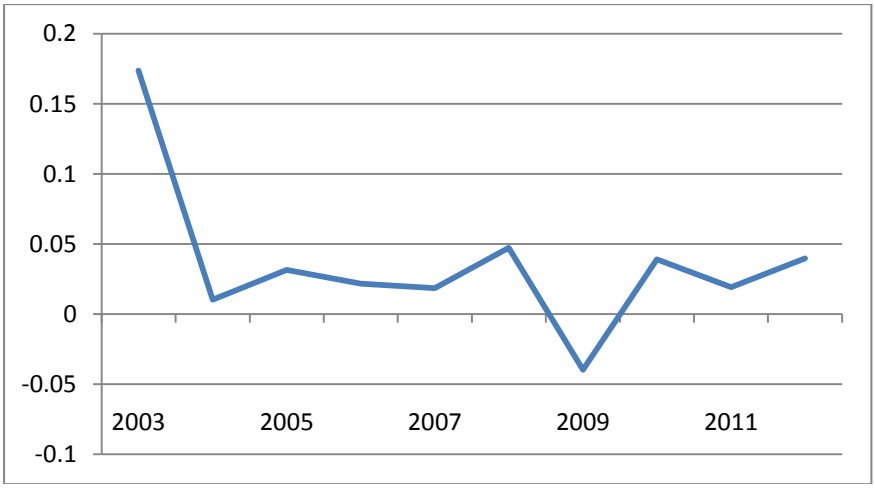
Figure 26 - Annual Growth Rates of Employment



Source: Conference Board of Canada

2) *Retail sales adjusted for inflation*

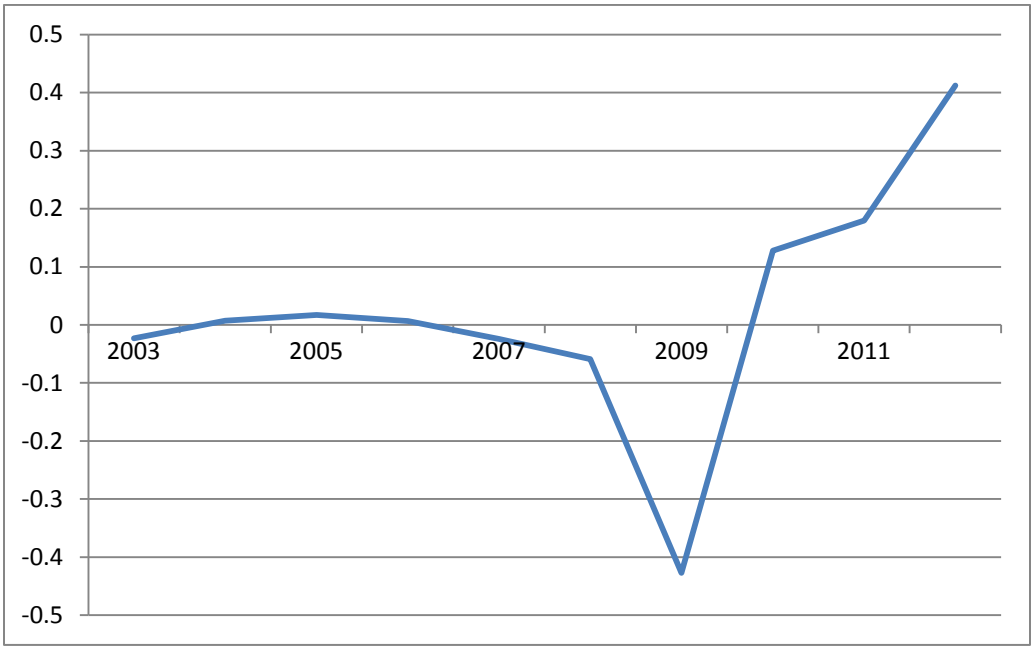
Figure 27- Annual Growth Rates of Retail Sales Adjusted for Inflation



Source: Conference Board of Canada

3) *Initial claims for unemployment benefits*[7]

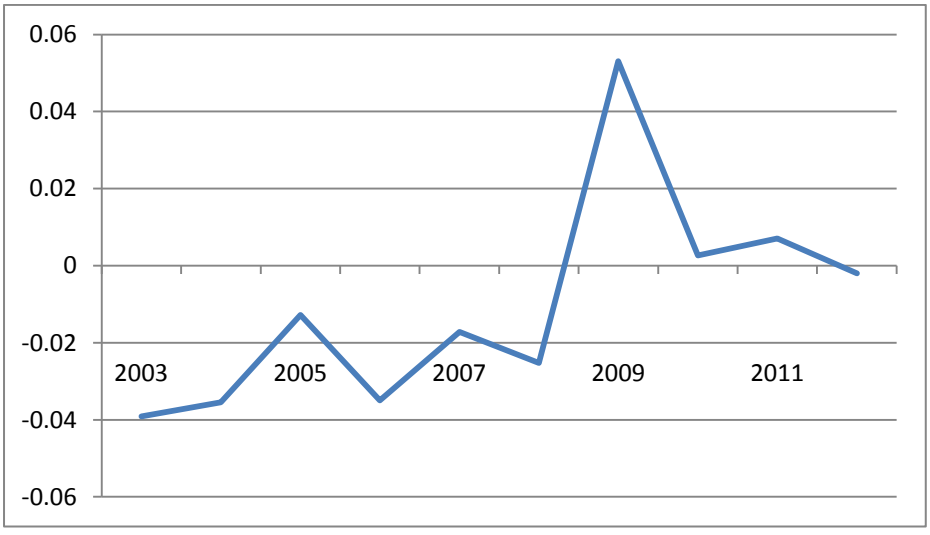
Figure 28 - Annual Growth Rates of Initial Claims for Employment Benefits



Source: Statistics Canada

4) *Affordability of housing measure*[8]

Figure 29 - Annual Growth Rates of Affordability of Housing Measure

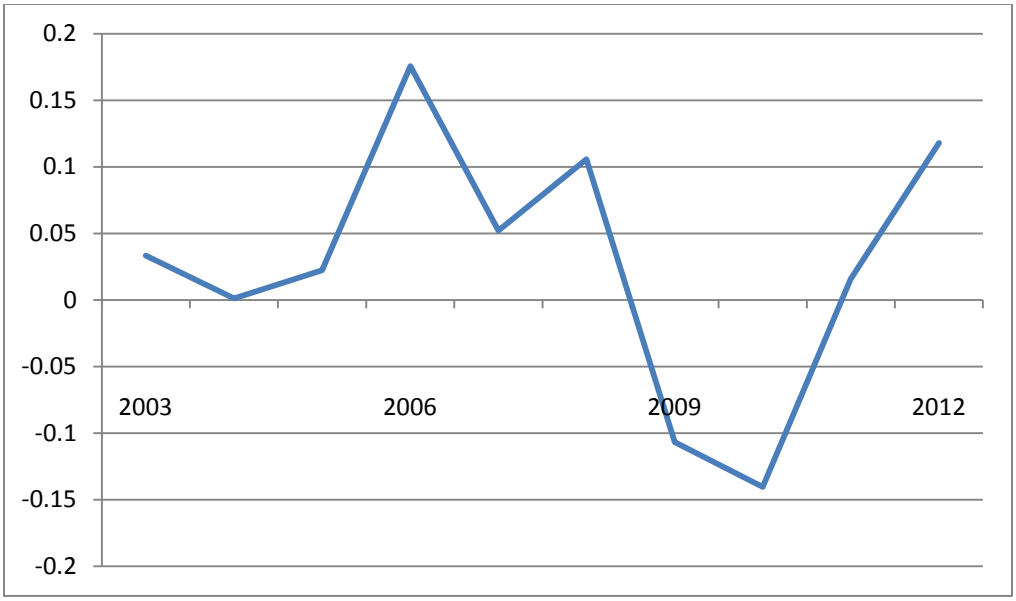


Source: CMHC Housing Times Series Database

[7] This variable was multiplied by -1 to ensure a direct relationship with real GDP growth.
[8] The affordability of housing measure is defined as the ratio of average annual rent to average annual income. A high average affordability of housing measure indicates relative unaffordability of renting.

5) *Total value of home sales*

Figure 30 - Annual Growth Rates of Total Value of Home Sales



Source: Conference Board of Canada

A casual observation of the above figures of the five variables suggests that the variables follow the pattern of the GDP growth rate rather well. The composite TBEA Index is constructed for the 2003-2012 period when data for all variables were available. In addition, considering the dynamic nature of financial markets, it is more sensible to track more recent movements in variables.

This report, in general, follows the methodology of the Conference Board[9], a reputable independent, non-profit organization that produces leading indicators for the United States (U.S.) and the world economy. The TBEA Index is constructed as follows:

1. A symmetric difference $x_{it} = 200 \times \left(\frac{X_{it}-X_{i(t-1)}}{X_{it}+X_{i(t-1)}}\right)$ is created for all five X_{it} variables (i=1,...,5; t=2002,...,2012);

[9] http://www.conference-board.org

2. Standard deviations of the symmetric differences are calculated for all variables. Let σ_i denote the standard deviation of each x_{it}.
3. The weight of each indicator is defined as $\omega_i = \frac{\sigma_i}{\sum_{i=1}^{5} \sigma_i}$. This setup implies that the more volatile an indicator is, the larger the weight it will carry in the composite index.
4. The weights calculated in the previous step are used to determine the annual contribution of each indicator to the composite index, which is then computed by $I_t = \sum_{i=1}^{5} \omega_i \times x_{it}$.
5. The TBEA Index is calculated by rescaling I_t and treating 2003 as the base year (100). The values of the TBEA Index are found recursively from the base year as $TBEA_t = TBEA_{t-1} \times \left(\frac{200+I_t}{200-I_t}\right)$.

The weights that are found for the five X_{it} variables are the following: employment (ω_1=0.1038), retail sales adjusted for inflation (ω_2=0.1434), initial claims for unemployment benefits (ω_3=0.4224), affordability of housing measure (ω_4=0.0736), and total value of home sales (ω_5=0.2565).

In order to verify the performance of the TBEA Index, it is displayed along with the GDP growth rate in Figure 31. GDP growth rate is also rescaled by setting its 2003 value to 100. The goal of this exercise is to observe whether the TBEA Index can adequately capture the movements in the real economy.

Figure 31 – Relationship Between the TBEA Index and Real GDP Growth for 2003-2012

It can be concluded that the two indices consistently move together while the correlation coefficient between the series is high and statistically significant (0.91). The TBEA Index reached its maximum over the data set in 2006 which is consistent with the accelerated rebound of the real economy from the early 2000s recession. This rebound was followed by a sharp drop that reflects the contraction of the real economy caused by the subprime mortgage crises in the U.S. The minimum value was recorded in 2009 and the TBEA Index has been growing steadily until present time.

Section III - Theories of Regional Economic Development

In order to develop their economies, regions pursue various strategies that may include

- encouraging entrepreneurship,
- improving the talent base,
- enhancing the attractiveness of the region to outsiders with creative talents,
- creating a legal, fiscal, and regulatory regime that encourages new businesses,
- creating larger pools of venture capital,
- attracting out-of-region businesses through regional business-attraction centers,
- encouraging research and development in local universities,
- facilitating the movement of inventions from the laboratory to the business plan.

More focused strategies can also be applied by 1) fostering new investment, measuring it and retaining successful investment projects, 2) developing sectors with a clear opportunity for growth such as mining, oil and gas, 3) facilitating small business development and meeting their needs, 4) building the value proposition for investment and coordinating such efforts with provincial and federal governments, and 5) encouraging international business investment.

Regions are not uniform, however, in terms of their state of infrastructure, availability of factors of production, composition of population and culture. To decide on the best course of action, each region is faced with the following questions: Which development strategy is the most appropriate? What strategies will actually work? How can empirical research be used to evaluate and select alternative strategies? To help answer these questions, the following narrative provides a summary of the theories pertaining to regional economic development, a brief insight into Canadian economic development strategies, and an overview of regional economic paths.

3.1 Theories of Regional Economic Development

3.1.1 Staple Theory

Regional economic development is associated with diversification, systematic improvements in the structure of production, productivity growth and efficient utilization of the factors of production and trade. Resource-based regional economies are generally dependent on an outside market. These types of regions essentially export natural resources and have certain characteristics that render the resources immobile, such as the nature of forests, minerals, climate and geographical location. Regions with such unique endowments, however, can still enjoy economic rents[10] which are essential for their development. The search for economic rent leads to the production of "staples[11]" for export. In general, this type of economy produces the staple for use outside of the region rather than for local consumption.

The major question that the resource exporting regional economies face is whether primary exports lead to future growth and development or not. This growth depends on the technology of the export industry (i.e. skilled labour and capital intensity), the linkages of the industry to the rest of the economy through the demand for intermediate goods and services, the availability of infrastructure (railroad, ports, etc.), the impact on government budgets through taxes and the relative involvements of foreign and local factors of production. The greater the local linkages, the greater will be the effect of staple exports on the development of the region's economy. A major concern regarding whether the staple exports will lead to development of the region or not is that local linkages are inherently low and, thus, the growth of the natural resource-based industry does not lead to the development of other industries (for more discussion about staple economic theory see Watkins, 1984 and Innis, 1956).

[10] Economic rent is the minimum amount of money that an owner must receive in order that an asset is worth the investment to produce to market.
[11] Staple commodities are raw materials such as lumber, fish, minerals, etc. that are produced for markets outside the region of origin.

3.1.2 Export-Based Theory of Regional Economic Development

The staple theory has influenced the development of the export-based theory of regional economic development which is associated with the writing of North (1955). Unlike the staple theory, commodities in the export-based approach are not necessarily limited to primary products. Goods and services from secondary sectors are candidates for exports, as well. In an export-based system, the exogenous or external changes in the level of economic activities in other regions are translated into changes in the level of activities in the region in question. In the export-based economies, the impacts of regional activities have greater influence than the original initial increase because of the greater linkages through indirect and induced effects.

North (1955) argues that the ability of any region to export is closely related to its comparative advantages, especially in terms of production and transportation costs as well as the market size. Small regional, export-driven economies are subject to a higher sensitivity to the export prices of their commodities than are other types of economies. Therefore, a small predominantly export-based region can have a sustainable economy by reducing production costs via improvements to its production technology, productivity, infrastructure, human capital and other local factors of production. These factors are the major determinants of the long-term growth and prosperity of a region. This ability, however, is contingent upon the resource locational advantage, productivity growth, production costs, export demand, commodities prices and new resource discovery (Dadgostar, Jankowski, and Moazzami, 1992).

3.1.3 Potential Problems of Small Exporting Regional Economies

Considering their long-term growth possibilities, export-based economies generally face the following problems:

- The small size of the region limits its ability to take advantage of economies of scale in certain tradable goods,

- Natural location disadvantages for producing other goods,
- Relative inefficiency and high costs of producing goods for the local market,
- Sluggish productivity growth relative to the change in labour costs during the production of resource-based export products, which in the long-term, limits the growth of all sectors.

Nevertheless, the above potential problems can be rectified if a region utilizes its exports of the existing tradable goods to help create or expand other sectors. In other words, diversifying the economy of the region can be beneficial in the long-run. The key for the success of the diversification strategy is the ability to capture and to invest the resource rent productively. Specifically, the portion of the rent that is captured by private non-residents is unlikely to be used for economic diversification of the region. The portion of rent captured by the provincial and federal governments could be returned to the region and used to diversify its economic base, but that route involves a responsible regional development and diversification strategy.

3.2 Canadian and Regional Economic Strategies

Prior to World War II, the economy was dependent on the primary sector and significantly related to the local economic trends and patterns in the various regions in Canada. Since World War II, the Canadian economy has moved through three stages of economic development. After World War II, the structure of the Canadian economy went through a major transformation into the secondary sector. This stage of economic development was a transition period that lasted approximately 20 years as workers moved from the primary sector and rural areas into secondary sector jobs in urban centres. Large industrial plants were established and work forces were covered by collective agreements.

In the stage of development between the 1980s and 1990s, Canadian firms faced considerable global competition. As a consequence, skilled labour, technology and innovation

were demanded by firms in order to increase their productivity and their international competitiveness. During the period between 1950 and 1980, the economic strategy was to attract firms to the cities and regions by offering cheap factors of production, subsidies, tax advantages and subsidizing the infrastructure that firms required. The Province of Ontario followed this strategy until the 1980s.

At the same time, the provinces were developing a new approach by enhancing the education and technological infrastructure necessary for creating a knowledge-based system capable of meeting the requirement of an ever-changing economic environment. This new approach focused on knowledge transformation from universities to industries, increasing managerial skills, establishing industrial parks, etc. This approach was very government-dependent. The third stage of the economic strategy focused on the quality of the physical, social and knowledge infrastructure of the locality. This stage called for adequate infrastructure, wide accesses to information and enhanced efficiency that needed government involvement. Aboriginal economic development has also been undergoing a transformation, from a system based on dependency of government transfers to one of developing local economies. This transformation can be explained by the Alternative Development perspective put forward by Friedmann (1992) in response to the failure of the market to not only alleviate poverty in underdeveloped regions but to also address the sharp rise in world poverty and increasing relationships with under-developed regions. The Alternative Development approach does not negate the market economy, but rather its objective is to restructure the system through organizational and capacity development. This transformation is evident in the increasing numbers of Aboriginal students in post-secondary institutions, the rising number of community owned businesses, increased employment and entrepreneurship, and partnerships of Aboriginal

communities with industry in regards to resource development that meet social, as well as business goals.

For Thunder Bay, economic development after World War II until the late 1990s followed a Staple Theory of Economic Development. Staple Theory examines issues in terms of various characteristics of the natural resource-based exports and their impact on the rest of the economy. Resource-based economies are generally dependent on outside markets. The immobility and scarcity of resources leads to the presence of economic rent (essentially, the immobility of resources implies that economic adjustments to them are slow. In turn, this becomes one of the major causes of international comparative advantage, trade and development).

The search for rent leads to the production of goods that are valuable internationally, but not consumed locally. In the late 1980s and early 1990s, the major question was how to understand the link between staple exports and the development of other industries. The resource-based exports were questioned and a search for other approaches to economic development began. Gradually, a new approach to regional economic development emerged. Although the forestry and mining sectors are still considered to be vital to the well-being of Thunder Bay and the region, it is recognized that regional economic growth is associated with diversification, systematic improvement in the structure of production, productivity growth, efficient utilization of the factors of production and trade expansion and sustainable development. The role of Aboriginal people in the forestry industry is rooted in forest management for cultural and community survival. Social enterprise encourages economic development that considers social, as well as commercial goals. Community and capacity development of Aboriginal youth contributes to regional economic development and

contributions to the economy and the future development of Thunder Bay is often not well recognized.

The focus of the economic development of Thunder Bay and the region has recognized both internal and external factors necessary for exporting primary goods. In this sense, the trend in regional economic development has shifted over time from a focus on comparative advantage to competitive advantage and more recently to the notion of collaborative advantage. In order to establish a new approach for Thunder Bay's economic development, the process of globalization has to be understood, as well as the emergence of concern for achieving sustainable development, and the focus on regional self-help in the pursuit of endogenous (internal) growth. Today, it is more and more the responsibility of regions to use their own devices to develop and to compete internationally in order to survive and there is more reliance on internal economic dynamics or endogenous growth.

A number of key themes have emerged regarding what constitutes regional growth and development as well as regional competitiveness. Not surprisingly, there are different points of view among regional economic development scholars, and some of these differences are related to the relative focus given to the role of exogenous forces on the one hand, and the roles of endogenous processes and factors on the other. There now seems to be an almost universal realization of what Garlick, Taylor and Plumber (2006) refer to as the "institutional embeddedness" of endogenous processes and factors in regional development. In a broader context, institutional embeddedness refers to the interplay between a regional population and regional institutions. Of course, exogenous factors do remain important to a region's economic performance and how it develops over time. However, increasing importance is being placed on endogenous forces as determinants of a region's economic competitiveness. Regional economic

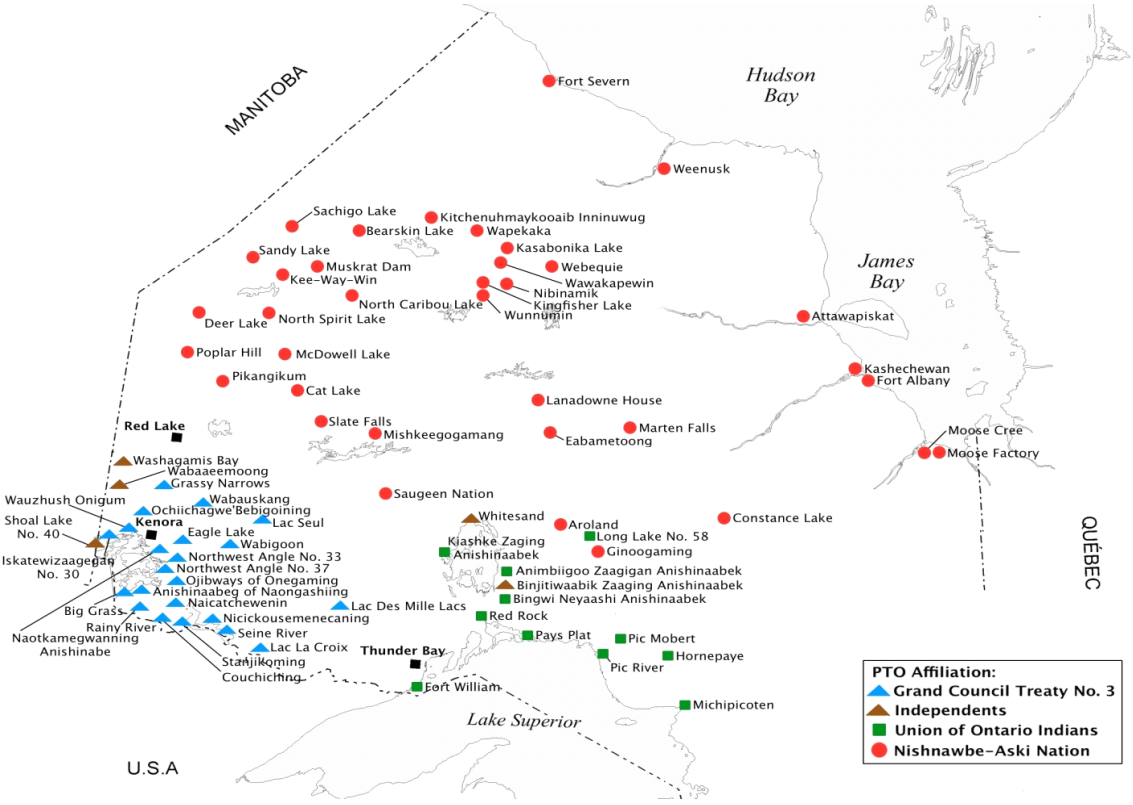
development policy initiatives tend to be more oriented towards measures that enhance local capacity and capability for a city or region to cope with a rapidly changing and increasingly competitive global environment. This study will provide a number of insights into these issues.

Section IV – Aboriginal Peoples' Contribution to the Thunder Bay Economy

4.1 Introduction

In a study pertaining to Aboriginal people and the economy of Northern Ontario, Southcott (2009) describes the Aboriginal population as having increased rapidly over the past 10 years with the highest population growth rates and labour force participation rates in urban areas. Aboriginal people are forming an increasing proportion of urban populations due to factors such as in-migration for employment opportunities, natural increase of individuals being born and raised in the city, increasing student enrollments for secondary and post-secondary education and the establishment of urban-based Aboriginal businesses. Aboriginal communities are also investing in business opportunities and purchasing urban property. Aboriginal political organizations are establishing offices in the city for locational advantages and there is an increase in the number of Aboriginal institutions and agencies who provide culturally appropriate services to this growing population. The economic impact of the Aboriginal people in the region who come to Thunder Bay for business, shopping, medical appointments, etc. also provides a significant contribution that should not be overlooked. According to the 2006 Canada census, approximately 44,000 people in Northwestern Ontario have self-identified as Aboriginal. This population is a mix of rural and urban inhabitants of First Nations living on and off reserve and Métis. The First Nation populations of Northwestern Ontario are located within the treaty territories of Treaty 9 and 5, Treaty 3, and the 1850 Robinson-Superior Treaty (Figure 32).

Figure 32 - First Nations Affiliated with Each Treaty Area



Adapted from Chiefs of Ontario website

In total, there are 101 reserve communities affiliated with these treaty territories, 89 within Northwestern Ontario (Tibishkogigig, Personal Comunication, 2012). The Métis population in Northwestern Ontario is dispersed throughout the region in rural and urban areas (Figure 33) and is represented by 7 Métis Regional Councils

Figure 33 - Métis Regions in Ontario

Source: Metis Nation, 2013, retrieved from: http://www.metisnation.org/community-councils/council-map

The political and community infrastructure of the regional Aboriginal population has implications for the economy of Thunder Bay. Without an economic base or retail amenities, such as grocery stores, department stores, etc., and not having high schools or post-secondary institutions on reserve, there is little option for community members but to travel to urban areas to meet their personal and business needs.

Defining the catchment area for Aboriginal peoples' preference to travel to Thunder Bay could not be determined using established economic theories pertaining to distance to markets. Theories pertaining to spatial interaction within regional landscapes make predictions regarding the movement of people, goods and services with the assumption that market penetration decreases as distance increases while making allowances for personal preference pull factors (Hayes & Fotheringham, 1984). Based on this type of theory, trade boundaries for Thunder Bay

would lie roughly midway to Winnipeg to the west and Sault Ste. Marie to the east. Economic models fall short, however, when trying to understand the movement of a group of people who are influenced by their relationship with the Crown and location of Federal and Provincial offices, as well as the scheduling of airline services to remote communities. By default, these circumstances increase the economic catchment area for Thunder Bay to include, on occasion, the whole Northwestern region, the Northeastern region and the province as a whole. First Nations located closer to Winnipeg, for example, still need to travel to Thunder Bay periodically for meetings with government departments and ministries. Fort Severn, as well, a community near Hudson Bay, is closer in distance to Timmins than Thunder Bay but closer to Thunder Bay in relative terms due to flight schedules. It takes one day to fly to Thunder Bay rather than two days to Timmins which makes Thunder Bay a more attractive destination in relative terms. Provincial wide or regional conferences hosted by government departments are often held in Thunder Bay for program managers and their staff. On occasion, the Chiefs of Ontario hold provincial meetings in the north and Métis regional representatives often travel to the city for regional meetings and other business purposes. Events such as hockey and golf tournaments and the Canadian Lakehead Exhibition (CLE) are huge drawing cards for large numbers of people from the region to travel to Thunder Bay and who subsequently spend up to a week or more in the city.

Much research on the urban Aboriginal populations and the economy draws attention to the distance between Aboriginal people and the broader society in terms of educational attainment, labour force participation rates, access to employment opportunities, retention patterns, and socio-economic conditions. This approach provides insight into the challenges faced by urban Aboriginal peoples by creating an understanding of the complexity of the issues

and by providing a focus for intervention and change. While not diminishing the nature of these challenges, there are increasing examples of Aboriginal educational attainment, permanent employment, long standing business success and capital flows from rural Aboriginal communities to urban centres that is not readily apparent to the general population and the local business community. Less research is being conducted from the stand point of economic achievement and economic contribution to mainstream society. This section of the report will focus on this hidden dimension in Thunder Bay's economy. First, Aboriginal peoples' contribution to Thunder Bay's GDP will be estimated based on census data from Statistics Canada, and second, a description of the economic activity of the businesses, political and social services organizations located here will be the focus. The scope and patterns of economic activity from the surrounding region that impact Thunder Bay's economy will then be explored.

4.2 Methodology

Given the preliminary nature of this type of investigation and the lack of available data, information was gathered from a broad range of primary and secondary sources and analyzed to provide insight into the underpinnings of the economic impact of Aboriginal people. Though limited, each source provided a portion of information that, taken together, reveals the pattern of economic activity and the nature of economic impact.

Census data was first used to determine the working age population of Aboriginal residents and their contribution to Thunder Bay's GDP. Considering the challenges[12] for measuring Aboriginal demographic information, however, census data could provide only a conservative estimate. The market size of households, businesses, government, students and people from the region who come to Thunder Bay on a regular basis are also not included in

[12] changes in reporting status from census to census, mobility factors and many Aboriginals not self-identifying

census data. To gain a sense of the significance of this contribution, the concept of 'a representative firm (reserve)' is utilized for illustrative purposes. Two communities, one remote and one road-accessible provided information about the characteristics of their communities, frequency of travel to Thunder Bay and subsequent spending patterns while in the city. All primary data is examined for significant indicators of economic contribution.

Attempts were also made to get additional data from private sector businesses such as hotels, retail stores, restaurants, and professional services to gain a sense of the portion of their business that pertains to Aboriginal customers, clients, etc. This data was not forthcoming, however, due to privacy concerns. A few businesses did offer some anecdotal estimates to provide an indication of the significance of the Aboriginal population to their business. Due to challenges of gaining sensitive financial data, this study provides only a cursory review of the topic under investigation and a mere glimpse of the tip of the iceberg regarding Aboriginal peoples' impact to the economy of Thunder Bay. Despite these limitations, this study draws attention to the significance of this vital yet often overlooked component of the Thunder Bay economy.

4.3 Aboriginal Residents' Contribution to the GDP of the Thunder Bay CMA

This section estimates the contribution of the Aboriginal identity population, 15 years and over, with earnings to Thunder Bay's real GDP. Based on the 2006 Census data (Statistics Canada), the Aboriginal contribution for 2005 is first determined and then extrapolated for the contribution in 2012.

The methodology applied is adapted from Sharpe et al. (2007). According to the International Monetary Fund, the GDP deflators[13] for 2005 and 2012 were reported to be

[13] a measure that considers inflation

110.101 and 126.684, respectively. Thunder Bay's real GDP figures are available from the Conference Board of Canada and they are $4.07 billion ($4,068,000,000) in 2005 and $3.91 billion (3,906,000,000) in 2011. The real GDP growth rate in 2012 was 1%. The real GDP for Thunder Bay in 2012 can be calculated as $3,906,000,000 x 1.01 = $3,945,060,000 or $3.94 billion. These figures are used to calculate Thunder Bay's nominal GDP for 2005 and 2012 as:

Nominal GDP = Real GDP x GDP deflator x (1/100. Hence, Nominal GDP (2005) = $4,478,908,680 and Nominal GDP (2012) = $4,997,759,810 ($4.998 billion).

The next step was to estimate the portion of the nominal GDP that pertains to the Aboriginal population. From the 2006 Census, the total Aboriginal identity population with earnings is 4,380 and the median earnings were $18,011. A total of 22.2% was added as the percentage of benefits of straight-time payroll. This gives the median employment income with benefits for 2005, as $22,009 which implies that the approximate total Aboriginal employment income in Thunder Bay was $96,401,355 (i.e., 4,380 x $22,009). According to the methodology of Sharpe et al. (2007), the approximate total Aboriginal employment income represents roughly half of the Aboriginal nominal GDP. Thus, the nominal GDP contribution of the Aboriginal Canadians in the Thunder Bay area for 2005 is $192,802,711 or 4.30% of the Thunder Bay's nominal GDP. When utilizing the average Aboriginal earnings for 2005 ($27,173) the nominal GDP contribution is estimated to be 6.49%.

With respect to extrapolating the nominal GDP contribution for 2012, a 2% annual growth rate in earnings is assumed which places the median earnings with benefits at $25,281 and the average earnings with benefits at $38,142. Assuming a conservative 2% annual growth

rate in the total Aboriginal identity population with earnings, an increase from 4,380 in 2005 to 5,031 in 2012 is produced. This leads to the nominal GDP contribution of the Aboriginal peoples in 2012 to be 5.09% and 7.67%, as per the median and average earnings figures, respectively. Taken together, the results indicate that the contribution of the Aboriginal peoples to the Thunder Bay's GDP is considerable and slightly below the Aboriginal's contribution to the city's total population (8% in 2005; 10% in 2012; assumed). Given the past trends, it may be expected that the Aboriginal share of the city's GDP will experience future growth as the population continues to increase, regional economies develop and labour force participation rates continue to rise.

4.4 Additional Economic Contributions

This section explores the economic contributions of the Aboriginal organizations and businesses located in Thunder Bay, the neighbouring community of the Fort William First Nation (FWFN), the regional Aboriginal population, mostly living on-reserve, who travel to the city to meet their business and personal needs and the students from the region who come to Thunder Bay for secondary and post-secondary education.

4.4.1 Aboriginal Organizations and Businesses

In addition to the working age population, secondary sources indicate there are a total of 78 Aboriginal social service agencies, private businesses, political organizations, Tribal Councils, and training institutes/educational authorities located in Thunder Bay (Indiana Marketing, 2011). All of the preceding, employ both Aboriginal and non-Aboriginal city residents. A breakdown of these organizations is provided in Table 8.

Table 8 - Categories of Aboriginal Organizations

Type of Organization	Number
Social Service Agencies	35
Private Businesses	25
Political Organizations, including First Nation satellite offices	10
Tribal Councils	4
Training Institutes/Educational Authorities	4

Surveys were distributed to all these groups (see Appendix II). The response rate, however, was low at 8 returned surveys, or 12%. Despite this limitation, the information gathered coupled with information from secondary sources, such as annual reports and Nishnawbe Aski Nation's Celebration & Contribution study, a pattern of activity was revealed regarding the direct and indirect contributions that local organizations, businesses, political organizations, and educational authorities make to Thunder Bay's economy. An aggregate of the key indicators from the data collected provides a conservative estimate of the direct annual contributions by these urban-based organizations. For illustration purposes, the estimates are depicted in Table ***9*** with the caveat that further detailed data is required to provide a full and accurate accounting.

Table 9 – Estimated Direct Contribution by Aboriginal Organizations

Estimated Direct Contribution	Approximate Value
Total Salary Expenditures	$65.0M
Office Space Rental/Capital Purchase	$3.0M
Office Supplies/Furniture	$1.6M
Meetings/Conferences	$5.0M
Local Professional Services	$1.7M
TOTAL	$76.3M

Anecdotal information provides further insight into the nature of contribution:

- Of the eight organizations that responded, six have been in operation for more than 10 years, have expanded their operations over this same time period, had an average of 25 full time and 12 part time employees with approximately 25% non-Aboriginal.
- One social service organization with its head office in Thunder Bay has 450 employees, 125 locally.
- Wequedong Lodge is a hostel providing accommodations for approximately 10,000 medical clients from remote communities per year.
- Of the 12 respondents to the community survey (see Appendix III), the average frequency of trips to Thunder Bay was 7 times per year.
- Of the 12 respondents, 100% indicated the main reason they travel to Thunder Bay was for medical purposes; they spend on average less than $500/trip mainly for shopping, especially clothing.
- Of the 12 respondents, 25% indicated they had a Thunder Bay cell phone with the average spent per month as $50 or $600/year.
- For the year 2011/2012, approximately $250,000 or one quarter of a million dollars was withdrawn from Wequedong's on-site ATM by their clients for spending while in Thunder Bay.
- One Aboriginal business located within the Thunder Bay CMA has been in operation for 37 years with 14 employees, 10 of which are non-Aboriginal. Annual salary is $1M plus.
- One Aboriginal organization utilizing a co-op model began as a pilot project in 2012 with one program to deliver healthy food boxes to one remote community. The organization has expanded in one year to 11 programs, currently delivering 22,000 food boxes to

communities on the James Bay coast, and is in the process of expanding into Northwestern Ontario. There is one part time staff and a host of volunteers with sales over $100,000. The exchange to Thunder Bay of this social enterprise is the development of a buying depot and import of country foods, such as organic blueberries, as well as traditional crafts that are sold in a local retail store for local consumption.

- Recent statistics released from Nishnawbe-Aski Nation indicate that 12 of their affiliated organizations alone have a gross payroll of $29.6M; they pay $2.5M for rental of office space, $1.5M for office supplies and $4.8M to local hotels for meetings and conference expenses for a total of approximately $52M (NAN, 2013). (These figures have been incorporated into the chart above).
- one non-Aboriginal construction company indicated that approximately 40% of their business was to Aboriginal communities
- One non Aboriginal consulting firm indicated that approximately 80% of their business was Aboriginal clients.

4.4.2 Aboriginal Students

In addition to the Aboriginal organizations, Aboriginal students both in the city attending elementary, secondary and post-secondary institutions and on reserve attending schools in nearby towns contribute to Thunder Bay's economy in the following manner:

- Elementary and high school students living on reserve in the Thunder Bay District and who attend schools in nearby towns, pay tuition directly to the Lakehead District Public School and Thunder Bay District Catholic School Boards.

- Currently110 Fort William First Nation (FWFN) students are registered in Thunder Bay's elementary schools, 65 students in secondary schools and 100 students at College and University.
- There are 20 elementary school and 10 high school students who are registered in Thunder Bay schools living in foster care with FWFN families. FWFN pays tuition directly to the respective Boards of Education and/or institutions.
- One thousand five hundred post-secondary Aboriginal students contribute tuition to the College and University and approximately $10,000 - $15,000 per student yearly for living expenses. Living expenses alone are estimated to be $1.9M in total.
- Nishnawbe Aski students pay a total of $1.5M in tuition costs with an additional $3.1M for room and board (NAN, 2013).

4.4.3 Fort William First Nation

Adjacent to the city is the neighboring community of the FWFN with a total band membership of 2,242, with approximately 935 members living on reserve and 300 - 400 living in Thunder Bay. The FWFN has an Agreement of Cooperation with the City of Thunder Bay and service agreements with the Province of Ontario to pay for services, such as fire, water and ambulance, as well as hydro. Most professional services for lawyers, accountants and consultants are obtained through local businesses.

FWFN employs 58 full and part time staff in the administration of ten program and service areas. Community members are employed in various occupations throughout the city, as well. There are eight businesses owned by FWFN band members and an additional seven businesses, organizations and government departments located in the FWFN's 225 hectare industrial park. The Federal Department of Aboriginal Affairs and Northern Development

Canada (AANDC), the Union of Ontario Indians, Chiefs of Ontario, Nishnawbe Aski Nation, two Aboriginal police services and the Wasaya group of companies have offices in the FWFN industrial park. The $14 million Fort William industrial park creates jobs for Band members as well as city residents in construction, operations and associated activities such as transportation, on-reserve fuel sales and restaurants. (Centre for Municipal-Aboriginal Relations, 2002). The current land claim settlement of $175 M has stimulated further investment in community and economic development, as well as partnerships with the city and industry. The vision of the FWFN is "to become the hub for all First Nation communities in Northwestern Ontario" (FWFN Annual Report, 2010-2011).

4.4.4 The Regional Aboriginal Population

The following narrative describes two types of reserve communities in Northwestern Ontario, i.e. remote and road-accessible, to illustrate the nature of the economic interaction with the city and subsequent economic contribution of reserve communities to Thunder Bay's economy. Information was gathered pertaining to frequency and purpose of visits along with approximations of spending patterns while in the city. The direct and indirect economic contributions from these two types of reserves are highlighted below to gain an insight into the significance of the regional Aboriginal population to Thunder Bay's economy. Specific dollar values were not often provided, and those that were are presented as anecdotal information rather than a statistical accounting.

A Remote Community

This example of a remote community is approximately 800km north of Thunder Bay, accessible by air year round with a seasonal access for hauling fuel, building materials and other supplies in the summer. Governance is by Chief and 4 Councillors. The community has 496

members living on reserve in 90 households. There is no high school or post-secondary institution. Seventy-five percent of the population is under the age of 25. Unemployment is high at 80%. Available employment is through the Band administration, the education authority, the Northern Store, the Canada Post office and operation of the air strip. Seasonal jobs are gained through construction projects for residential and community infrastructure, as well as maintenance of the winter road and the air strip. Sustenance hunting, fishing and trapping are important activities to off-set the high cost of transporting goods and services. Capital expenditures are for housing, a new school, a nursing station, an arena, or a community hall.

Direct economic contributions to Thunder Bay are as follows:

- Twenty-seven high school students are boarded in private homes. Tuition is paid to the Lakehead District School Board and living expenses are paid to host families.
- One Chief or Council member travels to Thunder Bay once a week for Band business
- Community members travel to Thunder Bay for doctor's appointments and specialized health services.
- For dialysis or cancer treatments, individuals move to Thunder Bay to live with family members, or they rent their own accommodation.
- Thunder Bay is the destination point for (1) shopping, (2) medical appointments, and (3) work related reasons.
- Of the 10 respondents to the community survey, the average frequency of visits is 5 times per year spending approximately $1 – 2,000/trip or $7,500/year per household which is roughly extrapolated to $675,000 for the community

- Of the 10 respondents, the average spent on a Thunder Bay cell phone service was $60/month or $720/year.
- Community members who purchase or rent a second house in Thunder Bay contribute to property tax and/or rental income to local landlords, as well as ancillary expenses, while in the city.

Indirect economic contributions to Thunder Bay are as follows:

- Professional services (legal, doctors, nurses, dentists, optometrists) visit the community once a week to twice a year.
- Elementary schools teachers are hired from Thunder Bay or other southern communities.

Figure 34 and Figure 35 reveal the reasons for members from a remote community to visit Thunder Bay and the average Spent per Visit to Thunder Bay by Members of a Remote Community, respectively.

Figure 34 – Main Reason for Members from a Remote Community to Visit Thunder Bay

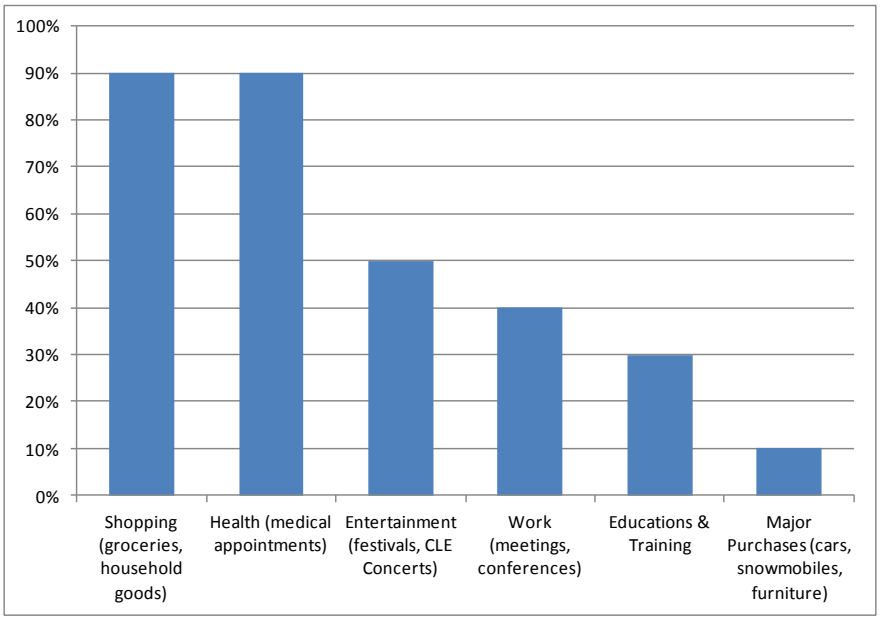


Figure 35 - Average Amount Spent per Visit to Thunder Bay by Members of a Remote Community

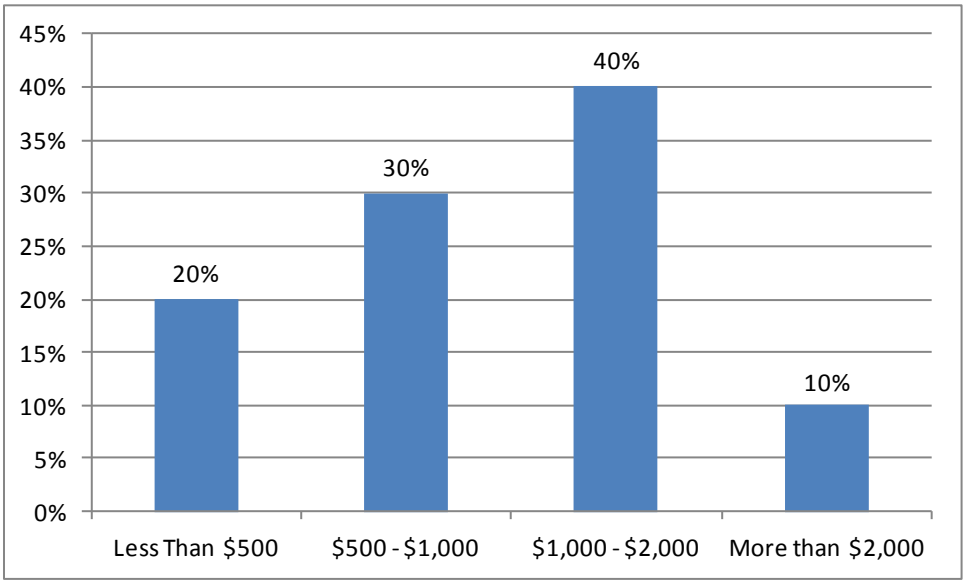


Figure 34 and Figure 35 highlight the significance of the remote Aboriginal communities contribution to the Thunder Bay economy.

A Road Accessible Community

This road accessible community is located 240 km from Thunder Bay and has 334 members living on reserve in 80 households. Governance consists of a Chief and six Council members. The unemployment rate is approximately 30%. The main administration office is located on reserve, and the community is involved in forestry, manufacturing, trade industries and government service where altogether there are 30 – 50 full and part time staff with a total salary of approximately $400,000 – 500,000 per year. Community members are employed with the administration of government programs, the community forestry company, the CNR, Ministry of Natural Resources, and Ontario Provincial Parks. Total contribution in one year from this road-accessible community is conservatively estimated to be $3M as itemized below. Direct economic contributions to Thunder Bay are as follows:

- Ninety elementary school children go to school in the nearby town. $90,000 tuition is paid directly to the Lakehead District School Board.
- There are 15 high school students in Thunder Bay with a total cost of approximately $75,000 for living expenses. Tuition is paid directly to the Lakehead District School Board and living expenses are paid directly to host families.
- There are 15 post-secondary students in Thunder Bay with a total cost of approximately $300,000 for tuition and living expenses.
- The Chief and four Council members travel to Thunder Bay approximately four to five times per year for Band business.
- The Chief, assisted by one or two council members, attend meetings or conduct Band business at least once a week in Thunder Bay.
- Five Program Managers attend regional meetings in Thunder Bay at least once a month.
- Total travel spent in Thunder Bay for Band leadership and staff over a one year period is approximately $40,000.
- A shuttle van commutes daily to Thunder Bay transporting an average of 70 individuals per month or 840 individuals per year for medical appointments.
- Costs to run the shuttle service are approximately $90,000 per year.
- Members who move to Thunder Bay to accompany their children and purchase or rent a second home, contribute to property tax and/or rental income to local landlords as well as ancillary expenses while in the city.

- Eighty percent of $1.6 M dollars capital projects building materials are purchased in Thunder Bay.
- On average, community residents travel to Thunder Bay twice per month mainly for (1) shopping, (2) medical, and (3) major purchases. The average expenditure per trip is $750.00 which is extrapolated to the community as $1.5Million per year
- Community members who purchase or a rent a second house in Thunder Bay contribute to property tax and/or rental income to local landlords.

Indirect economic contribution to Thunder Bay is as follows:

- Professional services (legal, accountants, consultants, insurance) approximately $100,000/year.

Figure 36, Figure 37 and Figure 38 reveal the reasons for members from a road access community to visit Thunder Bay and the average Spent per Visit to Thunder Bay by Members of a Remote Community, respectively.

Figure 36 – Frequency of Visits from Members of a Road Accessible Community to Thunder Bay

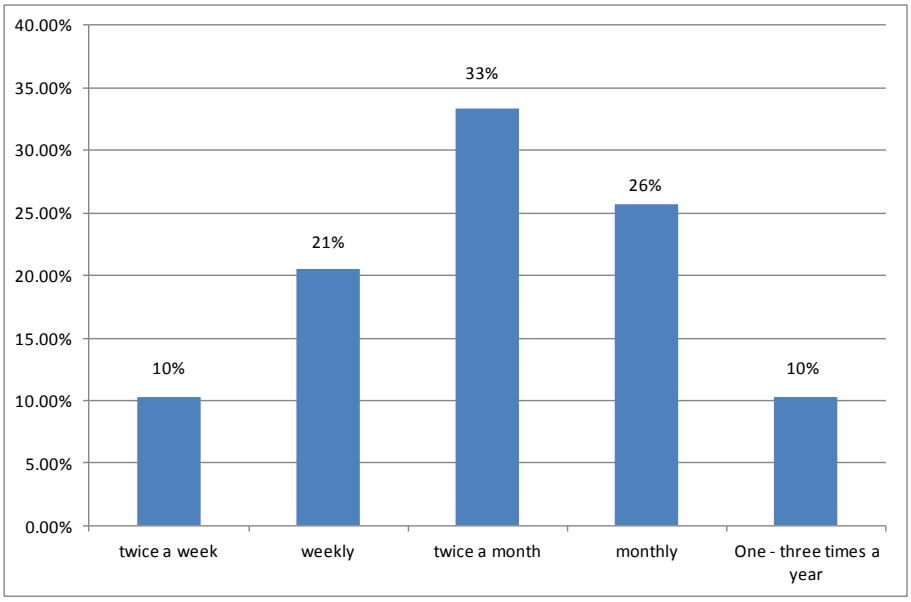


Figure 37 – Purpose of Visits to Thunder Bay by Members of a Road Accessible Community

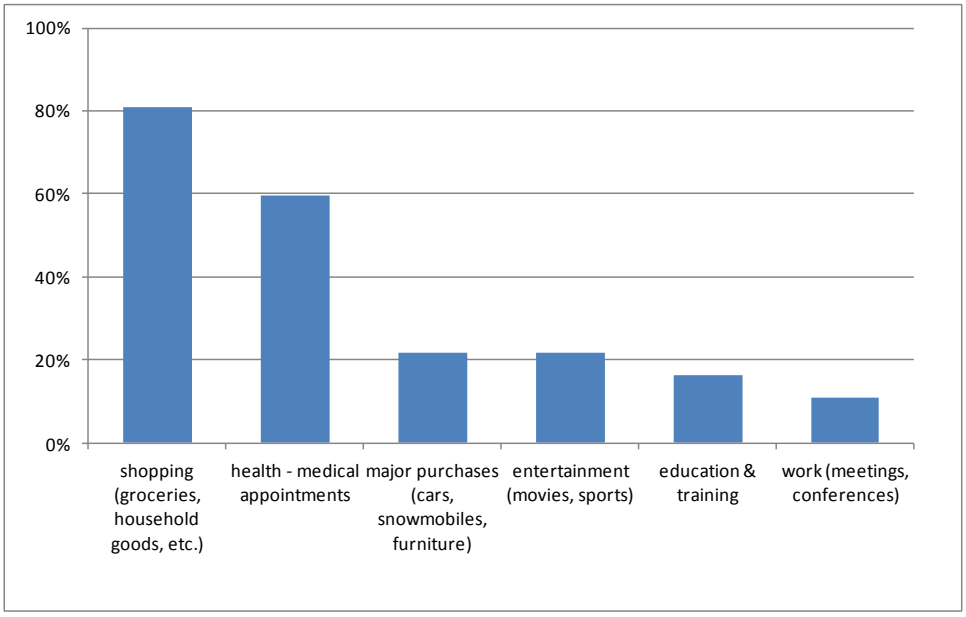


Figure 38 – Average Amount Spent per Visit to Thunder Bay by Members from a Road Accessible Community

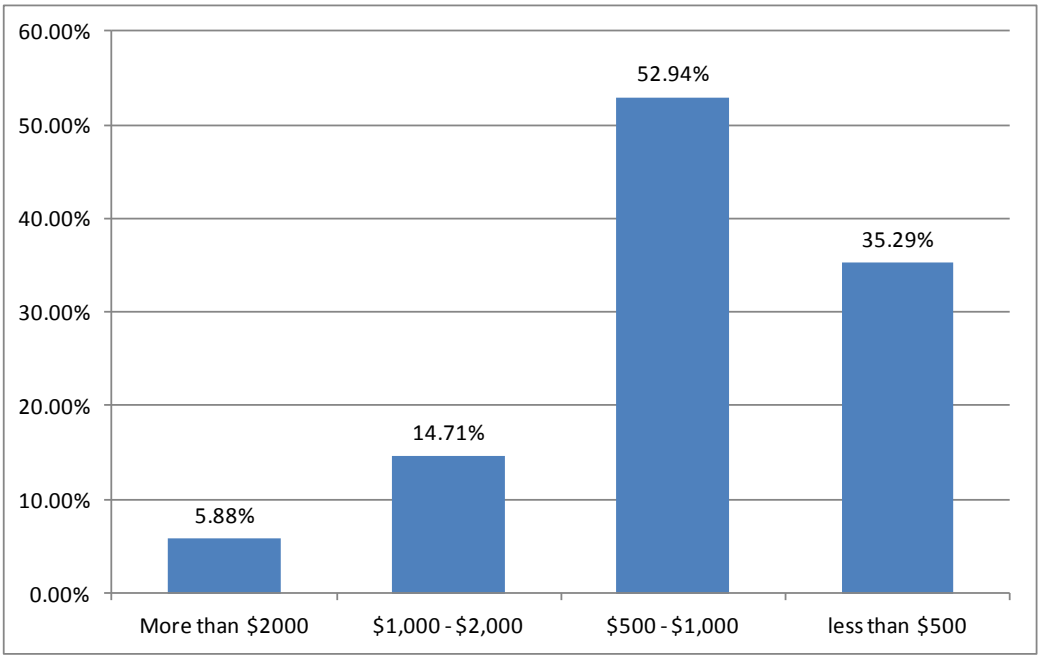


Figure 36, Figure 37 and Figure 38 highlight the significance of the road access

The Aboriginal community's contribution to the Thunder Bay economy.

4.4.5 The Métis Community

There is a total population of 4,400 Métis people located in the catchment area of Thunder Bay. Three surveys were received from Métis individuals, all of whom live within 3 hours drive of Thunder Bay. Direct and indirect economic indicators of contribution are as follows:

- Two individuals travel to Thunder Bay once a month; one travels twice a month and one travels three times a year.
- They spend an average per trip of between $500 - $1,000/visit.
- Their main reason(s) to travel to the city is for bulk shopping of groceries/household goods, work, and one for medical appointments, major purchases and entertainment.
- Spending was identified as being significant in all categories (i.e. shopping, entertainment, electronics, personal services, major purchases), with less identified for travel expenses.
- Two of the 3 respondents spent approximately $100 - $500 per month or approximately $6,000/year on Thunder Bay cell phone services.
- On average, the individuals shop for an additional 2 to 4 people while in the city, so the value of each trip would increase to 2 ½ times or close to $2,000/trip to Thunder Bay.
- These three individuals, then, contribute approximately $42,000 per year to Thunder Bay's economy, coupled with additional expenditures of an average shopping for 3 other individuals, the total increases to $126,000 per year.

4.5 Significance of Aboriginal People to Thunder Bay's Economy

The above information demonstrates the significance of Aboriginal people to Thunder Bay's economy as residents, business owners, employees, and as visitors to the city who travel to the city to meet their personal and business needs. The Aboriginal economy is undergoing a

transformation from a system based on dependency on government transfers to one of developing local and urban economies. This transformation is evident in Thunder Bay by the increasing employment participation rates, entrepreneurship, community-owned urban businesses, increasing numbers of Aboriginal students, and the growing partnerships of Aboriginal communities with municipalities, educational institutions and industry. The recent announcement of the development of the Dennis Franklin Cromarty Student Living Centre is a case in point. This initiative is in partnership with the Northern Nishnawbe Education Council, Wasaya Group Inc, Confederation College, and the City of Thunder Bay to house 150 students and 50 families from remote communities while post- secondary students are attending school in Thunder Bay.

The Aboriginal population is a growing and vital part of urban sustainability. They are a significant part of the urban landscape and are expected to remain so in the near future as they are expected to increase in numbers over the decades to come. The Centre for the Study on Living Standards (CSLS) emphasized the economic significance of improving the socio-economic well-being of Aboriginal people, that it is not only a social and moral imperative, but a sound public investment. By closing the gap in education and labour force participation rates, the Aboriginal population can play a key role in mitigating the critical labour shortages caused by Canada's aging population and low birth rate. The CSLS report estimates that for Canada in general:

"complete closure of both the education and the labour market outcomes gaps by 2026 would lead to cumulative benefits of $400.5 billion (2006 dollars) in additional output and $115 billion in avoided government expenditures over the 2001-2026 period." (Sharpe, A. & Arsenault, J-F., 2010, pg. 25).

These potential benefits will be realized at the provincial, municipal and regional levels, as well. Increasing the number of Aboriginal Canadians who complete high school is a low-hanging fruit with far-reaching and considerable economic and social benefits for all Canadians (Sharpe and Arsenault, 2010).

Levesque (2003) noted that urban areas have become central to Aboriginal economies. They support a growing Aboriginal civil service, are important gathering and meeting places, and function as important nodes in mobility patterns. Newhouse (2003) points out that the urban Aboriginal community is heterogeneous with representation in all walks of life, including business, the judiciary, entertainment, education, government, and the professions. The urban social service agencies deliver culturally appropriate programs to local families and individuals; Tribal Councils and regional Metis offices provide advisory and support services to First Nations and Métis communities; Provincial Territorial Organizations (PTOs) and First Nation satellite offices provide political and administrative linkages between communities in the region and mainstream business, government and educational institutions; urban residents are well connected to the communities and regions from which they come. As more and more students pursue post-secondary education, a pool of qualified individuals in all disciplines is developing from engineering and medicine to hospitality and trades. Some graduates will find employment; others may establish a business. Those returning to their home communities or regions often provide valuable links to the community and economic development occurring there. Given these trends, it may well be expected that the Aboriginal contribution to the city's GDP will experience future growth and continue to contribute to urban sustainability as regional economies develop and labour force participation rates continue to rise.

Section V – Identification of the Structure and Trends of Investments

5.1 Economic Theories of Investment

Capital expenditures have a direct link to economic activities because they are not only part of the total expenditure in an economy but they are also part of the factors of production (i.e., capital and labour) that determine an economy's productive capacity, and thus, an economy's aggregate supply. In its expenditure form, GDP is the sum of personal consumption (C), investment (I), government spending (G), and net exports (X-M), i.e. GDP=C+I+G+(X-M). If viewed from the perspective of the buyers, these expenditures reflect the total level of demand in the economy. In the short run, the level of GDP is determined by the magnitude of total demand. In the long run, investment is an important factor which influences growth in the production of goods and services. It determines the speed at which an economy can grow. Consequently, investment has a significant contribution on the supply side of the economy, as well.

The economic literature examining the relationship between investment, productivity and long-term economic growth, generally follows two schools of thought: the neoclassical model as first described by Solow (1956 and 1957) and the new growth theory (also known as the endogenous growth theory) articulated by Romer (1986, 1987 and 1990). A growing body of theoretical and empirical literature has examined the impact of public investment on economic growth. In the neoclassical model, the engine of growth is the increase in the accumulation of tangible assets. In the last 20 years, however, this concept of investment has been broadened from investment in tangible assets to include human capital, research and development, and investment in public infrastructure. This extended neoclassical model still emphasizes the internal benefit of investment in the form of enhanced productivity or higher wages.

The new growth theory has a different view of how investment impacts economic growth. This new school of thought emphasizes the types of investment that create externalities and generate an additional productivity boost through production spillovers or the associated diffusion of technology. In the new model, investment in machinery and equipment has been found to be directly and indirectly associated with the key drivers of knowledge in an economy, as advocated by the new growth theories and evidence. The central importance of investment and capital accumulation to economic growth is recognized by both models, but the differences between these models have important implications for the impact of investment on productivity, economic growth and capacity building. The empirical literature shows this duality.

In summary, the neoclassical model views capital expenditure as having a significant contribution to economic and labour productivity growth. The extensions of the neoclassical growth model, as well as the theories of endogenous growth, address the role of public investment in economic growth (Dadgostar & Mirabeli, 1988). The central issue is whether an increase in expenditures in public investment results in greater economic activity. Researchers, who have a positive view, argue that public investment stimulates private sector productivity, thereby, increasing economic growth (Barro, 1990). According to this school of thought, not only does public investment affect the long-term rate of growth and capacity building through investment in education, health, basic scientific research, and physical infrastructure but it also augments (by crowding in) investment and, thereby, enhances economic growth. In contrast to this view, there exists certain concerns associated with the efficiency of public investment, and some scholars argue that public investment may not necessarily have a favorable impact on economic growth (Khan, 1996). In general, however, the extensions of both the neoclassical

growth model, as well as the theories of endogenous growth, have underlined the role of public investment in economic growth.

This section of the study examines the level of private and public investment in the city of Thunder Bay and discusses strategies for attracting investors to the city. Given data availability limitations, this report relies on building permits to provide a proxy for investment in Thunder Bay.

5.2 Investment Trends in Thunder Bay

Data on investments was obtained from the City of Thunder Bay's Planning Department. Table 10 presents the total investments in Thunder Bay from 2002 to 2012 that resulted from new permits and additions/alternations to existing permits.

Table 10 –Investment in Thunder Bay from 2002 – 2012 (value of permits issued)

	Total ($000s) (2002 – 2012)	**Annual Average ($thousands)**
Apartment Blocks	46,307	4,210
Duplex Dwellings	14,592	1,327
Single Dwellings	308,003	28,000
Res. Add. & Alts	51,392	4,672
Shed & Garage	26,827	2,439
Commercial	218,609	19,874
Comm. Add & Alts	155,663	14,151
Industrial	62,039	5,640
Ind. Add & Alts	27,061	2,460
Institutional	234,668	21,333
Inst. Add & Alts	220,352	20,032
Total	**1,365,512**	**124,137**

Source: City of Thunder Bay Planning Department

Table 8 reveals that the average annual investment from residential, commercial, industrial, and institutional building permits is approximately $124.1 million.

Figure 39 presents the composition of investment which results from residential, commercial, industrial and institutional building permits from 2002 to 2012. Figure 39 reveals that residential, commercial and institutional investments are fairly equal; however, industrial investments are significantly smaller.

Figure 39 - Investment from Residential, Commercial, Industrial and Institutional Building Permits

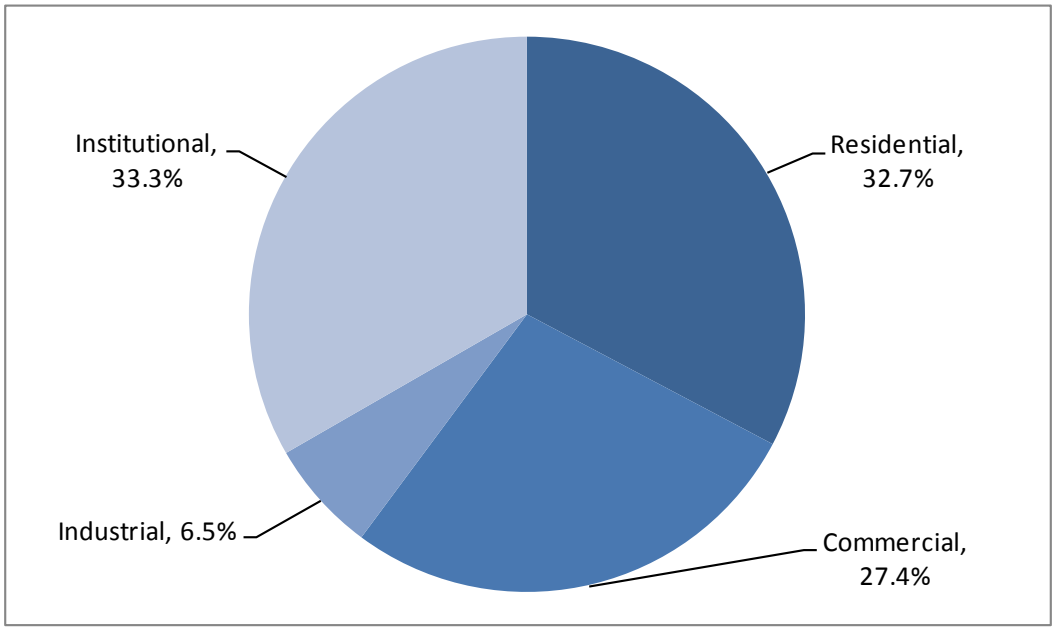


Figure 40 presents further details on the investments across the sub-categories of each of the four main groupings (residential, commercial, industrial, and institutional).

Figure 40 - Investment from Residential, Commercial, Industrial and Institutional Permit Sub-categories

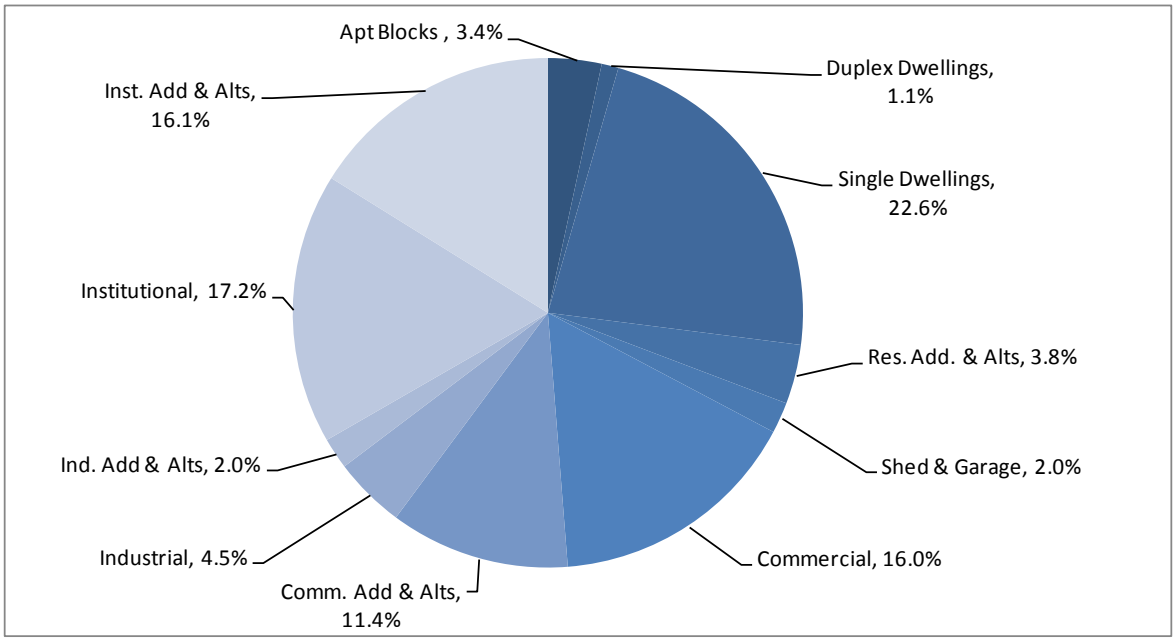


Figure 41 presents the annual investment from all four categories from 2002 to 2012, along with the average investment over the sample years, and its linear trend.

Figure 41 – Annual Investment Line Graph (2002 – 2012) and Trend of Issued Building Permit Values

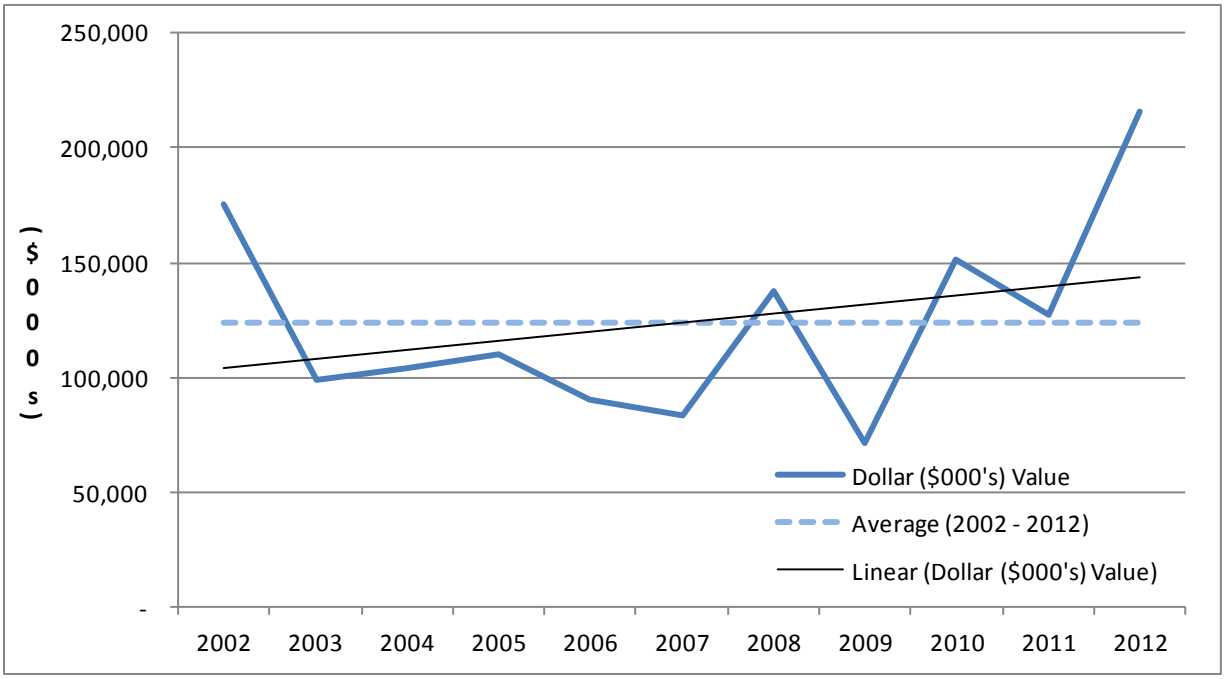


Figure 41 reveals an upward trend (positive sloping linear model) for investments in Thunder Bay. Since the decline in 2008, investment in Thunder Bay has been steadily increasing. Investments in the past three years have been above the historical (eleven year) average, with the largest annual investment over the past ten years occurring in 2012. It is important to note that the significant increase in 2012 is driven by the $225 million public/private partnership to build a new courthouse in Thunder Bay.

Figure 42 (see page 95) presents the annual investments for residential, commercial, industrial, and institutional building permits. It reveals that commercial and residential investments have been increasing over the past eleven years. Commercial investments have spiked significantly over the past three years. From 2009 to 2012, commercial investments have increased from $15.5 million to $133.9 million. The commercial investments are a significant portion of the recent growth in total investments, as displayed in Figure 41. Residential investments have also been steadily increasing over the past eleven years, with a more significant increase in the past three years.

Figure 42 also shows that industrial and institutional investments have been on the decline over the past eleven years. Institutional investment has experienced the most significant decline, dropping from $111.9 million in 2002 to $15.8 million in 2012. Industrial investments have also declined from $20.8 million in 2002 to $7.1 million in 2012.

Figure 42 – Value of Permits Issued for Residential, Commercial, Industrial and Institutional (2002-2012)

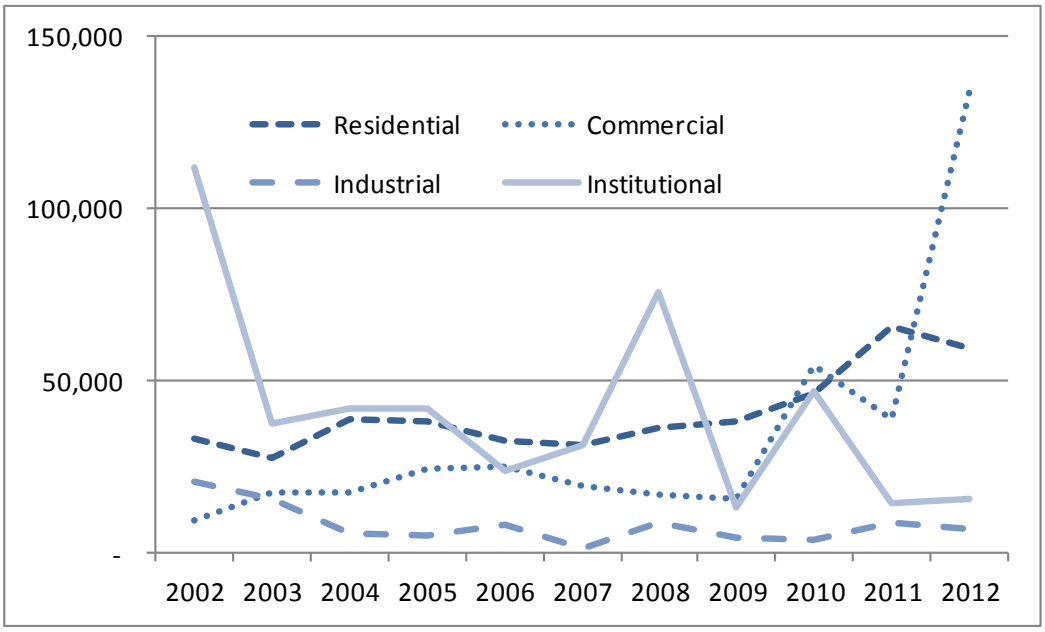


Figure 43 presents the average annual investment from 2002 to 2007 and 2008 to 2012 for residential, commercial, industrial, and institutional building permits.

Figure 43 – Average Annual Investment from 2002 to 2007 and 2008 to 2012 for Residential, Commercial, Industrial, and Institutional Building Permits

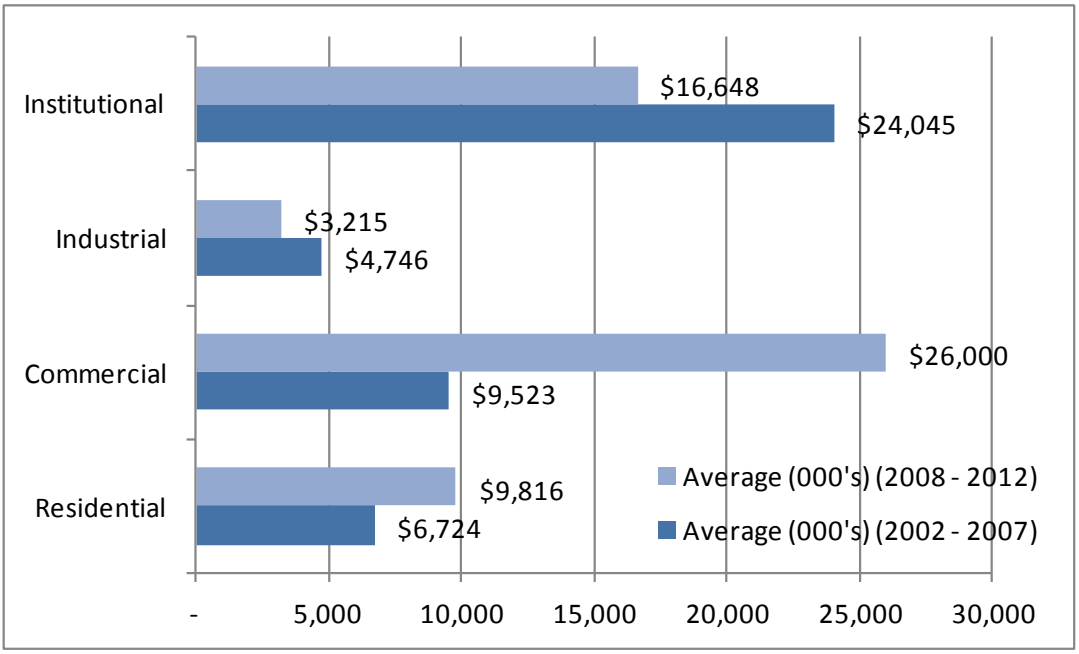


Figure 43 reinforces the results presented earlier, in that commercial and residential investments have been growing over the past five years, whereas industrial and institutional have been on the decline.

Figure 44 presents the change in the total investment as a proportion of the whole from the earliest six years (2002 – 2007) to the most recent five years (2008 – 2012). For example, commercial investment comprised 21% of total investments for the period of 2002 to 2007, and increased to 46% of the total investment for the period of 2008 to 2012. Therefore, commercial investments experienced an increased share of 26% of the total investments.

Figure 44 – Shift in Percentage of Total Investment Across Four Investment Classes (2002 – 2007 Compared with 2008 – 2012)

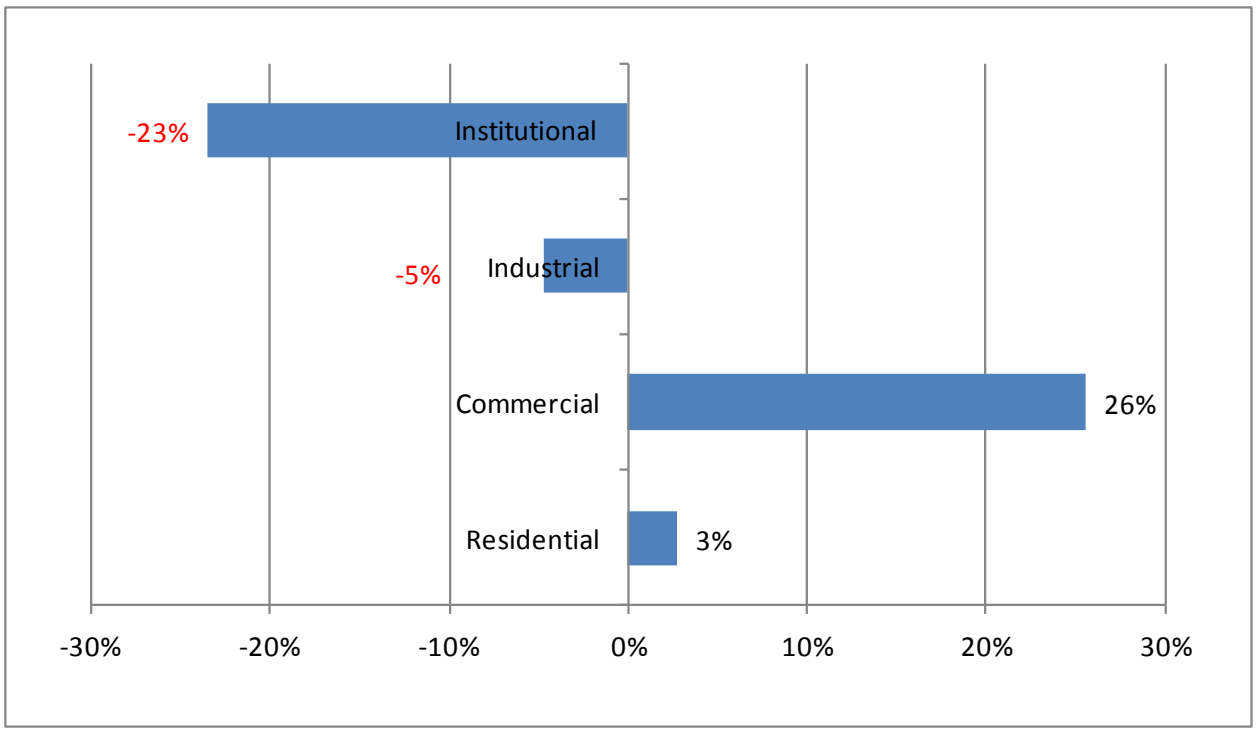


Figure 44 reveals two shifts in Thunder Bay's investment landscape. The most significant shift is from investments from institutional investors to commercial investors. However, the results may be somewhat skewed since the $225 million investment for the courthouse is included in the commercial category even though it is a private/public partnership. The second, more minor, shift is from industrial investments to residential investments.

5.3 Investment and Employment

In order to investigate the impact of investments on the economy, the following section investigates the relationship between investment and employment. The following analysis compares the one-year lagged percentage change total investment on the change in employment across different categories. For example, the percentage change in 2009 investment is compared to the change in 2010 employment in order to determine if an increase (or decrease) in investment leads to an increase (or decrease) in employment. Figure 45 presents the linear

relationship[14] between the lagged (one-year) change total investment and the change in employment in the *trades, transport and equipment operators and related occupations (*National Occupation Classification [NOC] code *H)*. Although the sample size is small (a total of 8 observations), the results clearly reveal a positive relationship (i.e. an increase (or decrease) in investment leads to an increase (or decrease) in the employment of various trades. The R^2 of 52.8% suggests that 52% of the year-over-year change in trades employment from 2002 to 2012 can be explained by the change in total investment from the previous year. From the slope coefficient[15], it can be concluded that, on average, each additional 1% change in the total investment growth corresponds to an approximately 0.12% increase to the total employment growth.

Figure 45 – Linear Model: Total Employment in Trades as a Function of Total Investment (percentage changes)

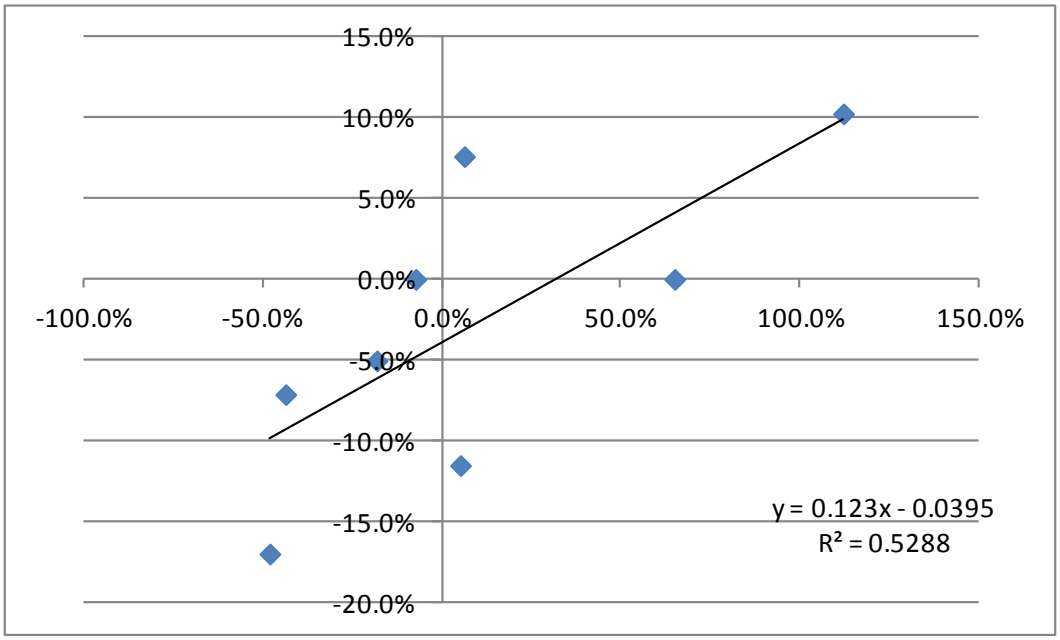


Figure 46 presents the linear relationship between the lagged percentage change in institutional investments and the percentage change in employment in the *occupations in social*

[14] The regression estimates illustrate that in principal the relationship is as expected, and consistent with prior literature; however, we acknowledge that due to the small sample size, the results may exhibit some biases.
[15] Statistically significant at the 5% level.

*science, education, government service and religion (*NOC: *E)*. The results reveal a positive relationship[16] between lagged change institutional investment and change in employment in education, government services, and social sciences. Again, the R^2 is fairly high, at 38%, suggesting that 38% of the year-over-year change in government employment from 2002 to 2012 can be explained by the change in institutional investment from the previous year.

Figure 46 - Linear Model: Employment in Government Services as a Function of Institutional Investment

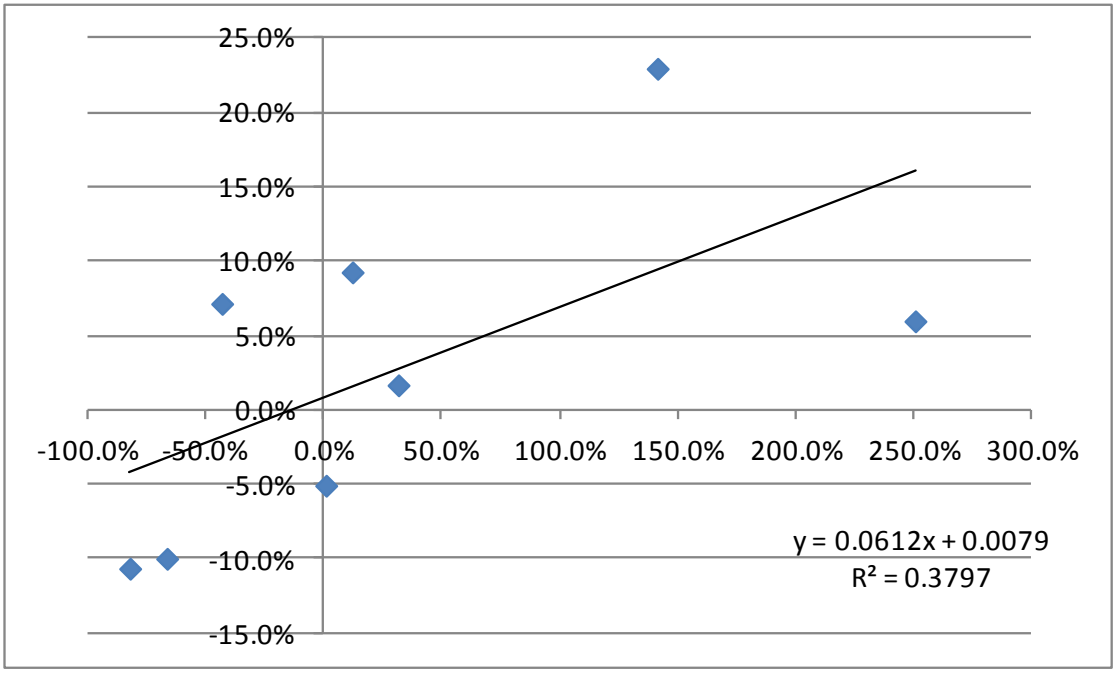
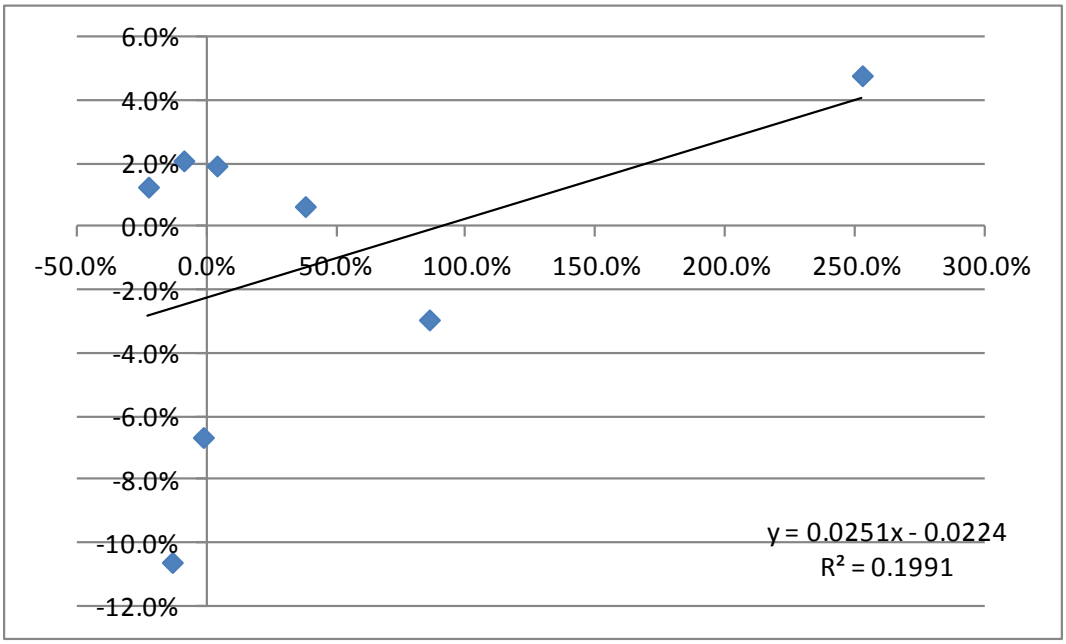


Figure 47 presents the linear relationship between the lagged percentage change in commercial investments and the percentage change in employment in the *management, business, finance and administrative occupations (*NOC: A & B). The results reveal a positive relationship between commercial investment and management/business employment. However, the R^2 is lower at 19.9%, suggesting that there are many other variables, aside from commercial investment that can explain the changes in management/business employment.

[16] Statistically significant at the 5% level.

Figure 47 - Linear Model: Employment in Management / Business as a Function of Commercial Investment

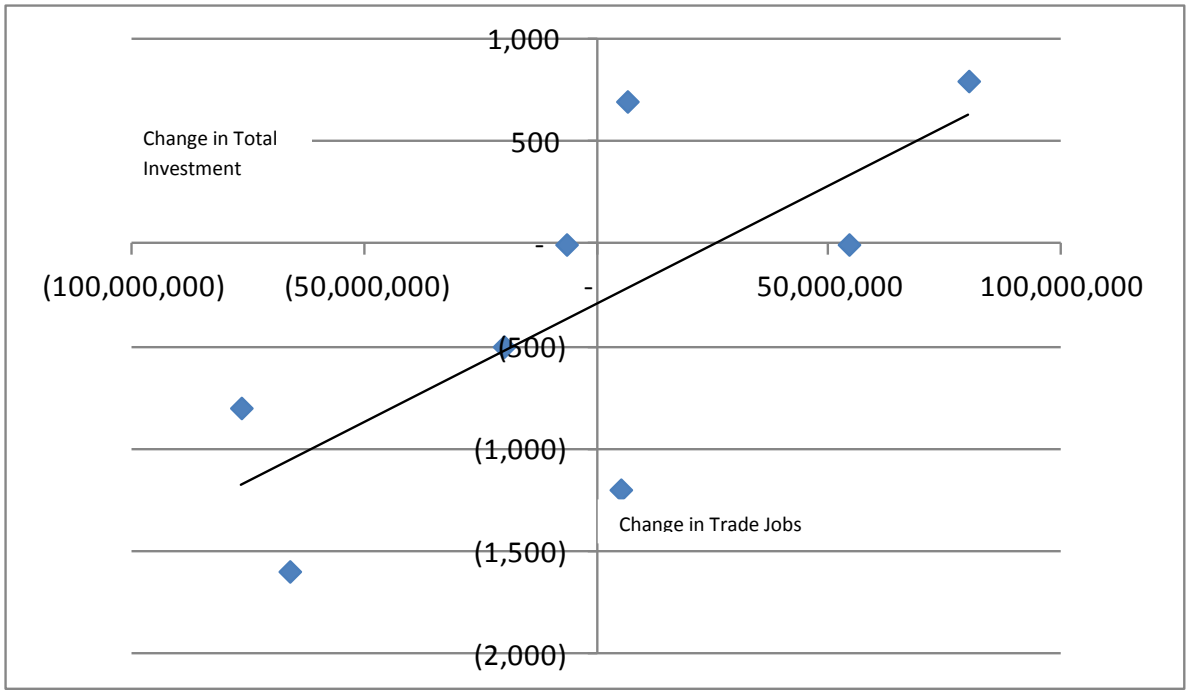


5.4 Implied Job Creation from Investment

Another way to analyze the relationship between investments and employment is to estimate the job creation per dollar amount of investment. An ordinary least squares (OLS) regression estimation with the lagged absolute change in investment dollars on the absolute change in employment provides the coefficient estimates required.

Figure 48 presents the regression output between the lagged absolute change in total investment (explanatory variable) on the absolute change in employment in the *trades, transport and equipment operators and related occupations* (dependent variable).

Figure 48 - Linear Model: Lagged Absolute Change in Total Investment (Explanatory) on Absolute Change in Employment (Dependent)



The regression coefficients from Figure 48 are used to estimate the trade job creation figures per $1 million investment presented in Table 11. Note that the regression coefficient is significant at the 5% level, and the resulting R^2 is 43.8%.

Table 11 – Trade Job Creation per $1 Million Investment

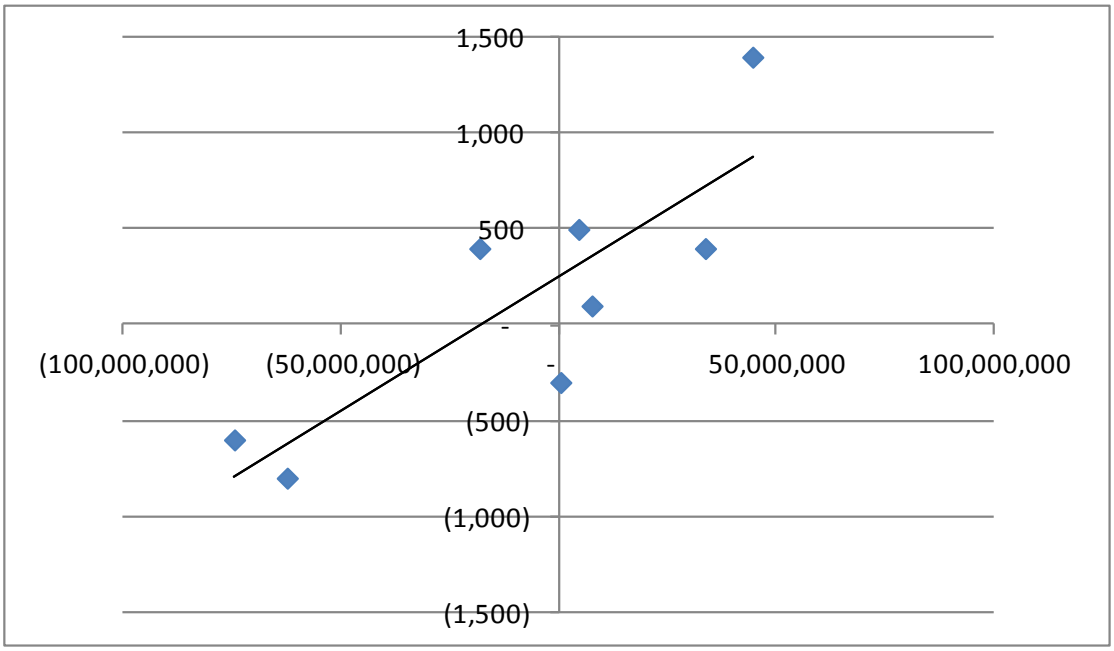
Occupation Category	Direct	Indirect and Induced[17]	Total
Trades, transport and equipment operators and related occupations	11.57	23.37	34.94
Range – Estimation	10 – 12	20 – 25	30 - 37

The results suggest that for every $1 million in investment, 11.57 direct jobs are created in the trades within the year following the investment. With indirect and induced positions, each $1 million investment leads to 34.94 new jobs.

[17] Multiplier is based on the Sectoral Base Multipliers for Northwestern Ontario for Government positions.

Figure 49 presents the regression output between the lagged absolute change in institutional investment (explanatory variable) on the absolute change in employment in the NOC: *E. Occupations in social science, education, government service and religion* (dependent variable).

Figure 49 - Linear Model: Lagged Absolute Change in Total Institution Investment (Explanatory) on Absolute Change in Government, Education, and Social Science Employment (Dependent)



The regression coefficients from Figure 49 are used to estimate the governmental, educational and/or social sciences job creation figures per $1 million investment presented in Table 12. Note that the regression coefficient is significant at the 1% level and the resulting R^2 is 65.7%.

Table 12 – Government, Education, Social Science Job Creation per $1 million Institutional Investment

Occupation Category	Direct	Indirect and Induced	Total
Occupations in social science, education, government service and religion	14.04	20.49[18]	34.53
Range – Estimation	12 - 15	18 – 22	30 - 37

The results suggest that for every $1 million in institutional investment, 14.04 direct jobs are created in the social sciences, education, government and religion within the year following the investment. With indirect and induced positions, each $1 million investment leads to 34.53 new jobs.

Therefore, it can be concluded that investment is vital to the creation of employment in an economy.

[18] Multiplier is based on the Sectoral Base Multipliers for Northwestern Ontario for Government positions.

Section VI – Developing the Knowledge Sector

Transitioning Thunder Bay's economy towards a knowledge-based economy is not a new concept. This notion has been around for many years and has been promoted by many City Officials and local economists. For example, a recent report by the North Superior Workforce Planning Board (NSWPB, 2010) suggests that transitioning Thunder Bay's economy from being reliant on the forest industry to a knowledge-based economy is not optional, but a requirement.

The purpose of this section of the report is to provide a snapshot of Thunder Bay's Knowledge Sector (KS), focus on some potentially high growth industries within the KS and offer recommendations on how to further develop the KS.

6.1 Defining the Knowledge Sector

What exactly is a knowledge-based economy or sector? These terms are often used in a superficial and uncritical manner with very little attention paid to their definition. It is very difficult to capture the definition of the knowledge economy in a single sentence or paragraph. The purpose of this section of the report is to explore the various definitions offered and highlight the key characteristics of the knowledge-based economy. Powell and Snellman (2004) offer one of the most succinct and robust definitions of the knowledge economy:

> as production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources. *(p. 1)*

Two key characteristics of the knowledge economy are the generation and use of knowledge in the wealth creation process. The following two quotations key into these characteristics:

> A knowledge economy is one in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use and exploitation of all types of knowledge in all manner of economic activity. (UK Department of Trade and Industry, 1998).

and

> Capitalism is undergoing an epochal transformation from a mass production system where the principal source of value was human labour to a new era of "innovation-mediated production" where the principal component of value creation, productivity and economic growth is knowledge. (Florida & Kenney, 1991).

The generation of new knowledge depends on innovation. The Oslo Manual (2005) offers the basis for the Organization for Economic Co-operation and Development (OECD) definition of innovation:

> the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.

The Science, Technology and Innovation Council (STIC, 2008) also defined innovation:

> The process by which individuals, companies and organizations develop, master and use new products, designs, processes and business methods. These can be new to them, if not to their sector, their nation or to the world. The components of

innovation include research and development, invention, capital investment and training and development.

The ability to be innovative and turn innovations into invoices is the essence of a knowledge-based economy. The Oslo Manual (2005) defines four types of innovation:

1. **Product Innovation:** involves a good or service that is new or significantly improved. This includes significant improvements in technical specifications, components and materials, incorporated software, user-friendliness or other functional characteristics.

2. **Process Innovation**: involves a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

3. **Marketing Innovation**: involves a new marketing method with significant changes in product design or packaging, product placement, product promotion or pricing.

4. **Organizational Innovation**: involves introducing a new organizational method in the firm's business practices, workplace organization or external relations.

These innovations can be new to the firm, new to the market/sector or new to the world.

An alternative lens to view innovations was offered by Christensen (2012):

1. **Empowering Innovations**: These transform complicated and costly products available to a few into simpler, cheaper products available to the many. Empowering innovations create jobs, because they require more and more people who can build, distribute, sell and service these products. Empowering

investments also use capital —to expand capacity and to finance receivables and inventory.

2. **Sustaining Innovations:** These replace old products with new models. There is a zero-sum aspect to sustaining innovations: They replace yesterday's products with today's products but create few jobs. They keep our economy vibrant — and, in dollars, they account for the most innovation. But they have a neutral effect on economic activity and on capital.
3. **Efficiency innovations:** These reduce the cost of making and distributing existing products and services. Such innovations almost always reduce the net number of jobs, because they streamline processes. But they also preserve many of the remaining jobs — because without them, entire companies and industries would disappear in competition against companies abroad that have innovated more efficiently.

In summary, we define a knowledge-based economy as one that has *a greater reliance on the innovation and use of knowledge than on physical inputs or natural resources in the wealth generating process.*

6.2 The Knowledge Sector in Canada: A Snapshot

Developing the Knowledge Sector has been a Federal Government goal for Canada as a whole. Recently, Startup Genome (2012) released a report that ranks the world's top start-up ecosystems based on their Startup Ecosystem Index. Canada had three cities that ranked in the top twenty, including Toronto (8^{th}), Vancouver (9^{th}) and Waterloo (16^{th}).

The Canadian Science, Technology and Innovation Council (STIC) recently issued reports specifically on the state of the Canada's knowledge economy (STIC, 2010; STIC 2008). The report analyzes Canada's performance in four broad metrics:

1. Resources for Research and Development (R&D);
2. Business Innovation Indicators
3. Knowledge Development and Transfer Indicators
4. Talent Indicators

Canada ranked worse or stagnated in 18 of 24 benchmarks tracked by the STIC from 2008 to 2010.

The large majority of Canadian-based enterprises rely on existing products, processes, marketing and organizational practices. Only 19 percent of enterprises in all surveyed industries stated that their strategic focus was to regularly introduce new or significantly improved goods or services, and only 34 percent of firms' long-term strategic focus was to introduce new or significantly improved business activities or processes to their operations (STIC, 2010).

Table 13 presents a summary of the key indicators of Canada's knowledge economy.

Table 13 – Indicators of Canada's Knowledge Economy

Section of Report / Indicator	2008 Report	2010 Report	Change on Final Year of Data from 2008 to 2010*
Resources for Research and Development (R&D)			
1. Gross domestic expenditure on R&D (GERD) as a percentage of Gross Domestic Product (GDP)	2006 1.97%	2008 1.84%	2006 to 2008 ↓
2. GERD by performing sector (constant 2002 dollars)	2007 $0.28 billion $14.19 billion $8.53 billion $2.21 billion	2008 $0.30 billion $13.22 billion $8.53 billion $2.15 billion	2007 to 2008 ↑ by provincial governments ↓ by business − by higher education ↓ by federal government
Business Innovation Indicators			
3. Business expenditure on R&D (BERD) intensity, as a percentage of GDP	2006 1.10% 15th place	2008 1.00% 18th place	2006 to 2008 ↓ as a percentage of GDP ↓ ranking in available OECD countries
4. Direct and indirect government funding of business R&D, as a percentage of GDP	2005 0.21% 0.023%	2008 0.22% 0.022%	2005 to 2008 ↑ indirect government funding ↓ direct government funding
5. Investment in machinery and equipment as a share of GDP	2004 6.2%	2007 6.3%	2004 to 2007 ↑
6. Venture capital relative to GDP	2007 0.12%	2008 0.08%	2007 to 2008 ↓
Knowledge Development and Transfer Indicators			
7. Higher education performance of R&D, as a percentage of GDP	2006 0.66%	2008 0.64%	2006 to 2008 ↓
8. Share of all business-financed R&D performed by higher education sector	2006 5.7%	2009 6.3%	2006 to 2009 ↑
9. Intramural government R&D as a share of GDP in Canada	2006 0.20%	2008 0.19%	2006 to 2008 ↓
Talent Indicators			
10. Programme for International Student Assessment (PISA): 15 year-olds	2006 Science: 534 3rd place Math: 527 7th place Reading: 527 4th place	2009 Science: 529 8th place Math: 527 10th place Reading: 524 6th place	2006 to 2009 ↓ in science score ↓ in science ranking − in math score ↓ in math ranking ↓ in reading score ↓ in reading ranking
11. Percentage of population with tertiary education: top 10 Organisation for Economic Co-operation and Development (OECD) countries	2006 47% 1st place	2008 49% 1st place	2006 to 2008 ↑ percentage of population with tertiary education − ranking in top 10 OECD countries
12. PhD graduates per million population: OECD countries	2002 129.6 20th place	2008 145.9 23rd place	2002 to 2008 ↑ in graduates per million population ↓ in ranking of OECD countries

Source: State of the Nation: Summary Comparison of Selected Indicators, 2008 and 2010 Reports

Table 13 highlights many negative trends for Canada's knowledge economy. Some of the key highlights include

- Business expenditure in inflation-adjusted terms on Research and Development (R&D) as a percentage of GDP declined from 1.1% to 1% from 2006 to 2008, dropping Canada from 15th to 18th overall for all OECD countries
- Venture capital relative to GDP declined from 2006 to 2007;
- Programme for International Student Assessment declined.

On the positive side, the following key highlights suggest signs of improvement for Canada's knowledge economy:

- Share of all business-financed R&D performed by higher education sector increased from 5.7% to 6.3% from 2006 to 2008;
- PhD graduates per million population increased to 145.9 in 2006 from 129.6 in 2002; however, Canada's ranking in all OECD countries declined by to 23rd from 20th place over the same time period, suggesting that other countries increased their PhD graduates per million at a faster pace.
- Percentage of population with tertiary education remained in 1st place across OECD countries.

Another measure of the knowledge sector is patent activity. Ontario was the province with the most patent applications and patents granted in 2011, followed by Quebec, Alberta, and

British Columbia. Thunder Bay's patent generating ability is discussed later in this section of the report.

In terms of Canadian corporations, Research in Motion had the most patent applications and patents granted in 2011 with 569 and 224, respectively (Canadian Intellectual Property Office [CIPO], 2011). Proctor and Gamble, and Honda Motors Co. had the second and third most patents, respectively.

6.3 The Current State of Thunder Bay's Knowledge Sector: A Top-Down Approach

The same detailed information presented in Table 13 for Canada is not available for Thunder Bay. Therefore, it is not possible to compare Thunder Bay to Canada on the same metrics identified by the STIC.

Accordingly, six unique metrics have been developed specifically to assess Thunder Bay's knowledge economy. In determining the appropriate metrics, two important factors were considered: 1) the availability of detailed data related to Thunder Bay and 2) past literature and resources analyzing knowledge sectors. As a result, the following indicators of Thunder Bay's KS were developed:

Indicator	Measure
1. Number of Businesses Indicator	The Number of Enterprises in Thunder Bay's KS
2. Employment Indicator	Employment in Thunder Bay's KS
3. Talent Indicator	The Educational Level of Thunder Bay's Population

4. Diversity Indicator	The Diversity of Thunder Bay's Workforce & Population
5. Knowledge Generation Indicator	The Patents Generated from Thunder Bay
6. Infrastructure Indicator	The Nature and Extent of Infrastructure to Support Thunder Bay's KS.

The analysis presented in this section employs a Top-Down Methodology in that secondary data is compiled and analyzed. The secondary data is obtained from various sources, such as Statistics Canada (e.g. Census data, Labour Force Survey, Canada Business Patterns, CANSIM tables, etc.), Canadian and US Patent offices, and previous research reports. The remainder of this section discusses the six indicators.

6.3.1 Number of Businesses Indicator: Enterprises in Thunder Bay's Knowledge Sector

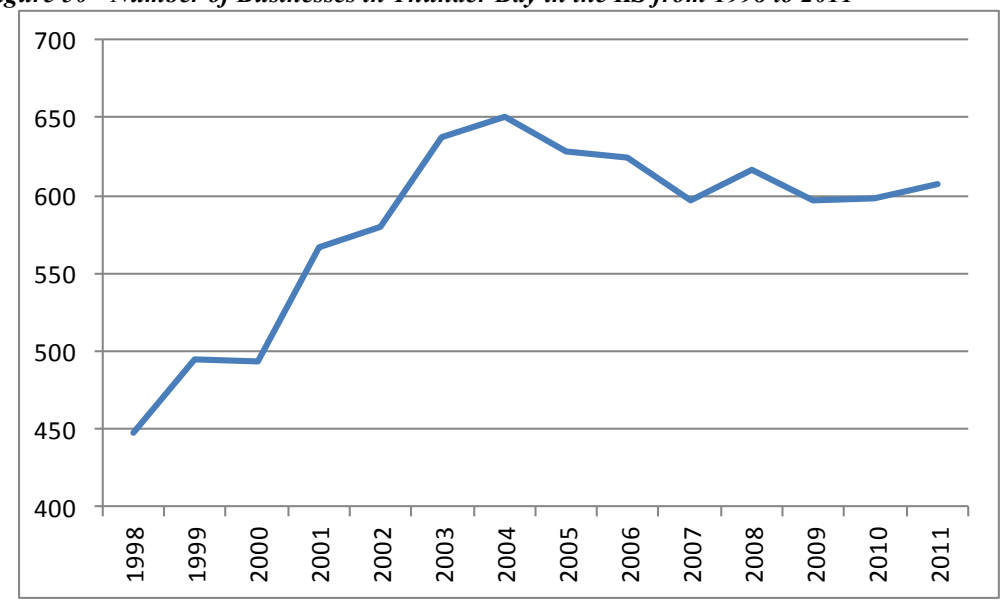
The North American Industry Classification System (NAICS) can be used to identify the companies that operate within the KS (Statistics Canada, 2012). The KS can be captured by the NAICS Classification for Sector 54, *Professional, scientific and technical services.* Although Sector 54 does not capture all of the KS industries, it does provide a good, high level proxy for the KS. Sector 54 includes a broad range of knowledge-based industries:

- Lawyers and legal services
- Accounting and tax preparation
- Architectural services
- Engineering services
- Geophysical surveying and mapping services
- Testing laboratories
- Various design services
- Business and management consulting services
- Scientific research and development costs
- Research and development in the physical, engineering, and life sciences
- Advertising and public relations

services

Figure 50 presents the number of businesses that operate in Thunder Bay's KS, based on the 2-digit NAICS Sector code 54, over the fourteen year period of 1998 to 2011.

Figure 50 - Number of Businesses in Thunder Bay in the KS from 1998 to 2011

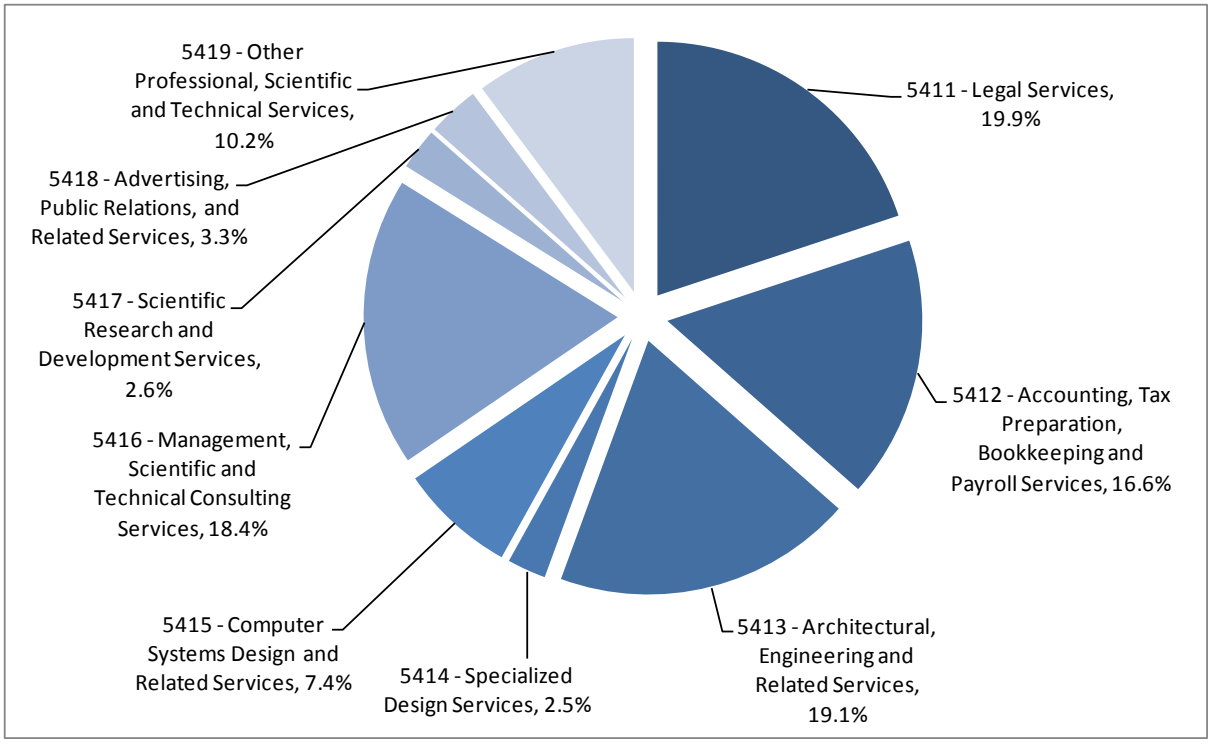


Source: Statistics Canada, Canada Business Patterns CA/CMA: 595 - Thunder Bay

Figure 50 reveals that Thunder Bay's KS grew from 447 businesses in 1998 to 650 in 2004, an increase of 45%. From 2004 to 2007, the KS declined to 597 firms, or a decline of 8%. Since 2007, the KS has remained relatively consistent at around 600 firms.

Figure 51 presents the composition of the major industry groups (4-digit NAICS code) within Thunder Bay's KS.

Figure 51 - Number of Businesses in Thunder Bay in the KS from 1998 to 2011



Source: Statistics Canada, Canada Business Patterns

Figure 51 reveals that legal (19.9%), engineering/architectural (19.1%), accounting (16.6%) and management, scientific and technical consulting services (18.45%) industry groups comprise a total of approximately 74% of Thunder Bay's KS. The next largest sub-sector is the computer systems design and related services (7.4%), with advertising relates services (3.3%), scientific research and development services (2.6%), and specialized design services (2.5%) rounding out the other industry groups. The other services category makes up the final 10.2%.

Table 14 presents the total number of firms for each NAICS sub-sector for the Thunder Bay KS, along with the five year (2006 to 2011) and fourteen year (1998 to 2011) percentage changes. The fourteen year period is a proxy for the long-run change in the sub-sector while the five year period is a proxy for the short-run change in the sub-sector.

Table 14 – Changes in the Thunder Bay's KS Businesses from 1998 to 2011 by Industry Grouping (4-digit NAICS)

NAICS Sector groups	Number of Firms (2011)	% Change from 1998 to 2011	Absolute Change from 1998 to 2011	% Change from 2006 to 2011	Absolute Change from 2006 to 2011
5411 - Legal Services	121	36.0%	32	22.2%	22
5412 - Accounting, Tax, Bookkeeping and Payroll Services	101	53.0%	35	8.6%	8
5413 - Architectural, Engineering and Related Services	116	-0.9%	-1	-15.3%	-21
5414 - Specialized Design Services	15	87.5%	7	-28.6%	-6
5415 - Computer Systems Design and Related Services	45	15.4%	6	-31.8%	-21
5416 - Management, Scientific and Technical Consulting	112	51.4%	38	-5.9%	-7
5417 - Scientific Research and Development Services	16	100.0%	8	6.7%	1
5418 - Advertising, Public Relations, and Related Services	20	-4.8%	-1	-28.6%	-8
5419 - Other Professional, Scientific and Technical Services	62	148.0%	37	31.9%	15
Total	608	36%	161	(2.7%)	(17)

Source: Statistics Canada, Canada Business Patterns

Table 14 reveals that the KS in Thunder Bay has grown over the long-run by 36%, and declined by 2.7% in the more recent short-run. There are some key highlights in regards to individual industry groups. For example, the scientific research and development sub-sector experienced the most significant long-run growth by doubling the number of businesses from 8 to 16; however, this sub-sector has experienced a more modest growth rate of 6.7% in the short-run. The legal services sub-sector experienced the largest absolute growth in the long-run and short-run by adding 32 firms in the long-run of which 22 were added in the short-run (2006 to 2011). The architectural, engineering and related services experienced a decline in the long-run of 1%, and 15.3% in the short-run by losing 21 firms. Short-run losses were also significant in the specialized design services, computer system design, and adverting services sub sectors.

Table 15 sheds light on the size of the companies that operate in Thunder Bay's KS by presenting the number of firms by sector in Thunder Bay's KS by firm size as measured by their number of employees.

Table 15 - Number of Businesses by Size and Industry Grouping (4-digit NAICS) in the Thunder Bay KS

NAICS Sector groups	1-4	5-9	10-19	20-49	50-99	100-199	200-499	500 +	Unknown	Total
5411 - Legal Services	65	14	8	1	0	0	0	0	33	121
5412 - Accounting, Tax Preparation, Bookkeeping and Payroll Services	44	6	4	5	1	0	0	0	41	101
5413 - Architectural, Engineering and Related Services	42	7	6	9	4	2	0	0	46	116
5414 - Specialized Design Services	4	2	1	0	0	0	0	0	8	15
5415 - Computer Systems Design and Related Services	13	2	5	0	0	0	0	0	25	45
5416 - Management, Scientific and Technical Consulting Services	31	2	1	3	0	0	0	0	75	112
5417 - Scientific Research and Development Services	6	2	1	1	0	0	0	0	6	16
5418 - Advertising, Public Relations, and Related Services	6	3	1	0	0	0	0	0	10	20
5419 - Other Professional, Scientific and Technical Services	21	4	2	2	0	0	0	0	33	62
Total	***232***	***42***	***29***	***21***	***5***	***2***	***0***	***0***	***277***	***608***

Source: Statistics Canada, Canada Business Patterns

Table 15 reveals that most of the businesses that operated in Thunder Bay's KS are small with 232 firms having 1 to 4 total employees. There are two firms that have been 100 and 199 employees. These two firms are the largest known firms as no firms in Thunder Bay's KS have reported to have over 200 employees. More detailed information can be obtained by analyzing the industries (6-digit NAICS code) within each industry grouping.

Table 16 presents the composition of the nine industry groupings across 40 different industries, as well as the change (percentage and absolute) in firms from 1998 to 2011 (long-run) and 2006 to 2011 (short-run).

Table 16 - Changes in the Thunder Bay's KS Businesses from 1998 to 2011 by Industries (6-digit NAICS)

NAICS Industries	Number of Firms (2011)	% of 2011 KS Firms	% Change from 1998 to 2011	Absolute Change from 1998 to 2011	% Change from 2006 to 2011	Absolute Change from 2006 to 2011
5411 - Legal Services						
541110 - Offices of Lawyers	112	18.4%	34.9%	29	17.9%	17
541120 - Offices of Notaries	0	0.0%	n/a	0	n/a	0
541190 - Other Legal Services	9	1.5%	50.0%	3	125.0%	5
5412 - Accounting, Tax Preparation, Bookkeeping and Payroll Services						
541212 - Offices of Accountants	66	10.9%	65.0%	26	26.9%	14
541213 - Tax Preparation Services	3	0.5%	50.0%	1	-57.1%	-4
541215 - Bookkeeping, Payroll and Related Services	32	5.3%	33.3%	8	-5.9%	-2
5413 - Architectural, Engineering and Related Services						
541310 - Architectural Services	13	2.1%	-31.6%	-6	-18.8%	-3
541320 - Landscape Architectural Services	0	0.0%	-100.0%	-1	n/a	0
541330 - Engineering Services	66	10.9%	0.0%	0	-13.2%	-10
541340 - Drafting Services	8	1.3%	60.0%	3	0.0%	0
541350 - Building Inspection Services	8	1.3%	300.0%	6	14.3%	1
541360 - Geophysical Surveying and Mapping Services	4	0.7%	33.3%	1	-50.0%	-4
541370 - Surveying and Mapping (except Geophysical) Services	3	0.5%	-25.0%	-1	-40.0%	-2
541380 - Testing Laboratories	14	2.3%	-17.6%	-3	-17.6%	-3
5414 - Specialized Design Services						
541410 - Interior Design Services	4	0.7%	300.0%	3	0.0%	0
541420 - Industrial Design Services	2	0.3%	100.0%	1	100.0%	1
541430 - Graphic Design Services	7	1.2%	16.7%	1	-53.3%	-8
541490 - Other Specialized Design Services	2	0.3%	n/a	2	100.0%	1
5415 - Computer Systems Design and Related Services						
541510 - Computer Systems Design and Related Services	45	7.4%	15.4%	6	-31.8%	-21
5416 - Management, Scientific and Technical Consulting Services						
541611 - Administrative and General Management Consulting	47	7.7%	-14.5%	-8	-23.0%	-14
541612 - Human Resources Consulting Services	7	1.2%	75.0%	3	-12.5%	-1
541619 - Other Management Consulting Services	21	3.5%	320.0%	16	23.5%	4
541620 - Environmental Consulting Services	9	1.5%	200.0%	6	-25.0%	-3
541690 - Other Scientific and Technical Consulting Services	28	4.6%	300.0%	21	33.3%	7
5417 - Scientific Research and Development Services						
541710 - Research and Development in the Physical, Engineering and Life Sciences	9	1.5%	200.0%	6	0.0%	0
541720 - Research and Development in the Social Sciences	7	1.2%	40.0%	2	16.7%	1
5418 - Advertising, Public Relations, and Related Services						
541810 - Advertising Agencies	5	0.8%	-58.3%	-7	-58.3%	-7
541820 - Public Relations Services	2	0.3%	100.0%	1	100.0%	1
541830 - Media Buying Agencies	0	0.0%	n/a	0	n/a	0
541840 - Media Representatives	0	0.0%	n/a	0	-100.0%	-1
541850 - Display Advertising	4	0.7%	100.0%	2	-42.9%	-3
541860 - Direct Mail Advertising	2	0.3%	n/a	2	100.0%	1
541870 - Advertising Material Distribution Services	2	0.3%	100.0%	1	0.0%	0
541891 - Specialty Advertising Distributors	4	0.7%	300.0%	3	300.0%	3
541899 - All Other Services Related to Advertising	1	0.2%	-75.0%	-3	-66.7%	-2
5419 - Other Professional, Scientific and Technical Services						
541910 - Marketing Research and Public Opinion Polling	3	0.5%	0.0%	0	-25.0%	-1
541920 - Photographic Services	8	1.3%	-11.1%	-1	-27.3%	-3
541930 - Translation and Interpretation Services	0	0.0%	-100.0%	-1	n/a	0
541940 - Veterinary Services	12	2.0%	50.0%	4	33.3%	3
541990 - All Other Professional, Scientific and Technical Services	39	6.4%	875.0%	35	69.6%	16
	608	100.0%	36.0%	161	-2.7%	-17

Source: Statistics Canada, Canada Business Patterns

Table 17 presents ten largest industries, as measured by total number of firms, in Thunder Bay's KS.

Table 17 – Ten largest Industries (6-digit NAICS) in Thunder Bay's KS (by number of firms)

NAICS Industries	Number of Firms (2011)
541110 - Offices of Lawyers	112
541212 - Offices of Accountants	66
541330 - Engineering Services	66
541611 - Administrative Management and General Management Consulting Services	47
541510 - Computer Systems Design and Related Services	45
541990 - All Other Professional, Scientific and Technical Services	39
541215 - Bookkeeping, Payroll and Related Services	32
541690 - Other Scientific and Technical Consulting Services	28
541619 - Other Management Consulting Services	21
541380 - Testing Laboratories	14

Source: Statistics Canada, Canada Business Patterns

The three largest industries in the KS are the offices of lawyers, accountants, and engineers. Three of the other largest industries are management consultants (fourth largest), bookkeeping services (seventh largest), and other management consultants (ninth largest) which are all similar to the offices of accountants. This conclusion is not surprising as Thunder Bay has a long history of providing exemplary legal, accounting, and engineering services. These three industries employ a large number of people in high paying positions (this is discussed further in the education section below).

Table 18 presents the top five increases and decreases in the number of industry firms over the long-run (1998 to 2011) and short-run (2006 to 2011). Table 18 reveals that offices of lawyers, accountants, and professional, scientific and technical services experienced the most growth over both the long- and short-run periods. In regards to declining industries, management and general consulting services experienced long- and short-run declines, losing 14

firms in the short-run. The computer system design industry lost 21 firms in the short-run. Interestingly, the number of engineering firms decreased by ten in the short-run period.

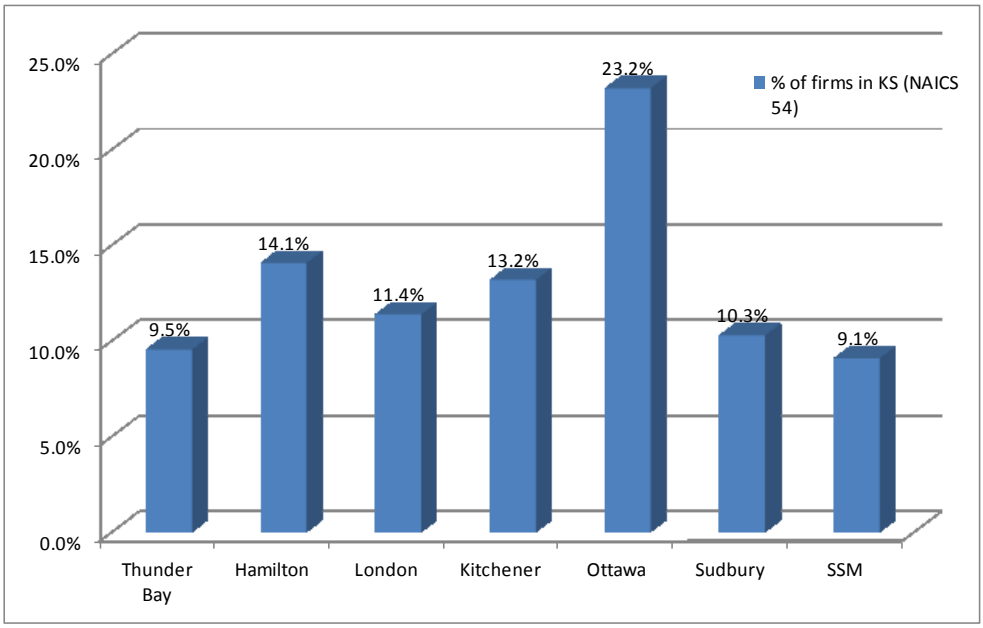
Table 18 – Ten Largest Industries (6-digit NAICS) in Thunder Bay's KS (by number of employees)

NAICS Industries	Long-run change (Δ '98)	NAICS Industries	Short-run change (Δ '06)
541990 - All Other Professional, Scientific and Technical Services	35	541110 - Offices of Lawyers	17
541110 - Offices of Lawyers	29	541990 - All Other Professional, Scientific and Technical Services	16
541212 - Offices of Accountants	26	541212 - Offices of Accountants	14
541690 - Other Scientific and Technical Consulting Services	21	541690 - Other Scientific and Technical Consulting Services	7
541619 - Other Management Consulting Services	16	541190 - Other Legal Services	5
541380 - Testing Laboratories	-3	541810 - Advertising Agencies	-7
541899 - All Other Services Related to Advertising	-3	541430 - Graphic Design Services	-8
541310 - Architectural Services	-6	541330 - Engineering Services	-10
541810 - Advertising Agencies	-7	541611 - Administrative Management and General Management Consulting Services	-14
541611 - Administrative Management and General Management Consulting Services	-8	541510 - Computer Systems Design and Related Services	-21

Source: Statistics Canada, Canada Business Patterns

Figure 52 presents the percentage of firms in the KS (NAICS Code 54) for Thunder Bay and six other Ontario cities.

Figure 52 – Percentage of Firms in the KS (NAICS 54) for Thunder Bay and Six Other Ontario Cities



Source: Statistics Canada, Canada Business Patterns

Figure 52 reveals that Thunder Bay's KS firms (NAICS Code 54), as a percentage of total firms, are on the lower end of the range, greater than only Sault Ste. Marie. Ottawa has the largest percentage of firms in the KS with 23.2 percent. Recently, British Columbia Stats and the Ministry of Competition, Science and Enterprise undertook a joint project to define the British Columbia High Technology Sector using NAICS (BC Stats, 2001). The number of firms in the High Technology Sector identified by BC Stats for Thunder Bay and six other Ontario cities has been complied to provide a robustness check to the KS tables presented above. Table 19 presents the NAICS that define the High Technology Sector, along with the number of firms in this sector for Thunder Bay and six other Ontario cities.

Table 19 – Number of Firms in the High Technology Sector for Thunder Bay and Six Other Ontario Cities

NAICS	Industry Classification	Thunder Bay	Hamilton	London	Kitch.	Ottawa	Sudbury	SSM
511210	Software Publishers	1	46	23	45	176	2	0
541710	Research and Development in the Physical, Engineering and Life Sciences	9	69	53	45	209	13	4
334512	Measuring, Medical and Controlling Devices Manufacturing	2	27	22	31	37	6	1
541510	Computer Systems Design and Related Services	45	1,049	499	786	5,552	63	32
334210	Telephone Apparatus Manufacturing	0	0	2	2	3	0	0
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturer	0	7	1	6	15	0	0
334410	Semiconductor and Other Electronic Component Manufacturing	0	9	4	13	35	2	0
334511	Navigational and Guidance Instruments Manufacturing	1	0	1	4	8	0	0
335990	All Other Electrical Equipment and Component	1	7	5	6	6	1	0

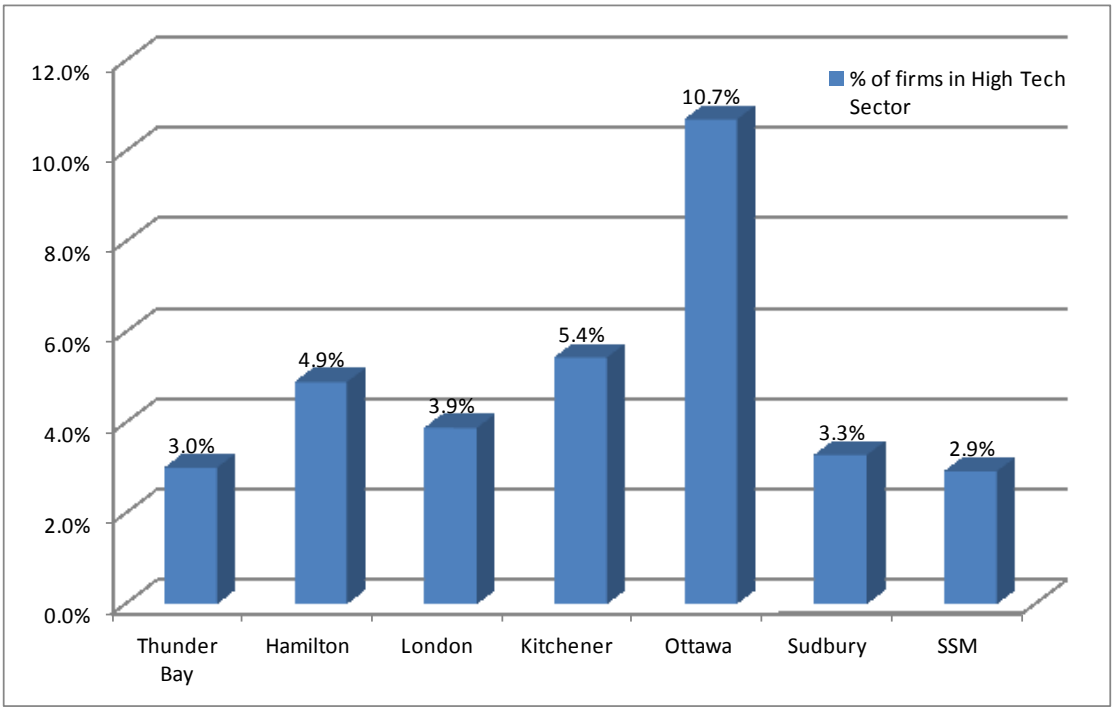
	Manufacturing							
541330	Engineering Services	66	469	224	319	828	100	32
325410	Pharmaceutical and Medicine Manufacturing	1	11	11	3	11	0	1
334110	Computer and Peripheral Equipment Manufacturing	0	8	3	17	20	0	0
336410	Aerospace Product and Parts Manufacturing	2	5	7	10	9	1	4
335315	Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing	0	10	2	7	2	1	0
417310	Computer, Computer Peripheral and Pre-Packaged Software Wholesaler	8	53	37	36	112	6	1
443120	Computer and Software Stores	11	70	60	54	139	20	3
334290	Other Communications Equipment Manufacturing	0	3	3	1	6	0	0
417320	Electronic Components, Navigational and Communications Equipment and Supplier	5	26	22	28	104	9	5
339110	Medical Equipment and Supplies Manufacturing	9	56	33	27	78	7	5
514210	Data Processing Services	0	0	0	1	2	0	0
541620	Environmental Consulting Services	9	61	33	56	149	14	7
541720	Research and Development in the Social Sciences and Humanities	7	12	8	15	93	2	3
621510	Medical and Diagnostic Laboratories	14	56	47	29	100	19	5
	Total High Technology Sector	**191**	**2,054**	**1,100**	**1,541**	**7,694**	**266**	**103**

Source: Statistics Canada, Canada Business Patterns

Table 19 reveals that Ottawa is by far the largest High Technology sector in terms of total number of firm. Thunder Bay's two largest High Technology industries are Computer Systems Design (541510) and Related Services and Engineering Services (541330) which make up over 55% of the total sector. Table 19 also reveals that Thunder Bay is lacking in firms in seven industries of the High Technology sector, including the semiconductor manufacturing industry (334410), computer manufacturing (334110), and telephone apparatus manufacturing (334210), among others. Conversely, Ottawa has at least one firm in each of the High Technology sector industries.

Figure 53 presents the High Technology Sector as a percentage of Total Firms for Thunder Bay and six other Ontario cities, and allows for a relative comparison of each cities High Technology sector.

Figure 53 – High Technology Sector as a Percentage of Total Firms for Thunder Bay and Six Other Ontario Cities



Source: Statistics Canada, Canada Business Patterns

Figure 53 is consistent with the results presented for the broad KS (NAICS Code 54) in that Thunder Bay is lagging many other Ontario cities in terms of the number of firms in the High Technology sector industries.

6.3.2 Employment Indicator: Employment in the Knowledge Sector

Employment in the KS is another important metric to measure the health of Thunder Bay's KS. This report adopts the three definitions of KS employment constructed by Di Matteo (2006) which are based on the original Florida (2002) categories modified for the availability of monthly Statistics Canada data. Adopting the Di Matteo (2006) categories will also allow for an updated comparison to the original results presented in Di Matteo (2006). The three employment groupings are as follows:

Core Knowledge Sector Employment is defined as employment in the occupational categories of professional business and finance, teachers and professors, professional scientific and technical employment, professional health employment, and finally arts, cultural and sports employment. This category broadly corresponds to the "Super Creative Core" concept developed by Richard Florida and includes mainly professional categories[19].

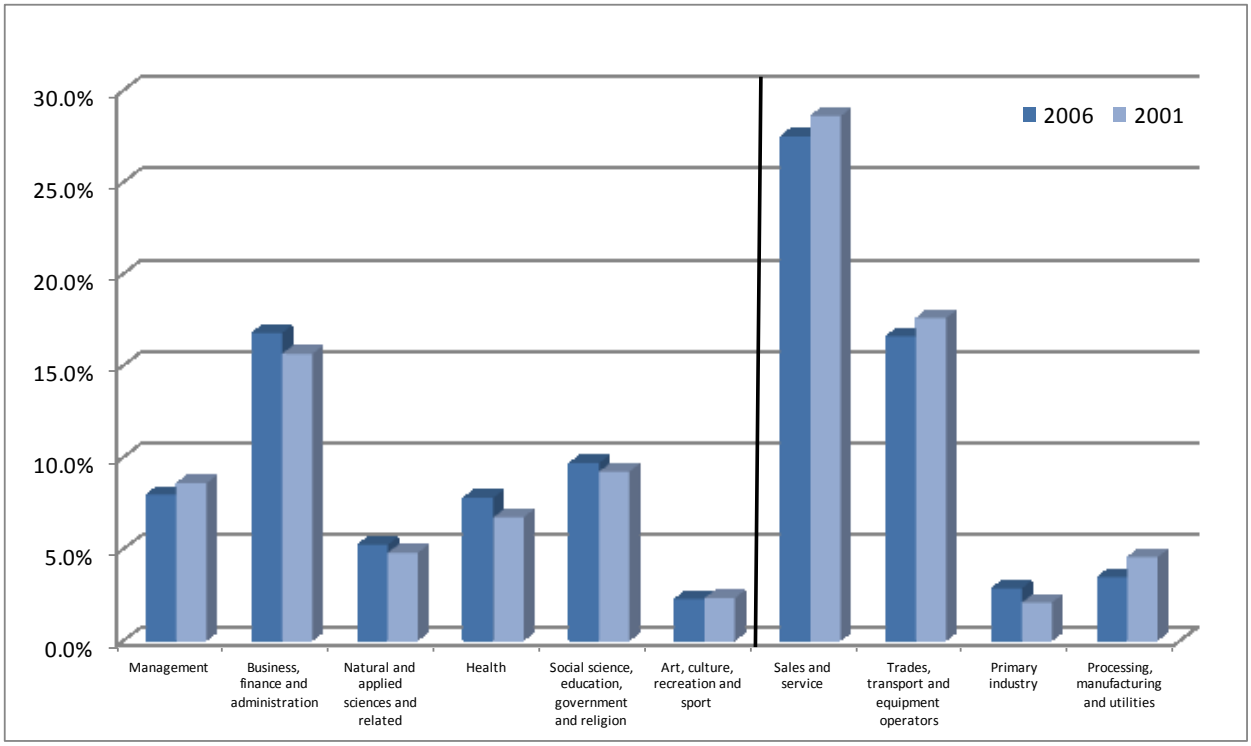
1) ***Augmented Core Knowledge Sector Employment*** takes the core knowledge sector definition and adds public administration employment to it, given its importance in the Northwestern Ontario economy, and the fact that in this region it is more than simply a service sector. This definition corresponds approximately to Florida's creative class concept[20].

[19] Florida (2002) defined the "Super-Creative Core Group" of KS employees to include computer, math, architecture, engineering, life, physical and social sciences, education, arts, designs, entertainment, media and sports occupations.
[20] Florida and Kenney (1991) defined the "Creative Professionals" to include managerial occupations, business and financial, legal, health care practitioners and technical occupations and high end sales and management.

2) ***Broad Knowledge Sector Employment*** is the sum of employment in those employment sectors that are most representative of new economy type activities. They include all of the employment in the Augmented Core concept plus the remaining employment in the sectors of finance, insurance and real estate, education, health and social services, and information and recreation. This definition of knowledge sector employment is the least useful in that it really is more of a service economy type measure. Moreover, it does not correspond to Florida's definition of the creative class.

Figure ***54*** presents the percentages of Thunder Bay's total employment across ten different industries.

Figure 54 – Thunder Bay Employment in the KS and Other Industries in 2006 and 2001



Source: Statistics Canada, 2006 Census Data

Figure ***54*** reveals that Thunder Bay has experienced growth in the employment of all but one KS industry as a percentage of total employment. The only decline was experienced in the management industry. The health industry experienced the most significant increase. In regards to the industries outside of the KS, all experienced a decline in employment except for the primary industry. Sales and services, trades, and processing and manufacturing all experienced a decline. It appears that a shift has taken place in terms of employment from the primary industries to the KS from 2001 to 2006.

Table 20 presents the total employment in Thunder Bay for 1996 and 2011, along with the Core KS, Augmented Core KS, and Broad KS employment. These figures are estimated

based on the Labour Force Survey estimates, grouped into the three KS employment categories by the authors.

Table 20 – Changes in Core, Augmented Core, and Broad KS Employment for Thunder Bay CMA from 1996 to 2011

	1996	2011	Jobs Created	% Change
Total employed, all occupations	61,600	59,500	(2,100)	-3.4%
Core KS employment	13,500	15,600	2,100	15.6%
Augmented Core KS employment	16,700	19,500	2,800	16.8%
Broad KS employment	30,600	33,200	2,600	8.5%

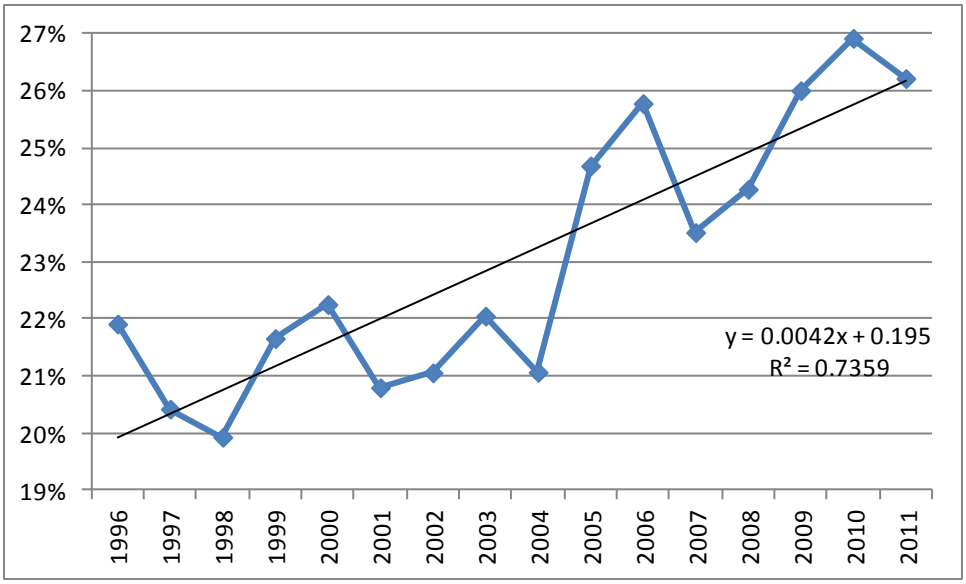
Source: Statistics Canada, Table 282-0114 - Labour force survey estimates (LFS)

Table 20 reveals that the shift to a knowledge economy has been underway since 1996. Consistent with the results reported by Di Matteo (2006) for the entire Northwestern Ontario region, the growth in Thunder Bay's knowledge sector (2,600 new positions) from 1996 to 2006 has cushioned the overall decline in employment (2,100 positions lost) that has occurred primarily in traditional resource based manufacturing in the region. While overall employment in Thunder Bay declined by 3.4%, the Broad Knowledge Sector employment increased by 8.5%.

Figure 55 presents the annual "*Core KS*" employment in Thunder Bay from 1996 to 2011, with a linear regression fitted trend line (in the form of $y = \alpha + \beta x$).

Figure 55 reveals that from 1996 to 2011, the Core KS employment experienced an increasing trend (i.e. increased by 15.6%, Table 20).

Figure 55 – Annual Core KS Employment in Thunder Bay with Trend: 1996 – 2011

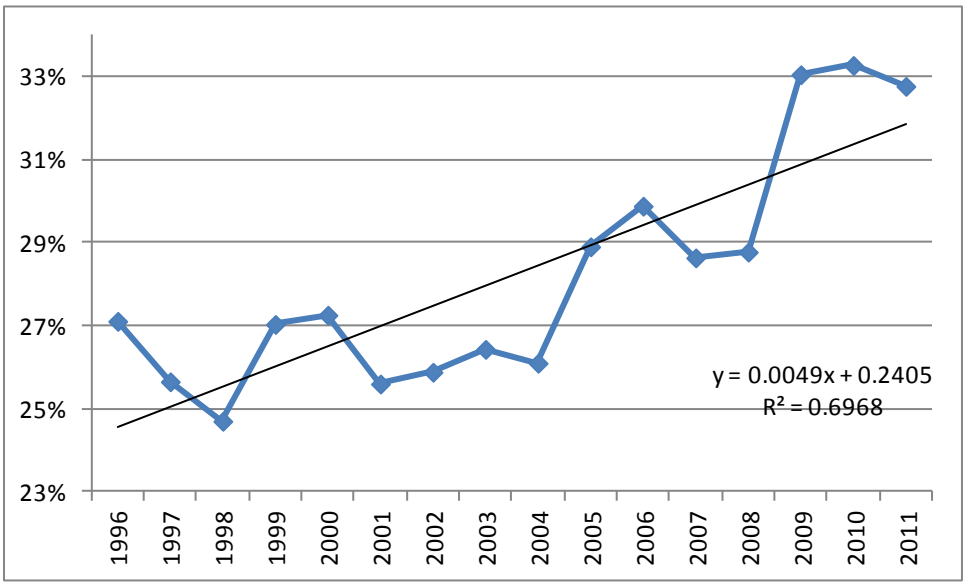


Source: Statistics Canada, LFS, CANSIM Table 282-0114

period of 1996 to 2006. Since 2006, the Core KS employment declined to 24% only to grow to 27% and decline back to 26.2% in 2011. This result suggests that the Core KS employment as a percentage of total employment has not grown significantly over the past five years.

Figure 56 presents the annual "*Augmented Core KS*" employment in Thunder Bay from 1996 to 2011 with a linear regression fitted trend line (in the form of $y = \alpha + \beta x$).

Figure 56 – Annual Augmented Core KS Employment in Thunder Bay with Trend: 1996 – 2011



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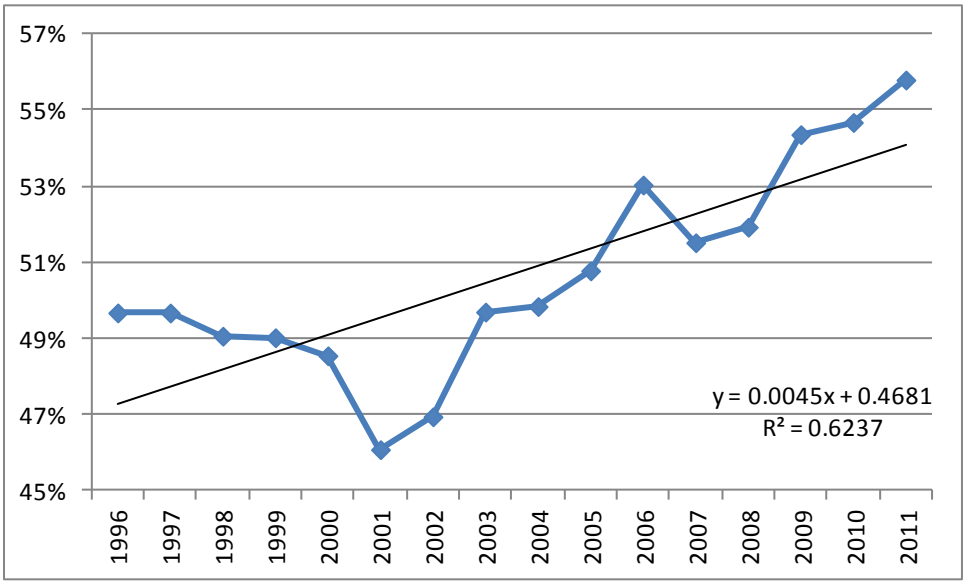
Source: Statistics Canada, LFS, CANSIM Table 282-0114

Figure 56 presents an upward trend in the Augmented Core KS employment as a percentage of total employment from 1996 to 2011. Again, this is consistent with the results in Di Matteo (2006). Over the past five years, the Augmented Core KS employment has increased from approximately 30% (2006) to 33% (2011). Since the Core KS employment has not increased over the past five years, this suggests that the employment in government and social sciences positions has driven the increase in the Augmented Core KS from 2006 to 2011. From 1996 to 2011, the Augmented Core KS employment increased by 16.8%. All of this increase occurred over the eight year period of 2004 to 2011.

Figure 57 presents the annual "*Broad KS*" employment in Thunder Bay from 1996 to 2011, with a linear regression fitted trend line (in the form of $y = \alpha + \beta x$).

Figure 57 - Annual Broad KS Employment in Thunder Bay with Trend: 1996 – 2011

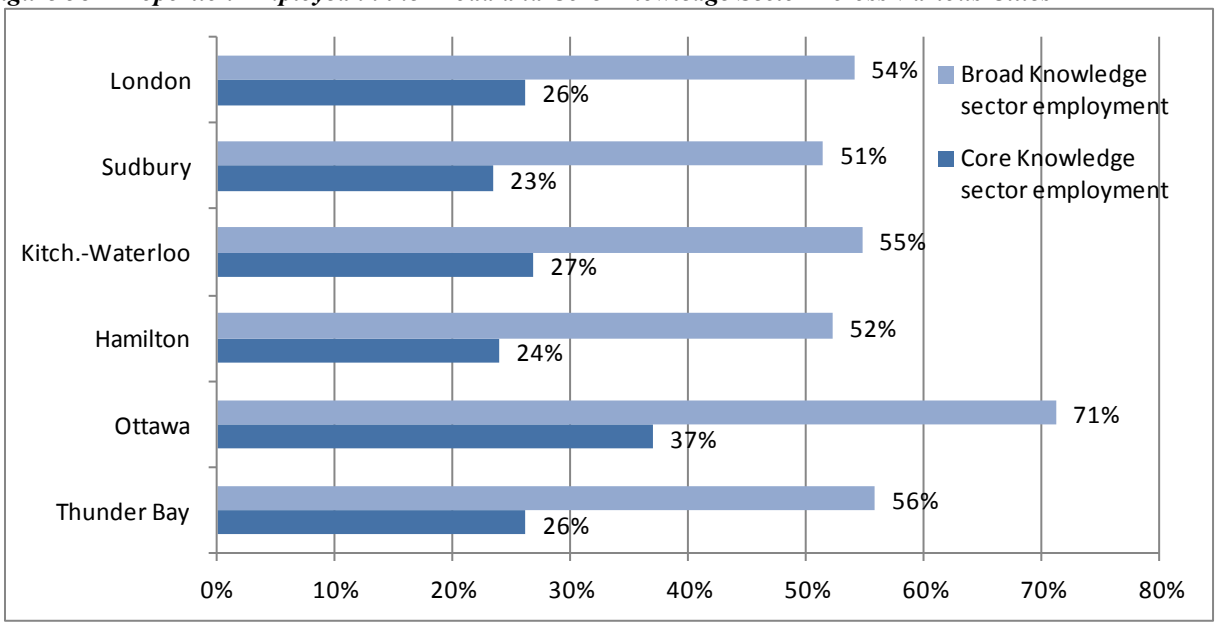


Source, Statistics Canada, LFS, CANSIM Table 282-0114

Figure 57 also presents an upward trend in the Broad KS employment as a percentage of total employment from 1996 to 2011. Again, this is consistent with the results in Di Matteo (2006). Over the past five years, the Broad KS employment has increased from approximately 53% (2006) to 56% (2011). From 1996 to 2011, the Broad KS employment has increased by 8.5%. All of this increase occurred over the ten year period of 2002 to 2011.

Figure 58 presents the percentage of total employees working in both the Core KS and Broad KS in Thunder Bay and five other Ontario cities.

Figure 58 - Proportion Employed in the Broad and Core Knowledge Sector Across Various Cities



Source, Statistics Canada, LFS, CANSIM Table 282-0114

Figure 58 reveals that Thunder Bay's overall employment in the Core KS is consistent with many other cities in Ontario, including cities such as Hamilton and Kitchener-Waterloo. Ottawa is the leader with 37% of its workforce employed in the Core KS. In terms of the Broad KS,

Figure 58 reveals that Thunder Bay has 56% of all employees working in the Broad KS. Thunder Bay is second only to Ottawa which has 71% of its workforce in the Broad KS. Thunder Bay's Broad KS employment is greater than cities such as Kitchener-Waterloo and Hamilton.

Table 21 presents the proportion employed with post0secondary education across the ten occupation categories discussed in

Figure ***54***.

Table 21 – Proportion Employed with Post-secondary Education Across Occupation Categories

	Categories	Thunder Bay		Ontario
		2006	2001	2006
A Management occupations		**62.9%**	**60.5%**	**69.5%**
	Senior management	71.0%	68.2%	77.6%
	Middle and other management	62.2%	59.5%	68.4%
B Business, finance and administration occupations		**55.3%**	**50.1%**	**60.2%**
	Professional occupations in business and finance	83.5%	81.1%	86.6%
	Skilled administrative and business	59.8%	49.6%	62.0%
	Clerical	47.5%	44.3%	51.7%
C Natural and applied sciences and related occupations		**79.7%**	**80.9%**	**86.0%**
	Professional occupations in Natural and applied sciences	93.3%	89.6%	91.4%
	Technical occupations related to natural and applied sciences	71.7%	74.3%	78.2%
D Health occupations		**91.5%**	**92.0%**	**91.5%**
	Professional occupations in health	98.5%	97.7%	98.4%
	Technical and skilled occupations in health	93.0%	92.2%	92.3%
	Assisting occupations in support of health services	75.1%	70.9%	77.2%
E Occupations in social science, education, government service and religion		**89.4%**	**88.6%**	**89.9%**
	Professional occupations in social sciences, education, government, and religion	93.3%	91.9%	94.8%
	Paraprofessional occupations in law, social services, education and religion	77.9%	78.0%	75.0%
F Occupations in art, culture, recreation and sport		**63.2%**	**55.1%**	**71.1%**
	Professional occupations in art and culture	71.8%	68.9%	79.6%
	Technical and skilled occupations in art, culture, recreation and sport	59.5%	46.5%	64.1%
G Sales and service occupations		**36.3%**	**32.4%**	**42.3%**
	Skilled sales and service occupations	47.5%	46.5%	57.8%
	Intermediate sales and service occupations	42.7%	36.7%	47.8%
	Elemental sales and service occupations	24.1%	21.4%	27.4%
H Trades, transport and equipment operators and related occupations		**57.9%**	**51.6%**	**49.8%**
	Trades and skilled transport and equipment operators	75.9%	67.4%	62.9%
	Intermediate occupations in transport, equipment operation	33.8%	28.6%	34.6%
	Trade helpers, construction labourers and related	35.9%	22.0%	26.7%
I Occupations unique to primary industry		**34.0%**	**29.0%**	**32.5%**
	Skilled occupations in primary industry	36.0%	28.2%	40.3%
	Intermediate occupations in primary industry	35.3%	34.2%	23.7%
	Labourers in primary industry	30.0%	27.6%	28.1%
J Occupations unique to processing, manufacturing and utilities		**32.8%**	**29.4%**	**34.4%**
	Processing, manufacturing, and utilities supervisors and skilled operators	46.5%	42.6%	29.5%
	Processing and manufacturing machine operators	32.8%	29.1%	34.8%
	Labourers in processing, manufacturing and utilities	22.1%	20.6%	27.5%
Total - Occupations		**57.1%**	**52.3%**	**59.5%**

Source: Statistics Canada, 2006 Census Data

There are several key highlights that can be taken from Table 21:

- Thunder Bay's total proportion of individuals employed with post-secondary education increased from 2001 (52.3%) to 2006 (57.1%); however, Thunder Bay is still lagging behind Ontario in this regard (59.5%).
- The occupation categories with the highest proportion of individuals with post-secondary education are occupations in health, social sciences, education, government, natural and applied sciences, professional business, senior management, and professions in art and culture. The occupation categories with the lowest proportion of individuals with post-secondary education are occupations in sales and service, primary industry, processing and manufacturing, and trades and transport. This is consistent with the discussion, and presentation of
-
- Figure ***54***.
- Thunder Bay exceeds Ontario only in the trades and equipment operator occupation category in terms of employees with post-secondary education. The Ontario average was greater for the remaining nine occupation categories.
- Professionals in the health category had the highest sub category proportion with 98.5% of employees in this area holding some form of post-secondary education.

In terms of private sector employment in the KS, Table 22 presents an estimate of the number of employees working in each of the top ten private-sector KS industries (as identified in Table 17). Table 22 (see next page) reveals that the top ten industries in the KS employ 4,122 individuals in Thunder Bay. The total KS in Thunder Bay, as measured by NAICS Sector 54,

employs approximately 5,381 individuals (table not presented). Accordingly, the top 10 industries employ approximately 76.6% of all individuals in Thunder Bay's KS. The offices of engineers (995), lawyers (640), and accountants (559) employ a combined 2,194 individuals. The top three industries employ approximately 40.8% of all individuals in Thunder Bay's KS. This percentage is significantly greater when the bookkeeping and management consultant industries are included.

Table 22 – Ten largest Industries (6-digit NAICS) in Thunder Bay's KS (by number of employees)

NAICS Industries	**Estimated Number of Employees (2011)[21]**
541330 - Engineering Services	995
541110 - Offices of Lawyers	640
541212 - Offices of Accountants	559
541611 - Administrative Management and General Management Consulting Services	342
541510 - Computer Systems Design and Related Services	338
541380 - Testing Laboratories	309
541990 - All Other Professional, Scientific and Technical Services	279
541215 - Bookkeeping, Payroll and Related Services	244
541619 - Other Management Consulting Services	221
541690 - Other Scientific and Technical Consulting Services	195
Total	4,122

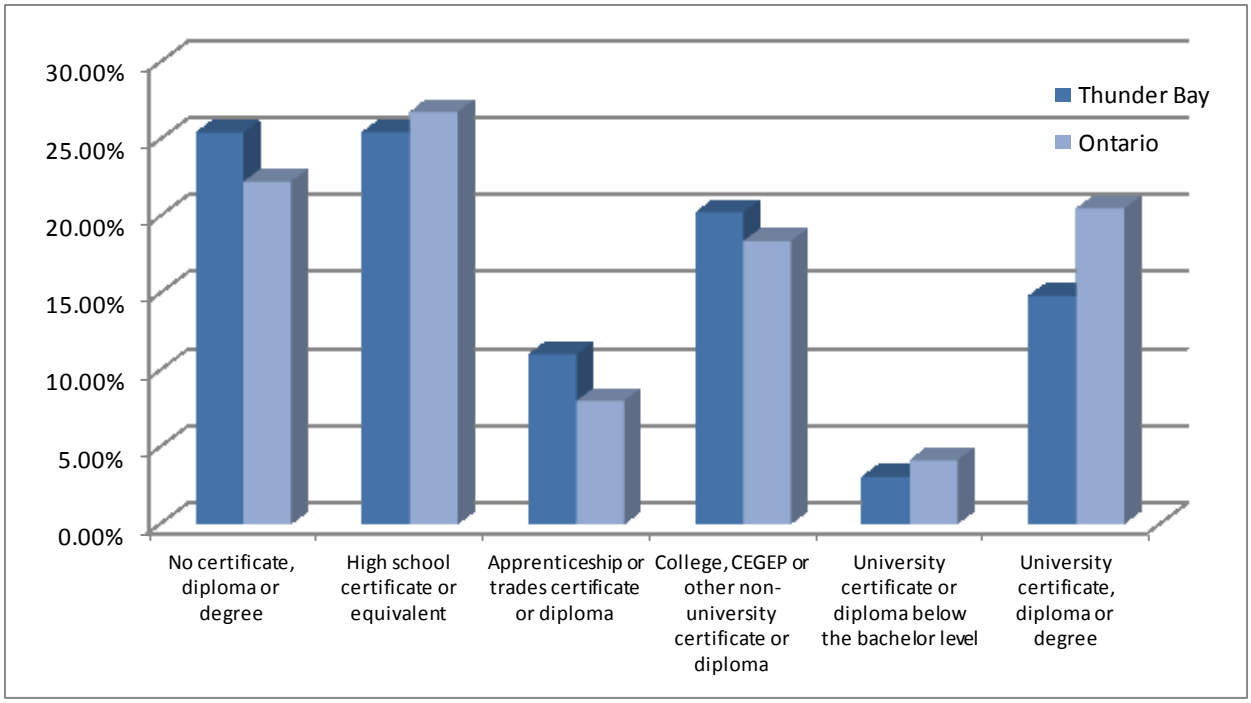
6.3.3 Talent Indicator: Educational Levels

A vibrant knowledge economy requires a population and employment base with the capacity to generate and use knowledge in order to drive to the wealth generation process. Thunder Bay must develop and maintain a highly qualified workforce attuned to innovation opportunities. Analyzing the overall educational level of the Thunder Bay population is one way to measure the workforce's disposition towards a knowledge-based economy. Figure 59 presents a breakdown of Thunder Bay's 2006 population according to highest level of education.

[21] Note: The number of employees is estimated by multiplying the number of firms in each employee size grouping by the average of the grouping. The indeterminate grouping assumed the weighted-average value of all other groupings.

Figure 59 reveals that Thunder Bay has a higher percentage of its population than Ontario of individuals without a high school education. In addition, Thunder Bay has a lower percentage of individuals with university degrees; however, Thunder Bay does have a higher percentage of individuals with apprenticeships/trade certificates and college diplomas.

Figure 59 – Thunder Bay and Ontario Populations by Highest Level of Education



Source: Statistics Canada, 2006 Census Data

Table 23 presents the change from 2001 to 2006 for each educational attainment level as a percentage of Thunder Bay's population.

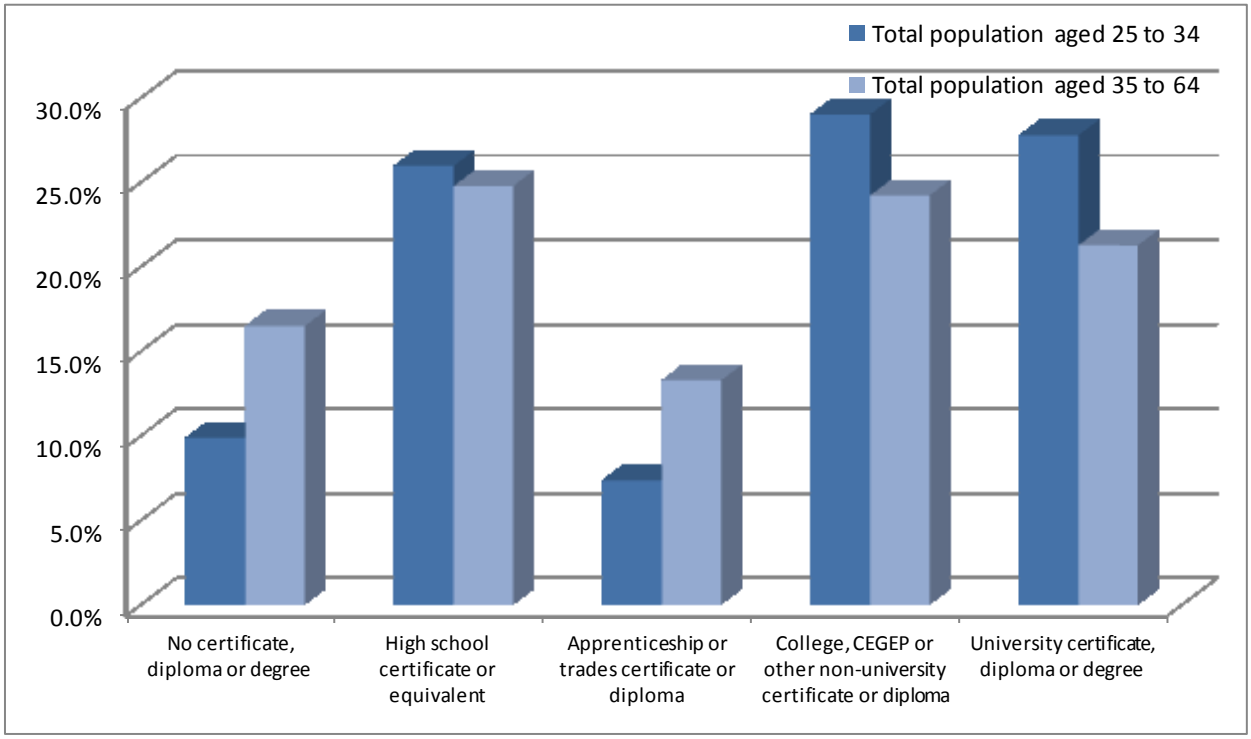
Table 23 – Breakdown of Thunder Bay's Population by Educational Attainment for 2006 and 2001

Educational Attainment	**2006**	**2001**
No certificate, diploma or degree	25%	20%
High school certificate or equivalent	25%	27%
Apprenticeship or trades certificate or diploma	11%	14%
College, CEGEP or other non-university certificate or diploma	20%	21%
University certificate, diploma or degree	18%	19%

Source: Statistics Canada, 2006 and 2001 Census Data

Table 23 reveals that Thunder Bay's population has not seen either a significant increase or decline in terms of university degrees and college diplomas held by its populations. Figure 60 presents the highest level of education attained by the population across age groups.

Figure 60 - Thunder Bay Populations by Highest Level of Education by Age Group

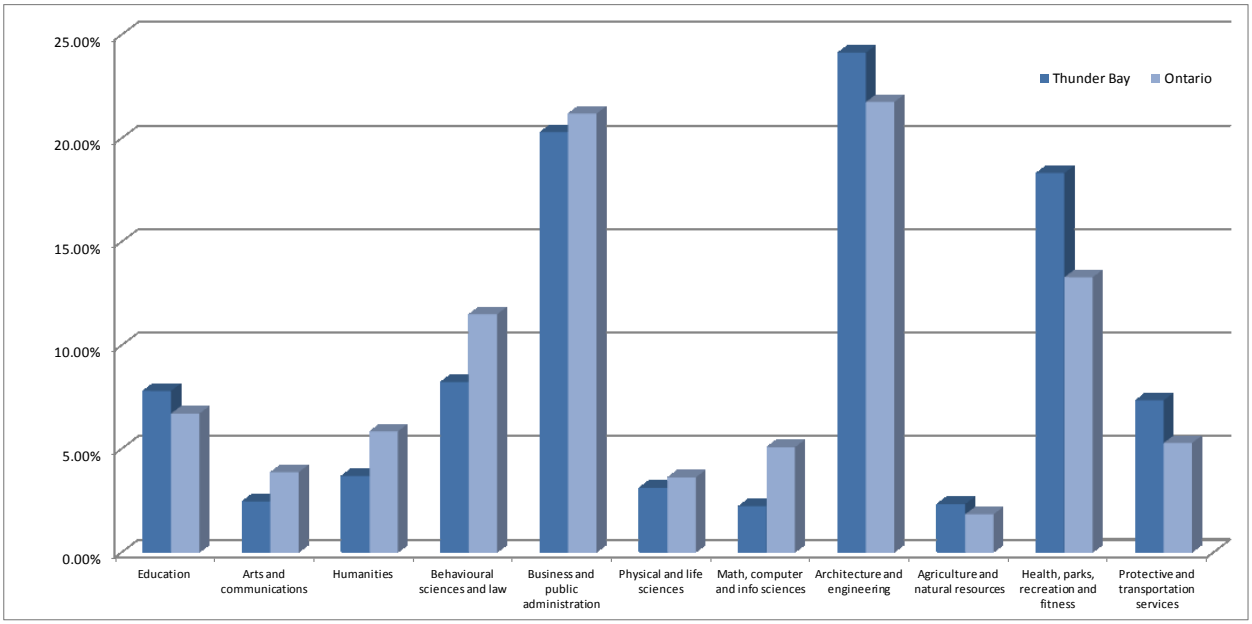


Source: Statistics Canada, 2006 Census Data

Figure 60 reveals a positive trend for Thunder Bay. Namely, the age group of 25 to 34 years old has a higher percentage of individuals with college diplomas and university degrees than the 35 to 64 year age group. It is also a positive factor that the population with a high school diploma is greater for the younger age group than the older age group. The younger age group holds fewer apprenticeships or trade certificates than the older group. Figure 61 presents Thunder

Bay's population of individuals with degrees and diplomas by major field of study (i.e., degrees/diploma in field of study divided by all degrees/diplomas).

Figure 61 – Degrees and Diplomas by Major Field of Study



Source: Statistics Canada, 2006 Census Data

Figure 61 shows that Thunder Bay has a higher percentage of individuals than Ontario with degrees or diplomas in education, architecture and engineering, agricultural and resources, health, parks and recreation and protective transportation services. Thunder Bay has a lower percentage of individuals than Ontario with degrees or diplomas in arts and communications, humanities, behavioural science and law, physical and life sciences, and math and computer sciences. The top three educational differences are presented in Table 24

Table 24 – Largest Differences in Major Field of Study for Thunder Bay Versus Ontario

Where Thunder Bay is greater than Ontario	
Health, parks, recreation and fitness	5.0%
Architecture and engineering	2.4%
Protective and transportation services	2.1%
Where Thunder Bay is less than Ontario	
Behavioural sciences and law	-3.3%

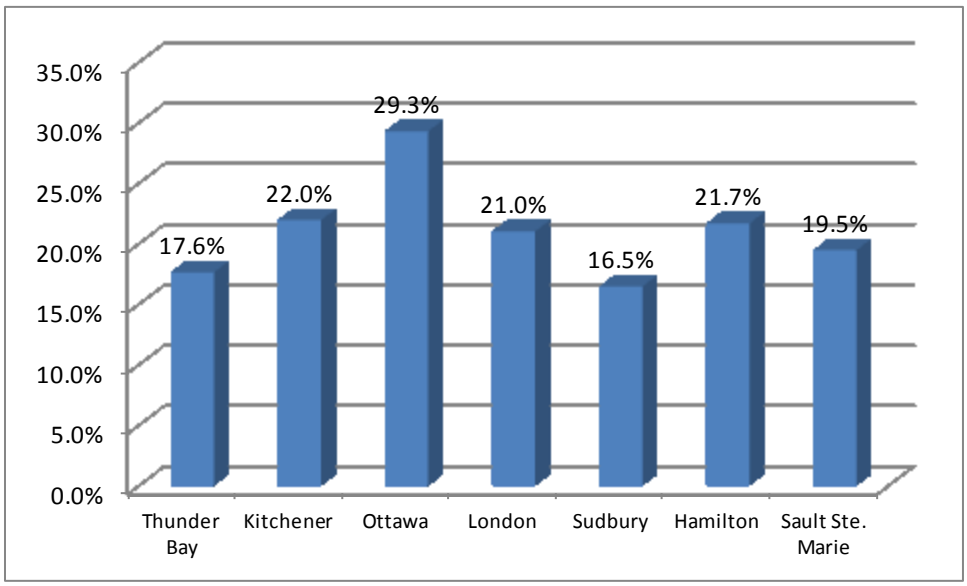
Humanities	-2.2%
Math, computer and info sciences	-2.9%

Source: Statistics Canada, 2006 Census Data

Table 24 reveals that Thunder Bay's population has a higher percentage of individuals with architecture and engineering degrees which bodes well for Thunder Bay's KS. However, this positive is offset by the fact that Thunder Bay's population is lagging behind Ontario in regards to behavioural sciences and law, and math and computer sciences.

Figure 62 presents the percentage of bachelor's degree holders relative to all individuals with diplomas and degrees for Thunder Bay, and various other cities in Ontario

Figure 62 – Bachelor Degree Holders as a Percentage of Total Population with a Diploma or Degree

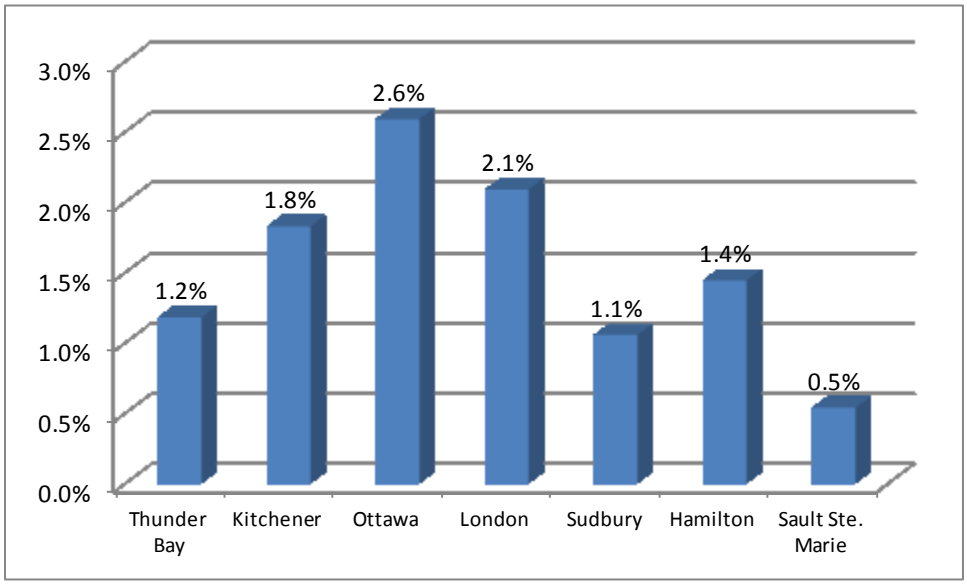


Source: Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-560-XCB2006016

Figure 62 reveals that the three Northern Ontario cities of Thunder Bay, Sudbury, and Sault Ste. Marie are the lowest in terms of population percentage holding a bachelor degree. Ottawa is the highest with almost 30% of its population with a degree or certificate holding a bachelor's degree or higher. Ottawa's percentage is almost twice that of Thunder Bay. In terms

of PhD intensity, Figure 63 presents the percentage of doctorate holders relative to all individuals with diplomas and degrees for Thunder Bay, and various other cities in Ontario.

Figure 63 – Doctorate Degree Holders as a Percentage of Total Population with a Diploma or Degree



Source: Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-560-XCB2006016

Figure 63 reveals that Thunder Bay has fewer doctorate holders than many leading KS cities in Ontario, such as Kitchener, Ottawa and London; however, Thunder Bay is very similar to comparable cities, such as Sudbury, Hamilton, and Sault Ste. Marie. Table 25 presents the distribution of doctorate degrees by major field of study for Thunder Bay and other Ontario cities. Thunder Bay's largest percentage of doctorate holders is from the physical and life sciences and technologies (26.5%), followed by the fields of study of social and behavioural sciences and law (15.4%) and architecture, engineering, and related technologies (11.1%). Thunder Bay is significantly lower than other cities in the mathematics, computer and information sciences field of study but is higher in the education and business fields of study.

Table 25 – Distribution of Doctorate Degrees by Major Field of Study for Thunder Bay and Other Ontario Cities

	Thunder Bay	Kitchener	Ottawa	London	Sudbury	Hamilton	Sault Ste. Marie
Education	18.8%	1.5%	3.0%	3.8%	3.0%	3.6%	6.1%
Visual and performing arts, and communications technologies	0.0%	1.3%	1.0%	1.1%	0.0%	1.9%	0.0%
Humanities	9.4%	13.1%	11.6%	11.9%	20.0%	11.7%	15.2%
Social and behavioural sciences and law	15.4%	18.4%	20.1%	19.7%	22.2%	13.8%	6.1%
Business, management and public administration	6.8%	3.1%	2.3%	3.6%	4.4%	4.1%	0.0%
Physical and life sciences and technologies	26.5%	22.5%	29.7%	30.9%	23.7%	27.3%	39.4%
Mathematics, computer and information sciences	1.7%	9.2%	4.6%	3.7%	3.7%	4.0%	0.0%
Architecture, engineering, and related technologies	11.1%	22.5%	16.4%	9.6%	6.7%	14.7%	0.0%
Agriculture, natural resources and conservation	2.6%	1.0%	2.6%	1.3%	1.5%	1.4%	6.1%
Health, parks, recreation and fitness	9.4%	7.2%	8.5%	14.6%	13.3%	17.3%	21.2%
Personal, protective and transportation services	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%

Source: Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-560-XCB2006016

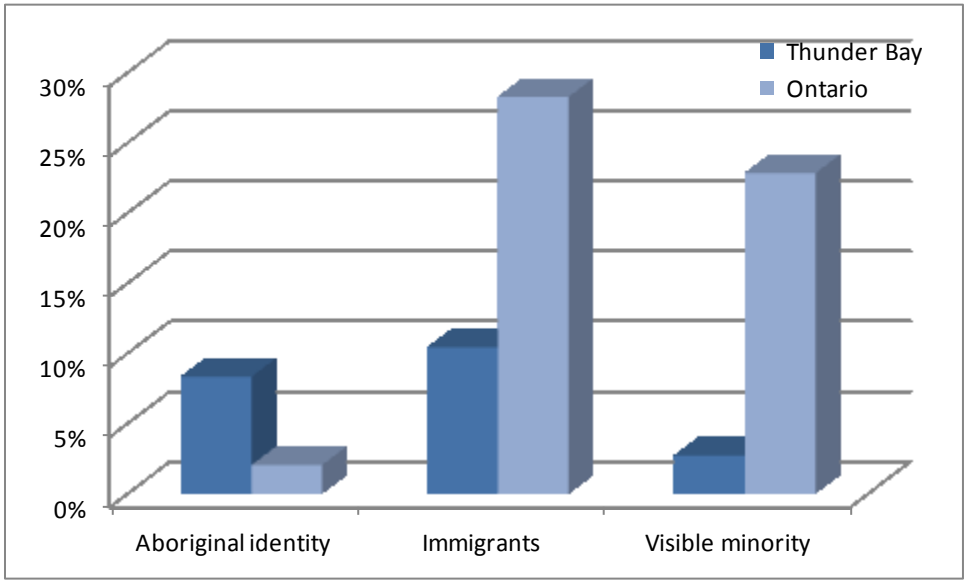
In summary, Thunder Bay's educational levels are lower than the Ontario averages. The percentage of Thunder Bay's population with college diplomas or university degrees did not change from 2001 to 2006; however, this trend may change in the future as Thunder Bay's younger age group has higher levels of education than the older age group. In terms of PhD intensity, Thunder Bay lags behind some of Ontario's leading knowledge-based industries and is more comparable with cities, such as Hamilton, Sudbury and Sault Ste. Marie.

6.3.4 Diversity Indicator: Diversity of the Work Force

According to Richard Florida (2002), the knowledge economy is enhanced by the diversity of its workforce. Figure 64 presents the population of Thunder Bay and Ontario for

Aboriginal, immigrant, and visible minorities. Thunder Bay has a much larger Aboriginal population than the Ontario average (8% of population in Thunder Bay versus 2% in Ontario). However, Thunder Bay lags significantly in both immigrant (28% of population in Ontario versus 10% in Thunder Bay) and visible minority immigrants (23% of population in Ontario versus 3% in Thunder Bay).

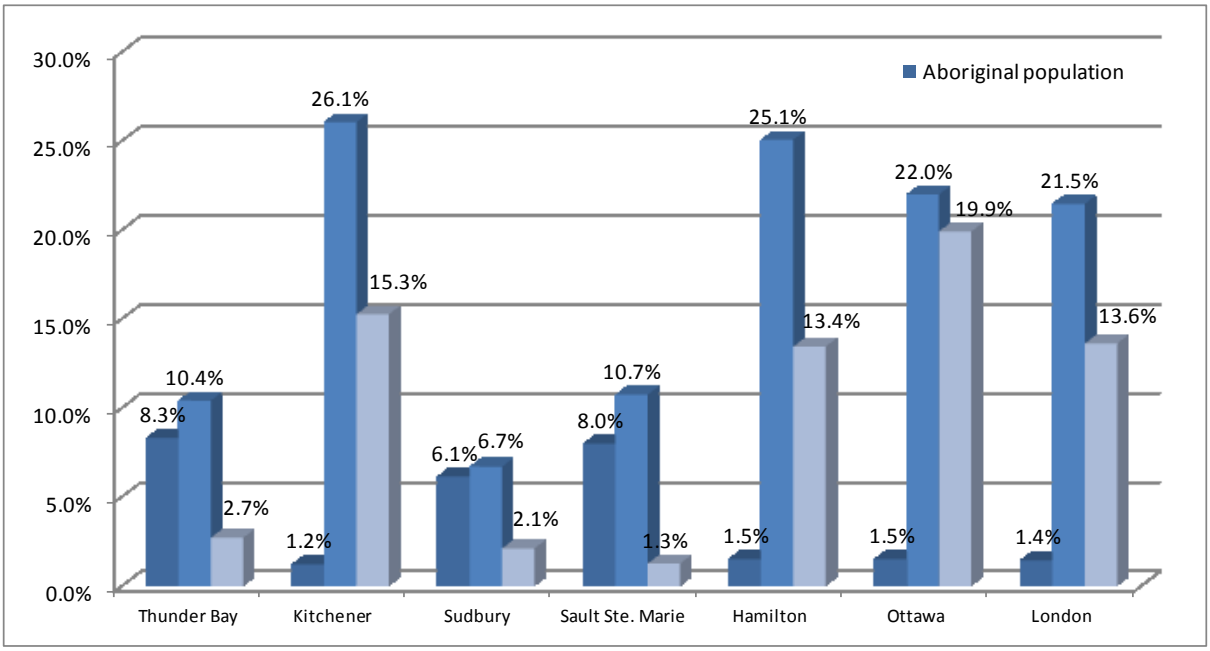
Figure 64 – Aboriginal, Immigrant and Minority Populations in Thunder Bay and Ontario



Source: Statistics Canada, 2006 Census Data

Figure 65 presents Thunder Bay's population of Aboriginal, immigrant, and visible minorities as a percentage of total population, along with the percentages for six other Ontario cities.

Figure 65 - Aboriginal, Immigrant and Minority Populations in Thunder Bay versus Other Ontario Cities

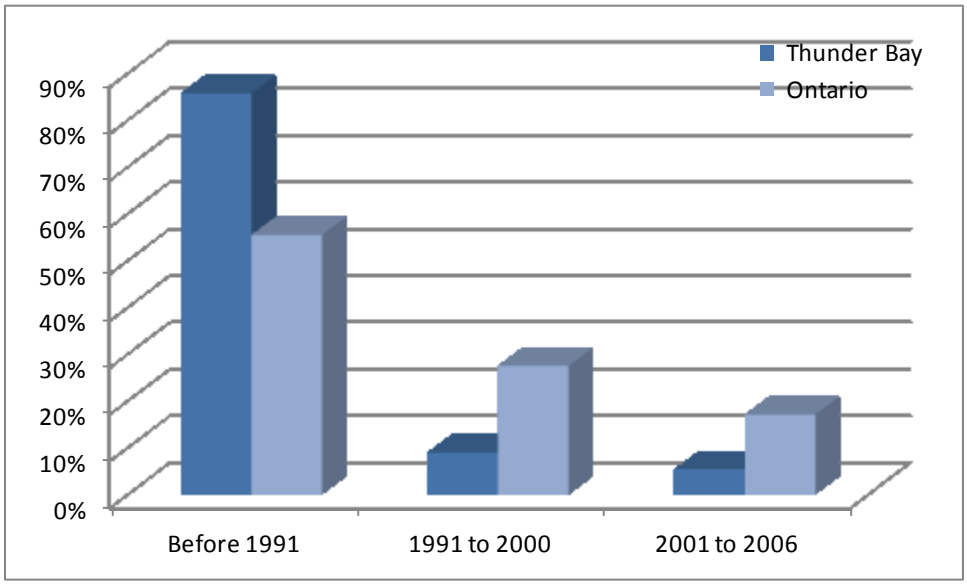


Source: Statistics Canada, 2006 Census Data

Figure 65 reveals that Thunder Bay has the highest percentage of Aboriginal peoples of the seven Ontario cities presented. The largest percentages of the Aboriginal populations are found in the three Northern Ontario cities (Thunder Bay, Sudbury, and Sault Ste. Marie). However, the Northern Ontario cities are the laggards in terms of visible minority population and immigrant populations.

Figure 66 presents the period of immigration for Thunder Bay and Ontario, and reveals that most of Thunder Bay's immigrant population came into the city before 1991 (86% of all immigrants in Thunder Bay are from before 1991 compared to 55% for Ontario). Clearly, Thunder Bay has not been the city of choice for immigrants relative to other Ontario cities since 1991.

Figure 66 – Period of Immigration for Thunder Bay and Ontario



Source: Statistics Canada, 2006 Census Data

The immigration patterns for Thunder Bay reveal that most immigrants to the city arrived prior to 1991. Thunder Bay significantly lags behind the Ontario average for attracting immigrants since 1991 (Figure 66). These trends pose a threat for Thunder Bay's KS as a diverse population base is a driver of the KS (Florida, 2002). This threat to the development of Thunder Bay's KS is exacerbated by the fact that recent immigrants to Canada tend to be highly educated.

Table 26 presents the highest level of education for Canadian-born individuals versus recent immigrants (2001 to 2006).

Table 26 – Highest Education by Recent Immigrants versus Canadian Born Population

Total - Highest certificate, diploma or degree	**Canadian Born**	**Immigrants (2001 to 2006)**
No certificate, diploma or degree	23.85%	16.39%
High school certificate or equivalent	25.55%	19.30%
Apprenticeship or trades certificate or diploma	10.90%	4.55%
College, CEGEP or other non-university certificate or diploma	17.33%	9.96%
University certificate or diploma below the bachelor level	4.40%	7.95%

University certificate, diploma or degree	17.97%	41.85%
	100%	100%

Source: Statistics Canada. Census of Canada, 2006: Immigrant Status and Period of Immigration, Labour Force Activity, Highest Certificate, Diploma or Degree, Location of Study, Age Groups and Sex (Topic based tabulations; 97-560-xcb2006025)

Table 26 reveals that approximately 42% of recent immigrants to Canada hold a university certificate, diploma or degree, a percentage which is over twice that for Canadian born individuals. The fact that Thunder Bay is not attracting these highly educated immigrants poses a threat to the future growth of the Thunder Bay's KS. For example, the well-educated immigrants in Thunder Bay earn over 25 percent more than their Canadian-born counterparts (King, 2009). In conclusion, Thunder Bay's population is less diverse than that of Ontario. Thunder Bay does have a larger Aboriginal population base but significantly fewer recent immigrants and visible minorities.

6.3.5 Knowledge Development Indicator: Patents Originating from Thunder Bay

According to the Patent Act (R.S.C., 1985, c. P-4), a patentable invention is any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter which would not have been obvious on the claim date to a person skilled in the art or science to which the invention pertains.

Among the things which are not normally patentable are

- an improvement to a known device which would be obvious to a person skilled in the art,
- a scientific principle or abstract theorem,
- a recipe, or design, and
- an idea or a process (or the product of a process) that depends entirely on a person's skill and leads to an ornamental effect.

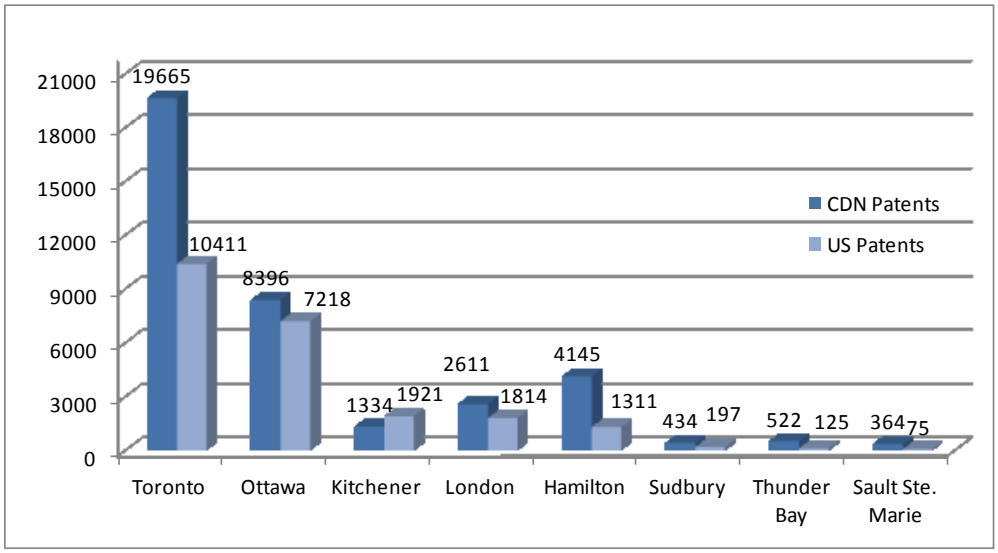
The number of patents with the Canadian government by city is not available through public searches of the patent database on the Canadian Intellectual Property Office's (CIPO) website (http://www.cipo.ic.gc.ca). However, the patent by originating city data was obtained through the CIPO's Data Extraction Division. The following analysis is based on the data obtained directly from the CIPO's Data Extraction Division. Note that for multi-author patents, the patent was included in a city's count if at least one of the authors was from the originating city.

Exploring the U.S. patent filings provides for additional insights into the international scope of intellectual properties originating from Canadian cities. The United States Patent and Trademark Office's (USPTO) website[22] allow for patent searches by originating city. The following data has been compiled based on the results from the database searches for patents by originating city. Note that for multi-author patents, the patent was included in a city's count if at least one of the authors was from the originating city.

Figure 67 presents the number of Canadian patents that originated from Thunder Bay, and seven other Ontario cities[23] from 1869 to 2012 along with the number of US patents originating from 1975 to 2011. The count for Thunder Bay includes Thunder Bay, Port Arthur, and Fort William. Figure 68 presents the same Canadian patent data for the more recent time period of 1975 to 2012.

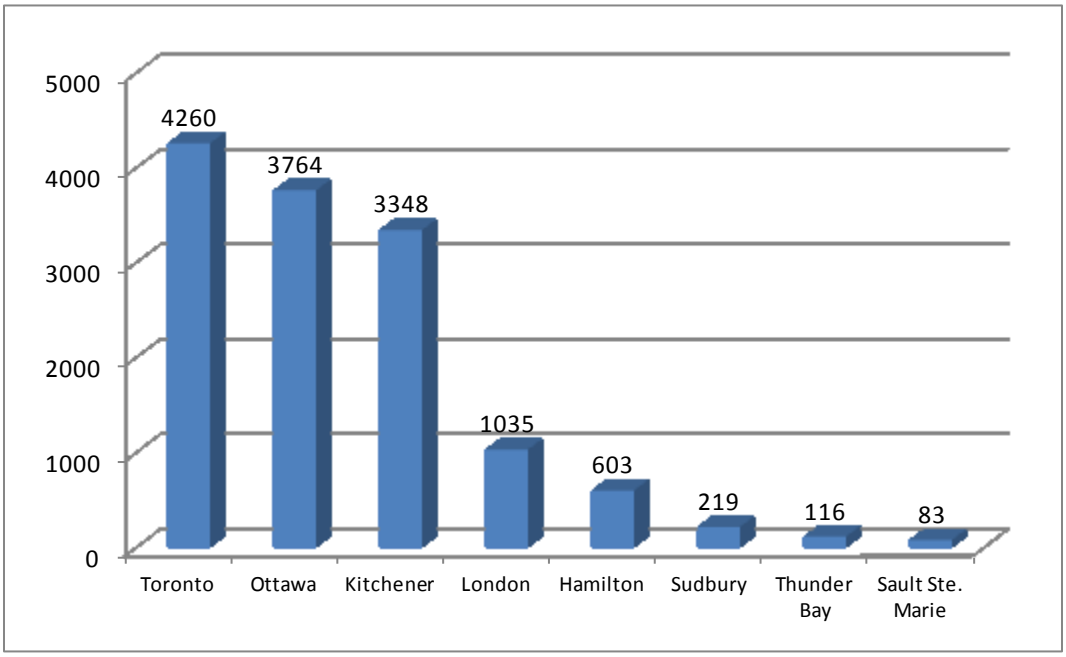
[22] http://www.uspto.gov
[23] Note that Kitchener includes the combined Kitchener-Waterloo area.

Figure 67 – Number of Canadian and US Patents Originating from various Ontario Cities



Source: http://www.uspto.gov/ & CIPO's Data Extraction Division

Figure 68 – Number of Canadian Patents Originating from Various Ontario Cities 1975 – 2012

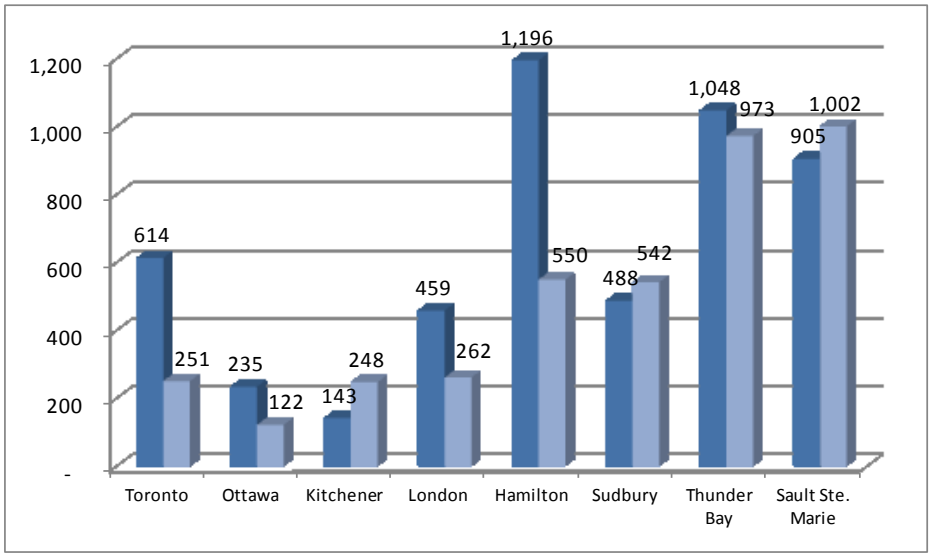


Source: CIPO's Data Extraction Division

Figure 67 and Figure 68 reveal that 522 Canadian and 125 U.S. patents have originated from Thunder Bay from 1869 to 2012, of which 116 are from 1975 to 2012. This is comparable to the other Northern Ontario cities of Sudbury and Sault Ste. Marie, however, significantly trails

the patents from Ontario's knowledge economy leaders, like Ottawa, Kitchener and London. The total number of patents generated by Thunder Bay is very similar for US and CDN filings. In order to provide a rough measure of the patents per person in each city, Figure 68 presents each city's 2011 population divided by the total number of patents. This provides a rough estimate of the number of people per patent.

Figure 69 - Number of People (Population) per Canadian and US Patents from Originating City



In terms of Canadian Patents, Figure 69 suggests that the Kitchener-Waterloo area is the most productive city in terms of patents development as the area has one Canadian patent per 143 people. On the other hand, Thunder Bay has one Canadian patent per every 1,048 people. The only city that has more people per Canadian patent is Hamilton with 1,196 people per Canadian patent. Sudbury, another Northern Ontario city, appears to be much more productive than Thunder Bay in terms of generating patents per person. In terms of U.S. patents, Figure 69 suggests that Ottawa is the most productive city in terms of patents development as the city has one U.S. patent per 122 people. On the other hand, Thunder Bay has one U.S. patent per every 973 people. The only city that has more people per U.S. patent is Sault Ste. Marie with 1,002

people per U.S. patent. Sudbury, another Northern Ontario city, appears to be much more productive than Thunder Bay in terms of generating U.S. patents per person. However, Thunder Bay appears to be the hub of patent activity for Northwestern Ontario. Figure 70 presents the number of Canadian and U.S. patents by various originating NWO cities. Figure 70 also reveals that Thunder Bay has produced a much larger number of patents than various cities in the NWO region. The seven NWO cities presented have a combined 29 Canadian patents, whereas Thunder Bay alone has 125.

Figure 70 - Number of Canadian and US Patents Originating from Northwestern Ontario Cities

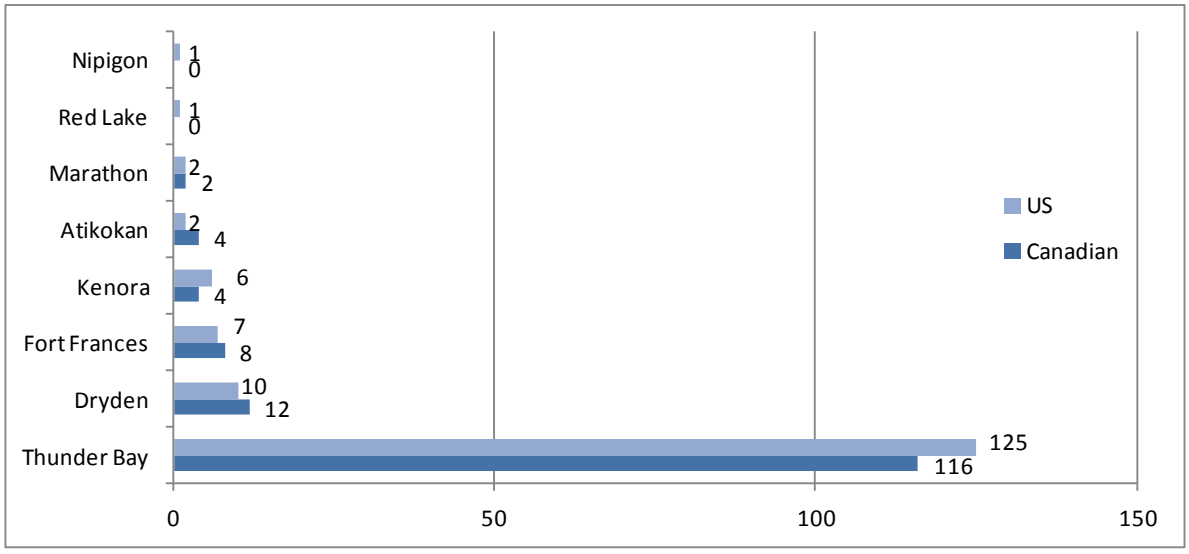


Figure 71 presents the cumulative number of Canadian patents originating from Thunder Bay for the time period of 1975 to 2012, along with a linear regression fitted trend line (in the form of $y = \alpha + \beta_x$).

Figure 71 – Cumulative Number of CDN Patents Originating from Thunder Bay from 1975 to 2011

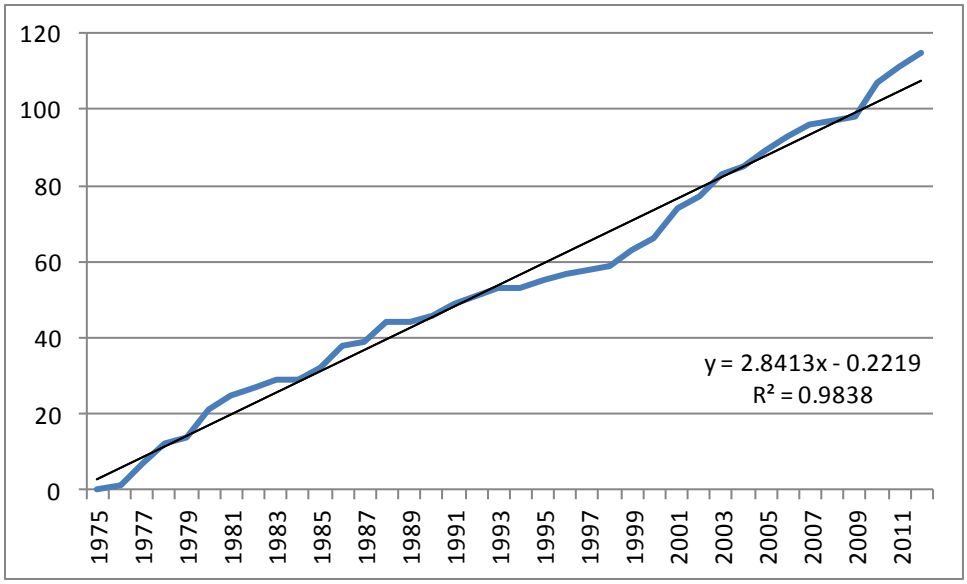
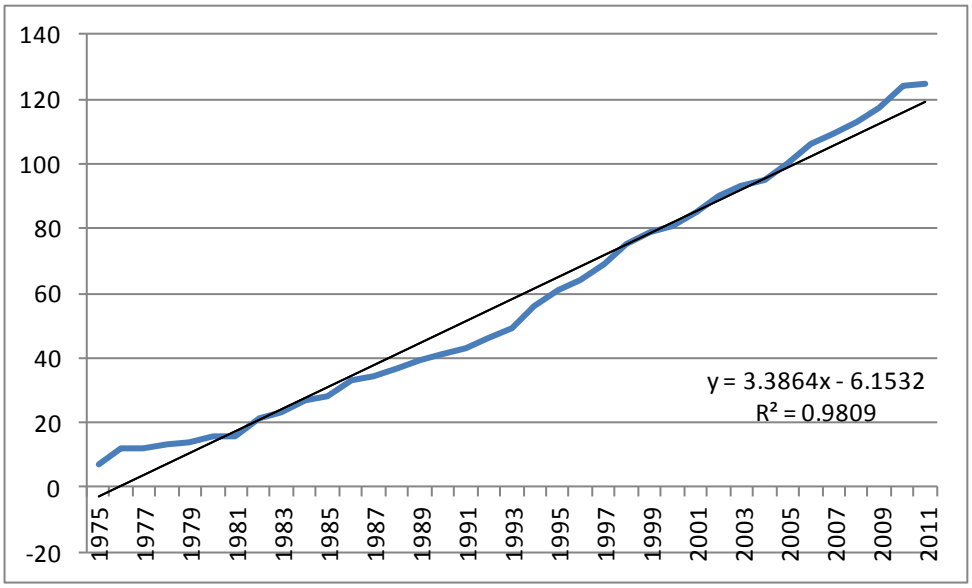


Figure 71 reveals that the linear trend line fits the historical trend extremely well with a resulting R^2 value of 98%. This suggests that Thunder Bay's patent generation has been fairly stable, and consistent on a year-over-year basis from 1975 to 2012. Figure 71 also reveals the actual patents filed during the period of 2009 to 2011 are above the fitted trend-line, suggesting that the past 3 years have been an above historical average in terms of patent generation.

Figure 72 presents the cumulative number of U.S. patents originating from Thunder Bay for the time period of 1975 to 2011, along with a linear regression fitted trend line (in the form of $y = \alpha + \beta x$).

Figure 72 – Cumulative Number of U.S. Patents Originating from Thunder Bay from 1975 to 2011



Source: http://www.uspto.gov/

Figure 72 reveals that the linear trend line fits the historical trend extremely well, with a resulting R^2 value of 98%. This suggests that Thunder Bay's patent generation has been fairly stable and consistent on a year-over-year basis from 1975 to 2011. Figure 72 also reveals that the actual patents filed during the period of 2005 to 2011 are above the fitted trend-line, suggesting that the past 6 years has been an above historical average in terms of patent generation. The period of 1985 to 1999 is below the fitted trend-line, suggesting that the 1985 to 1999 was below the historical average. This conclusion is supported by Table 27 which presents the number of Canadian patents originating from Thunder Bay for five year periods from 1975 to 2012.

Table 27 - Number of Canadian Patents Originating from Thunder Bay for Five Year Periods from 1975 to 2012

Year	Canadian Patents	US Patents
1975 – 79	14	14
1980 – 84	15	13
1985 – 89	15	12
1990 – 94	9	17
1995 – 99	10	23
2000 – 04	22	16
2005 – 09	13	22
2010 – 12	17	8[24]
Total	115	125

In terms of Canadian patents, Table 27 highlights the period of 2000 to 2004 is one of the most productive in the past 35 years with 22 patents developed. However, extrapolating the 2010-12 three year period out to five years would suggest a five year total of 28 patents generated. This would be the most productive five year period in the past 35 years. The ten year period of 1990 to 1999 was the least productive in terms of generation of new patents.

In terms of U.S. patents, Table 27 also highlights the period of 2005 to 2011 as one of the most productive in the past 35 years. Extrapolating the 2010-11 two year period out to five years would suggest a five year total of 20 patents generated. The ten year period of 1980 to 1984 was the least productive in terms of generation of new U.S. patents. In terms of the nature of the U.S. patents, Table 28 shows the last 10 patents filed from Thunder Bay. Table 28 reveals that the patents are from a variety of industries, including sports and recreation (e.g. golf putter) to health sciences (lipid A analogs) to industrial tools (hammer stapler grip).

[24] 2010 – 2011 for the US filings

Table 28 – 10 Most Recent U.S. Patents Filed from Thunder Bay

1	Vine crop supporting system
2	Camera dolly
3	Putting stroke teacher
4	Indole derivatives as histamine receptor inhibitors for the treatment of cognitive and sleep disorders, obesity and other CNS disorders
5	Matte box assembly
6	Lipid A and other carbohydrate ligand analogs
7	Mitochondrial mutations and rearrangements as a diagnostic tool for the detection of sun exposure, prostate cancer and other cancers
8	Pyrazoles for the treatment of obesity and other CNS disorders
9	Hammer stapler grip
10	Protecting device for spraying equipment and method of protecting it and its surroundings

Source: http://www.uspto.gov/

Overall, the results reveal that Thunder Bay is less productive than many other Ontario cities in terms of generating patents. The results are consistent for both Canadian and U.S. patent filings. Thunder Bay's productivity is similar to that of Sault Ste. Marie, but trailing Sudbury, and significantly behind many of the Greater Toronto Area's leading knowledge economies. The results also highlight that Thunder Bay is the hub of patent innovation in Northwestern Ontario. This result is not surprising as Thunder Bay has the region's College, University, Health Sciences Centre, and Medical School and is the hub for the region's engineering firms. A positive highlight is that Thunder Bay's patent generation has been increasing in recent years. Specifically, the period 2005 to 2011 is above historical averages in terms of patent generation for both Canadian and U.S. filings. The five year period of 2010 to 2014 is expected to be the most productive in the past 35 years.

6.3.6 Infrastructure Indicator: The Nature and Extent of KS Infrastructure in Thunder Bay

The infrastructure indicator is composed of the following elements:

- Educational Institutions
- Thunder Bay Regional Health Sciences Centre
- Information and Communication Technology
- Supporting Government Institutions

Each of these elements is discussed in further detail below.

6.3.6.1 Educational Institutions

Thunder Bay has 38 elementary schools, 3 middle schools, 7 secondary schools, 2 private schools, a college, a university, a medical school, a law school, and an adult education facility. As the only college and university in Thunder Bay, Confederation College and Lakehead University serve three very important purposes for the KS:

1) They attract and employ a large number of knowledge workers in the city, resulting in increased diversity and employment in the KS.
2) They provide post-secondary education to the population and region of Northwestern Ontario to aid in increasing the overall educational level of Thunder Bay's population.
3) They employ many faculty members who are actively involved in research, which leads to innovations and spin-off businesses.

The following is a brief discussion of Confederation College and Lakehead University as they relate to innovation and the KS in Thunder Bay.

Confederation College

Confederation College is part of the College Ontario Network for Industry Innovation (CONII), and, therefore, offers a range of programs that help take research from labs to the marketplace. Their collaborative commercialization supports the Industry-Academic Collaboration Program (IACP) on the commercialization of innovative ideas through three activities:

- Technical Problem Solving provides a focus on short-term projects and provides hands-on problem solving experience.
- Collaborative Research is designed for projects with special technical research challenges, demonstrated market pull and high potential for commercialization.
- Market Readiness aids in moving promising technologies from an academic lab setting to a new spin-off company or licensing opportunity.

More information can be found on the CONII website: http://www.conii.ca/

Lakehead University

Lakehead University has a long history of fostering economic growth through the innovation of its faculty and students. For example, it is home to one of the top ancient DNA laboratories in the world. The Paleo-DNA Laboratory was the first university-affiliated laboratory in Canada to become accredited by the Standards Council of Canada (SCC) for forensic DNA testing. Table 29 reveals that Lakehead University was ranked the 35th best research university by Research Infosource Inc. in 2012, up from a ranking of 36th in 2011 (Research Infosource Inc, 2012).

Table 29 – Research Ranking of Lakehead University versus Other Ontario City Universities

City	University	Ranking
Hamilton	McMaster University	6
London	Western University	10
Kitchener-Waterloo	Waterloo University	15
Ottawa	Ottawa University & Carleton University	15.5[25]
Sudbury	Laurentian University	31
Thunder Bay	Lakehead University	35
Sault Ste. Marie	Algoma University	N/A

Source: Research Infosource, 2012

An alternative ranking source for universities is the Association of University Technology Managers (AUTM) Canadian Licensing Activity Survey. The AUTM survey provides detailed information on various aspects of university activity. However, the AUTM survey requires voluntary disclosure by universities and many of the universities in our analysis do not participate. Therefore, it is not possible to use the AUTM survey in this study.

In terms of spin-off companies, Lakehead University assisted the following companies during their formation and initial stages of development:

- **Genesis Genomics Inc.:** Genesis Genomics, now operating as Mitomics Inc., is developing a diagnostic tool for early-stage detection and diagnosis of various diseases and conditions, beginning with different cancers.
- **Lake Superior Centre for Regenerative Medicine**: A not-for-profit company created to foster tissue donations.

The Economic Development and Innovation Office (EDI) at Lakehead University is responsible for supporting the liaison between industry and academia, facilitating industry

[25] Average ranking of Carleton and Ottawa Universities.

collaboration, and for the management and commercialization of the University's intellectual property (licensing and start-up companies). The EDI acts as a liaison among administration, faculty members, students, private industry, investors, and government.

The EDI also assists researchers with the four stages of the commercialization process:

- Invention Evaluation,
- Business Evaluation,
- Commercialization Plan Development and Implementation, and
- New Business Creation and Support in appropriate cases.

More information can be found on the EDI's website: http://edi.lakeheadu.ca/index.php

6.3.6.2 Thunder Bay Regional Health Sciences Centre

The Thunder Bay Regional Health Sciences Centre (TBRHSC) works to advance world-class patient and family centred care in an academic and research-based acute care environment. Table 30 reveals that the TBRHSC was ranked the 37th best research hospitals by Research Infosource Inc in 2011, up from a ranking of 40th in 2010 (Research Infosource Inc., 2011).

Table 30 - Research Ranking of TBRHSC versus Other Ontario City Hospitals

City	Hospital	Ranking
Hamilton	Hamilton Health Sciences	2
Ottawa	Ottawa Hospital	6
London	London Health Sciences Centre	9
Thunder Bay	Thunder Bay Regional Health Sciences Centre	37
Kitchener-Waterloo	Grand River Hospital	N/A
Sudbury	Health Sciences North	N/A
Sault Ste. Marie	Sault Area Hospital	N/A

Source: Research Infosource, 2011

As part of this initiative, the Thunder Bay Regional Health Sciences Centre supported the creation of the Thunder Bay Regional Research Institute (TBRRI), an independent research corporation that partners closely with the Health Sciences Centre. Other partners in science include Sunnybrook Health Sciences Centre, Cancer Care Ontario, Lakehead University, Northern Ontario School of Medicine, Confederation College, and industry partner Philips Healthcare. Through this partnership, the TBRHSC advances its academic and research mandate and strengthens its collective roles as leader in healthcare innovation and delivery. Since the inception of TBRRI in 2008, its scientists have secured over $12 million in grant funding for medical research. The number of career scientists has doubled from 6 in 2008 to 12 in 2010, and they are fortunate to operate from a facility of 44,000 square feet for pre-clinical research and 13,000 square feet at TBRHSC for translational research (TBRRI, 2012).

6.3.6.3 Information and Communication Technology

Information and communication technology (ICT) can help encourage greater innovation activity in Northwestern Ontario by helping to spread new ideas and knowledge more quickly and widely through a variety of forums (NOIC, 2010a). Innovation stimulated through the development of new applications, services and content from business applications to online services to entertainment applications. Additionally, adequate ICT enhances the population connectivity which can help an economy transform business models and organization structures by allowing for greater collaboration between firms, customers, suppliers and academia (NOIC, 2010a).

In terms of ICT infrastructure, Thunder Bay is serviced predominantly by Tbaytel. Various industry stakeholders, and SMEs interviewed, suggested that Tbaytel's technical

capabilities, infrastructure and commitment to the North are robust (Tbaytel, 2011). More information Tbaytel can be found on its website: http://www.tbaytel.net/

In order to enhance Thunder Bay's ICT, the Northwestern Ontario Innovation Centre (NOIC) conducted a 2010 feasibility study of locating a low carbon data centre in Thunder Bay. A data centre is a facility used to house computer systems and related components (e.g. power, network connections and environmental controls). The report recommended that the development of a Tier III 5,000 square foot structure would be the best fit for the existing market demand in Thunder Bay. The proposed data centre would cost approximately $5.7 million to construct and could lead to economic benefits to regional businesses in the form of reduced operating costs, reduced space needed for data storage and encouraging job retention (NOIC, 2010b).

6.3.6.4 Supporting Government Institutions

A knowledge economy is fostered by various government institutions that provide business advice and funding opportunities. The supporting government opportunities are extremely important in helping to move entrepreneurs from innovation to invoice and provide funding to these high risk SMEs where the private sector is absent. The government institutions that directly support the Thunder Bay KS are identified as follows:

- Northwestern Ontario Innovation Centre (NOIC)
- FedNor – Innovation Funding
- Northern Ontario Heritage Fund Corporation - Emerging Technology Program
- National Research Council of Canada - Industrial Research Assistance Program

Each of these programs is briefly discussed below.

Northwestern Ontario Innovation Centre (NOIC)

For 14 years, the Northwestern Ontario Innovation Centre has been a source of motivation and support to many first-time entrepreneurs with big ideas. The Centre offers support to innovative entrepreneurs, businesses, and community projects in the region of Northwestern Ontario. In addition, the Centre seeks out new approaches to improve, enhance and invigorate a commercialization system in our region. By encouraging ongoing cooperation between business, education and government, the Centre is a driving force to improve economic vitality. Located in Thunder Bay at the Centre for Change, the Centre works at creating linkages, engaging entrepreneurs, supporting management, training people, accessing markets, developing and implementing business plans, sourcing financing and building success.

A recently-released survey that tracks about 100 of its past and current clients reveal some amazing results from its alumni (Ross, 2012). Specifically, the small companies spawned by the centre

- Brought 67 new products and services to market within the last year,
- Created 48 full-time jobs and 22 internships,
- Had an annual combined payroll of $7.3 million,
- Responded optimistically (60%) that they expect to hire in the next year,
- Have leveraged $13.7 million in public financing and private investment,
- Developed 69 prototypes, and
- A total of 9 patents were granted out of 34 applications.

More information on the NOIC can be found on their website: http://www.nwoinnovation.ca/

FedNor

FedNor is committed to supporting Northern Ontario's economy by encouraging communities and businesses to become more innovative, productive and competitive through the adoption, adaptation and commercialization of new technologies, fostering technology linkages between business and institutions, advancing technological research and development, and promoting community innovation initiatives.

FedNor provides funding opportunities for activities that enable organizations and SMEs to increase the level of innovation, productivity, quality and competitiveness in key sectors, such as biotechnology, the mining and forest industries, agri-food, information and communications technology, renewable energy and manufacturing. Ideally, the innovation will lead to commercialization. Accordingly, basic research is not eligible for funding.

Examples of eligible activities include

- technology development and acceleration,
- commercialization of intellectual property,
- creating, acquiring or enhancing assets and capacity to support technological innovation, industrial R&D, and creation, adoption or adaptation of technology

More information can be found on FedNor's innovation website:
http://fednor.gc.ca/eic/site/fednor-fednor.nsf/eng/fn03444.html

Northern Ontario Heritage Fund Corporation (NOHFC)

The NOHFC has an Emerging Technology Program which aims to support the research, innovation and development of new technologies that will contribute to future northern

prosperity. For public sector entities, the NOHFC may provide a conditional grant, repayable loan or forgivable performance loan of generally up to 50 per cent of eligible costs, normally not to exceed $1 million per project. Similar funding is available for private sector entities. The NOHFC may consider higher levels of assistance on a case-by-case basis.

Eligible initiatives include but are not limited to

- Information and communications technology infrastructure, including high speed internet expansion and cellular expansion projects
- Centres of Excellence
- Film development and production
- Value-added products
- Capital project costs and intellectual property development
- Biotechnology and life sciences projects

More information can be found on the NOHFC website: http://nohfc.ca/en/programs/emerging-technology

National Research Council of Canada - Industrial Research Assistance Program (NRC-IRAP)

The NRC-IRAP provides technology assistance to small and medium-sized enterprises at all stages of the innovation process to build their innovation capacity. NRC-IRAP helps SMEs understand the technology issues and opportunities and provides linkages to the best expertise in Canada. The Industrial Technology Advisors (ITA) carry out the NRC-IRAP. The ITA is the key to NRC-IRAP's ability to encourage and support innovation in Canada's SMEs. Thunder Bay has an ITA which is the point of contact for local entrepreneurs.

More information can be found on the NRC website: http://www.nrc-cnrc.gc.ca/eng/irap/index.html

6.3.7 A Summary of Thunder Bay's Knowledge Sector: A Top-Down Analysis

Table ***31*** presents a ranking of Thunder Bay's KS versus six other Ontario cities (London, Kitchener-Waterloo, Hamilton, Ottawa, Sudbury, and Sault Ste. Marie) across the six indicators discussed in the Top-Down analysis.

Table 31 – Ranking of Thunder Bay's Knowledge Sector Against Six Other Ontario Cities

Indicator and Measures	Thunder Bay	Kitchener-Waterloo	Sudbury	Sault Ste. Marie	Hamilton	Ottawa	London
1. Number of Businesses Indicator							
% of firms in KS (NAICS Code 54)	6	3	5	7	2	1	4
% of firms in High Tech Sector	6	2	5	7	3	1	4
Average ranking	***6.0***	***2.5***	***5.0***	***7.0***	***2.5***	***1.0***	***4.0***
2. Employment Indicator							
% of total employment working in Core KS	3.5	2	6	N/A	5	1	3.5
% of total employment working in Broad KS	2	3	6	N/A	5	1	4
Average ranking	***2.8***	***2.5***	***6.0***	***N/A***	***5.0***	***1.0***	***3.8***
3. Talent Indicator							
Bachelor degrees, as percentage of population	6	2	7	5	3	1	4
Doctorates, as a percentage of degree holders	5	3	6	7	4	1	2
Average ranking	***5.5***	***2.5***	***6.5***	***6.0***	***3.5***	***1.0***	***3.0***
4. Diversity Indicator							
Aboriginal identity	1	7	3	2	4	5	6
Immigrant identity	6	1	7	5	2	3	4
Visible Minority identity	5	2	6	7	4	1	3
Average ranking	***4.0***	***3.3***	***5.3***	***4.7***	***3.3***	***3.0***	***4.3***
5. Knowledge Generation Indicator							
Canadian patent generation per population	6	1	4	5	7	2	3
US patent generation per population	6	2	4	7	5	1	3
Average ranking	***6.0***	***1.5***	***4.0***	***6.0***	***6.0***	***1.5***	***3.0***
6. Infrastructure Indicator							
Research intensity ranking of University	6	3	5	7	1	4	2

	Research intensity ranking of Hospital	4	6	6	6	1	2	3
	Average ranking	***5.0***	***4.5***	***5.5***	***6.5***	***1.0***	***3.0***	***2.5***
Average ranking across all six indicators		***4.9***	***2.9***	***5.4***	***6.0***	***3.5***	***1.8***	***3.4***

Table 32 presents the average ranking in ascending order.

Table 32 – Average Ranking of KS for Thunder Bay and Six Other Ontario Cities

City	Average Ranking
Ottawa	1.8
Kitchener-Waterloo	2.9
London	3.4
Hamilton	3.5
Thunder Bay	4.9
Sudbury	5.4
Sault Ste. Marie	6.0

Table 32 reveals that Ottawa has the highest ranking in terms the maturity of its KS, followed by the Kitchener-Waterloo area. London and Hamilton rank very closely and are third and fourth respectively. Thunder Bay ranks fifth of the seven cities but is the highest of three Northern Ontario cities. Sudbury and Sault Ste. Marie are ranked sixth and seventh, respectively.

In regards to Thunder Bay's performance on the individual rankings, Table ***31*** reveals that Employment Indicator and Diversity Indicator were the highest rankings. It is important to note that the Diversity Indicator is driven by the Aboriginal population and not the immigrant and visible minority populations. Thunder Bay's two lagging indicators are the Knowledge Generation Indicator and Number of Businesses Indicator.

6.4. Thunder Bay's Innovators of Knowledge Sector: A Bottom-up Approach

The top-down, statistical approach presented above reveals that the well-established industries in the Thunder Bay's KS tend to firms that "*practice knowledge*" as opposed to "*innovate knowledge.*"

The industries that "*practice knowledge*" (e.g. lawyers, accountants, and engineers) are well established and at the mature stage of their industry life cycle. It is clear that these industries provide significant economic benefits to Thunder Bay in terms of employment, donations to the community, tax payments to governments, etc.

It appears that the industries that "*innovate knowledge*" are in either the introduction or growth stage of the industry life cycle. These industries can be the engine of significant growth for the future of Thunder Bay's KS. Therefore, this analysis attempts to capture the recent start-ups that operate in the knowledge sector. This sample includes companies, such as Mitomics and Regen Med and does not include the Thunder Bay operations of larger companies that are innovators of knowledge, such as Bombardier and Resolute Forest Products.

The 'innovators of knowledge' in Thunder Bay has been compiled through discussions with representatives from the Northwestern Ontario Innovation Centre, National Research Council of Canada, Industrial Research Assistance Program in Northwestern Ontario, and Lakehead University's Economic Development and Innovation Office. Although three sources were used to compile the results, it is important to note that there may be some firms that were not captured in this analysis. However, given the nature of the three sources, it is expected that the resulting sample is reflective of the entire industry in Thunder Bay.

The "*innovators of knowledge*" are likely captured by the following NAICS:

- NAICS 541710 - Research and Development in the Physical, Engineering and Life Sciences
- NAICS 541720 - Research and Development in the Social Sciences
- NAICS 541380 - Testing laboratories

However, discussions with various industry stakeholders who are working with these start-up companies suggest that the NAICS codes are not flexible enough to capture the smaller, start-up knowledge-based companies. Therefore, the top-down approach to statistical analysis does not provide a robust, relevant and accurate data analysis of Thunder Bay's smaller innovators of knowledge. Accordingly, the Canada Foundation for Innovation (CFI) disciplines/field codes are used to classify Thunder Bay's innovators of knowledge as opposed to the NAICS.

The CFI codes were developed specifically for research to allow the CFI to classify the research infrastructure it supports in categories that are consistent with the mandates of federal granting councils. The CFI codes are better suited than the NAICS to capture the nature of firms operating in the knowledge sector. This study groups the innovators of knowledge according to groupings consistent with the CFI codes.

6.4.1 A Demographic Snapshot of Thunder Bay's Innovators of Knowledge

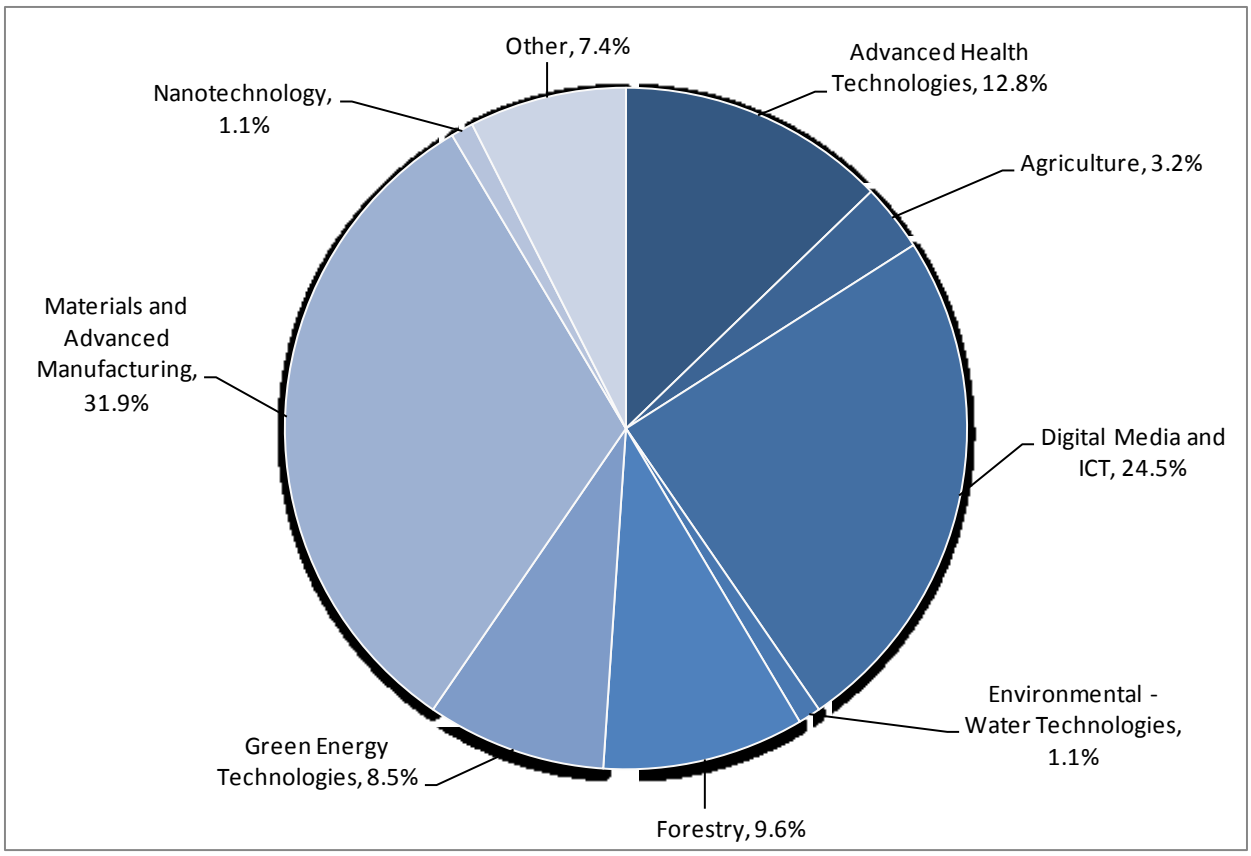
Based on the methodology and definitions noted in the previous section, Table 33 presents the number of innovators of knowledge companies classified across nine broad CFI codes, while Figure 73 presents the percentage of firms in each category.

Table 33 – Number of Innovators of Knowledge Firms in Thunder Bay

Firms	#
Advanced Health Technologies	12
Agriculture	3
Digital Media and ICT	23
Environmental - Water Technologies	1
Forestry	9
Green Energy Technologies	8
Materials and Advanced Manufacturing	30
Nanotechnology	1
Other	7
Total number of firms	94

Table 33 and Figure 73 reveal that most of the innovators of knowledge operate in three broad CFI categories: Materials and Advanced Manufacturing (30 companies), Digital Media and ICT (23 companies), and Advanced Health Technologies (12 companies). These three CFI categories represent approximately 70% of the innovators of knowledge with 65 of the 94 companies operating in these industries. Forestry and Green Technologies combine to represent approximately 18% of the "innovators of knowledge" industry. This is not surprising as many of the displaced forestry labour force may be the driving force behind these new start-ups.

Figure 73 – Percentage of Innovators of Knowledge Firms in Each Category



Further insights into Thunder Bay's innovators of knowledge can be obtained by analyzing the size of the firms in the industry. The innovators of knowledge have been categorized into the following size groupings:

- Early Stage Ventures - Pre-revenue Stage
- Late Stage Ventures - Post-first revenue Stage
- Small Enterprise – Multiple revenue sources and/or <50 employees
- Medium Enterprises – $10M in rev and/or 51 to 100 employees

Figure 74 presents the relative enterprise sizes of the innovator of knowledge firms.

Figure 74- Relative Enterprise Sizes of Innovators of Knowledge

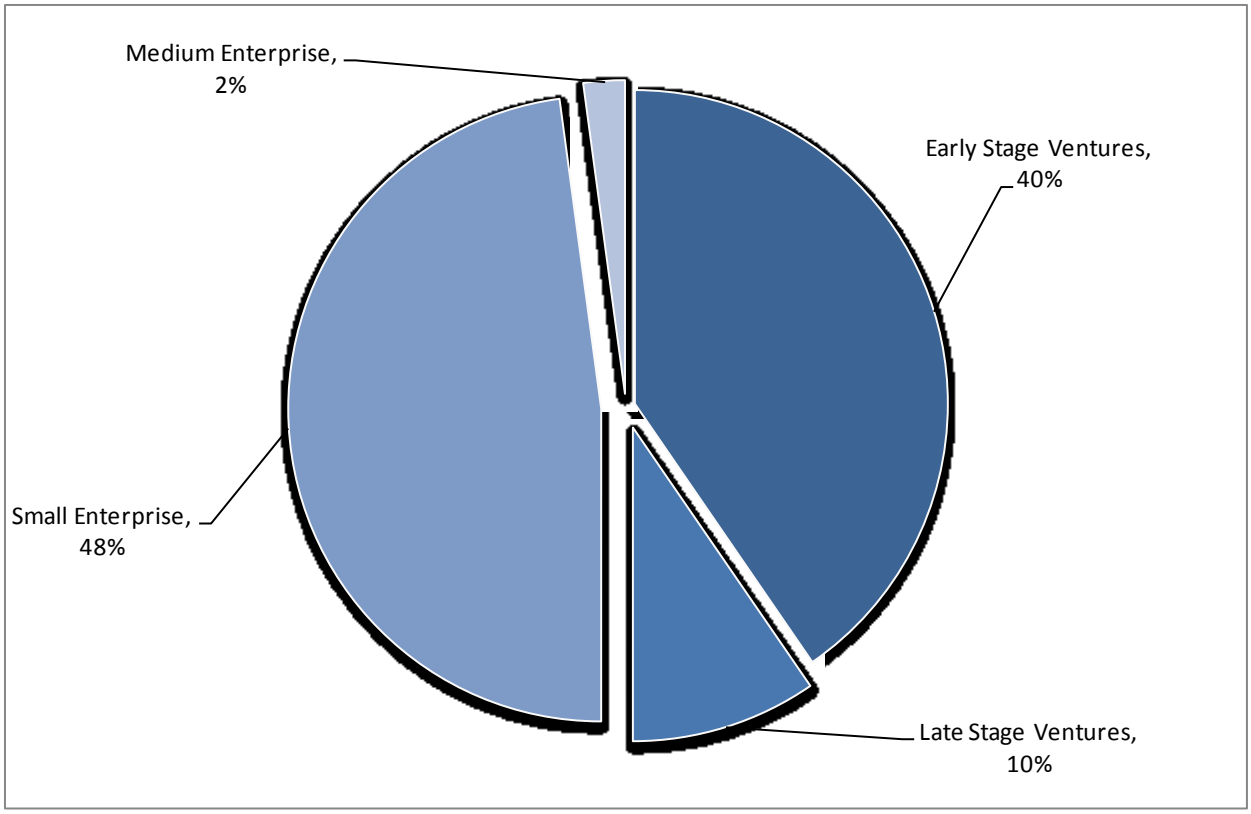


Figure 74 reveals that the vast majority of the innovators of knowledge firms are smaller enterprises with 50% as early or late stage enterprises. A total of 48% of the firms are small enterprises which have between 1 and 49 employees, and/or multiple revenue sources. Only 2% of the industry is comprised of medium sized enterprises that have 51 to 100 employees and/or $10 million in revenues. The large percentage of small enterprises and early stage ventures is consistent with some previous studies/reports. For example, past studies suggested that Thunder Bay's Innovators of Knowledge tend to be smaller firms with 1 to 5 employees (Canada Business Patterns, 2012; NOIC, 2010a).

It is important to note that the smaller enterprises tend to be susceptible to more risks than larger enterprises, such as a lack of diversified revenues and lack of talent diversification and expertise within the organization. These additional risks posed by smaller enterprises make

attracting top management talent very difficult as individuals are hesitant to take a long-term position with firms that have larger risks. An additional challenge faced by smaller enterprises is in regards to the availability and cost of financing. The smaller enterprises, with their additional risks, find attracting equity/venture capital difficult, and when capital can be secured, it normally comes at a high cost.

Another insightful metric is the corporate age of Thunder Bay's innovators of knowledge. Figure 75 presents the relative age of innovators of knowledge firms in Thunder Bay as at October, 2012.

Figure 75 – Relative Age of Innovators of Knowledge Firms

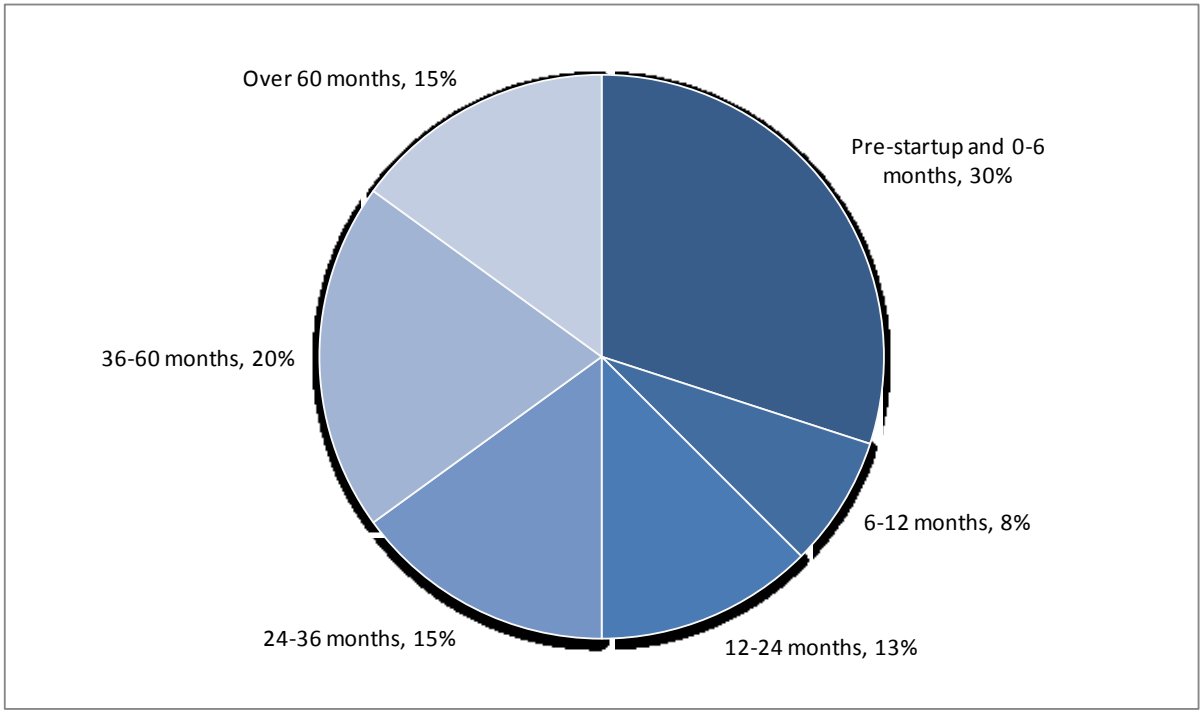


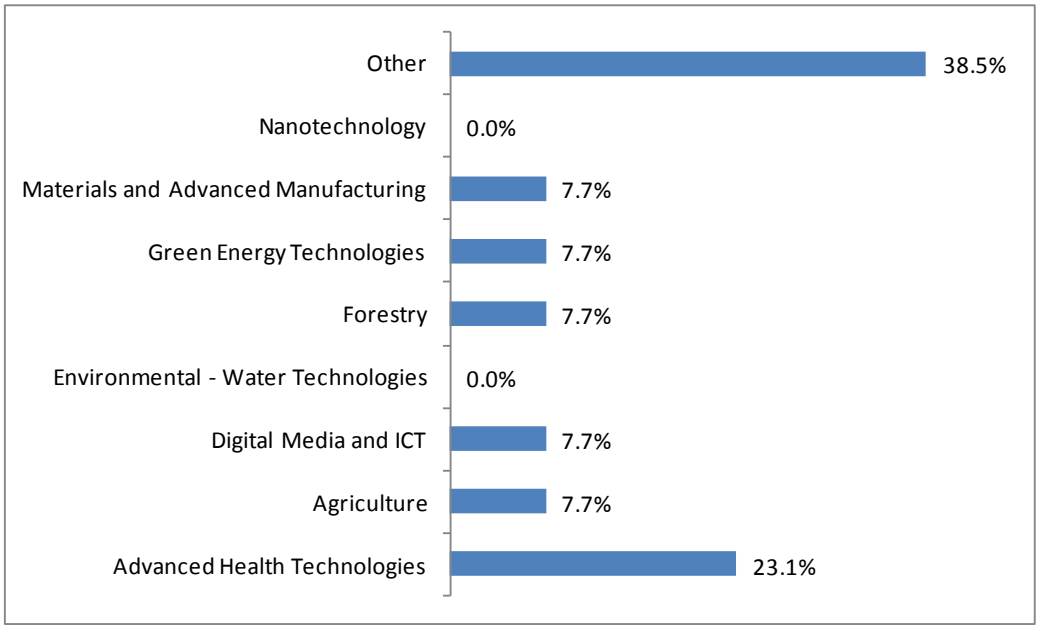
Figure 75 reveals that most firms (30%) are in the pre-startup phase (0 to 6 months); however, there is a fairly reasonable distribution across the remaining categories with a combined 35% of firms being in existence for three years (36 months) or more.

6.4.2. Strengths, Weaknesses, Opportunities and Threats

A SWOT Analysis (Strength, Weaknesses, Opportunities, Threats Analysis) of Thunder Bay's innovators of knowledge was prepared based on an email survey administered to the innovators of knowledge. The survey administered can be found in Appendix IV.

A total of 15 responses were received from the emails sent to a sample of 94 of the companies outlined in Table 33. Although the absolute number of responses is low, it represents 16% of the companies. When considering the fact that some email addresses were not available, this represents a 23% response rate. In addition, the responses are reasonably distributed across the industries (Figure 76). Based on this rationale, the survey is believed to provide representative insights into the SWOT faced by these companies.

Figure 76 – Survey Response Percentages Across Innovators of Knowledge Industry



The average number of employees of the respondents was 13 employees and the average year of commencing operations was 1996. The vast majority of the respondents are small enterprises that have been in operation for 15 – 20 years.

Figure 77 presents the responses from the Likert scale questions on the SWOT of the industry companies.

Figure 77 – Innovators of Knowledge - SWOT Likert Scale Question Responses

	Threat/ Weakness		Neutral		Opportunity/ Strength	Rating Average
Availability of Skilled Labour	**66.7%**	22.2%	0.0%	0.0%	11.1%	1.67
Availability of Financing	22.2%	33.3%	**44.4%**	0.0%	0.0%	2.22
Availability of Governmental Support	22.2%	**33.3%**	22.2%	11.1%	11.1%	2.56
Availability of ICT Infrastructure	12.5%	12.5%	**62.5%**	0.0%	12.5%	2.88
Availability of Business Expertise	11.1%	**44.4%**	11.1%	33.3%	0.0%	2.67
Con. College & Lakehead University	22.2%	0.0%	**33.3%**	22.2%	22.2%	3.22

The responses from the open-ended questions of the SWOT analysis have been analyzed in order to highlight key themes and recurring comments. The results of the textual analysis are presented in Table 34.

Table 34 – Innovators of Knowledge - SWOT Open-Ended Question Responses

Strengths	**Weaknesses**
• Staying as modern and progressive as possible; • Superior product and/or service offering; • Proximity to key institutions (e.g., TBRRI, Lakehead University, etc.), and • Young, talented, and adaptable workforce.	• Attracting and retaining quality workforce (e.g., more technical people and sales staff to support growth, access to qualified researchers, and executive level talent) and • Access to capital and/or limited financial resources for product development and sustained R&D.
Opportunities	**Threats**
• Local and regional interest in developing a cluster of high tech companies and • Access to faculty, students, research facilities etc. at Confederation College and Lakehead University.	• Education system not helping to foster entrepreneurial and research growth and not shaking people out of their comfort zones; • Public perception that industries like forestry are "dead" which can hinder the recruitment of the best and brightest young minds; • Cost of power is an issue, and • Location is an issue.

The responses from the Likert-scale questions and open-ended questions provide similar results which can be summarized as follows:

- Access to research facilities, such as Lakehead University, Confederation College, and the Thunder Bay Research Institute, was the main strength/opportunity.
- The lack of skilled labour (both as management executives and scientific researchers) combined with some limitations in the access to capital/financial resources are main threats/weaknesses.

Section VII – Mining Services and Supply Sector

7.1. Economic Base Modelling for Mining Service Industry

The GDP of a regional economy can be disaggregated into the customary national income accounting categories:

$$GDP = C + I + G + E - M$$

Where:

C is consumption,
I is gross investment,
G is government expenditure,
E is region's total exports, and
M is region's total imports.

According to the above equation, the source of regional economic growth can be found in any one or a combination of the above components of GDP.

In a national or provincial economy with a high degree of regional specialization, however, the income level or growth of a particular region is dependent on its ability to export goods and services to other regions.

While, in general, each of the five components of GDP theoretically can be a source of regional economic stimuli, the economic base model explicitly recognizes export expansion alone (Craig, 1990). For a regional economy, the economic base model implies that the contribution of exports, relative to the other components of GDP, is much higher and has the highest possible economic impact. In short, export expansion is considered to be the one of the most important primary engines of regional economic growth (Craig, 1990).

As a consequence, the economic base analysis stresses the distinction between "export activities," which are considered to be exogenously determined, and "non-export" activities, which are the endogenous component of total economic activity. In other words, the export (or the "base") sector consists of all economic activity whose ultimate market lies outside the region, while the non-export (or the "service") sector is comprised of that portion of total economic activity whose ultimate market is local. Total employment in a region may be broken down according to the export/non-export dichotomy (Craig, 1990). For example, if Firm A sells its entire output locally to Firm B and the latter exports all it produces, Firm A is part of the base sector because its ultimate market is outside the region.

Total economic activity, Y, in the region can be represented by export activity, E, and all other productive activity, D, along with the local service activity related to exports, S_E, and service activity for all other productive activity, S_D. Total economic activity can be expressed as follows:

$$Y = E + S_E + D + S_D \tag{1}$$

Next, if we define the proportions k_1 and k_2 as:

$$k_1 = S_E / E \tag{2}$$

$$k_2 = S_D / D \tag{3}$$

$$k_1 + k_2 = 1 \tag{4}$$

and substitute equations (2) and (3) it into equation (1) we can obtain

$$Y = (1+k_1)E + (1+k_2)D \tag{5}$$

Equation (5) suggests that the total economic activity in a region is a function of export activities (e.g., mining, forestry, etc.) and other non-export activities (e.g., tourism, agricultural production for local consumption, etc.). However, the service sector becomes a multiplier of these export and non-export sectors. For example, if mining export activity increases (decreases), total economic output will increase (decrease) by the amount of the change in export activity times the export multiplier, $(1+k_1)$.

The multiplier embodies the process by which export expansion takes place within the region. For example, suppose a local producer receives an increase in orders from outside his/her region. Suppose also that the firm purchases its inputs from three other local firms. The increase in exports will expand the wage bills and profits of all four local firms.

A portion of the increase in the wages and profits will likely be spent on locally supplied goods and services. The incomes of the suppliers of these local commodities will rise correspondingly and the recipients of these increased incomes will, in turn, spend portions of their incomes locally, and so on (Craig, 1990).

The process eventually comes to an end because of leakages (e.g., taxes, savings, non-local expenditures) that occur with each transaction. The region thus derives its major stimuli externally and is seen to grow or decline according to the nature and size of the basic activity.

The non-basic or local activity is, in turn, dependent upon the basic activity. Non-basic functions are thus "localized," but their nature and size depend upon the following:

1. The level of activity in the basic sector,

2. The size of the region,

3. The availability of services in the region.

Based on the above, the economic impact of the mining activity is very dependent on the availability of services required for harvesting the minerals, transporting, and refining them. In this section we would like to show Thunder Bay's capacity to provide services to the mining industry to indicate the importance of the mining services industry to the total economic activity of the city and to provide a few suggestions as to how Thunder Bay can improve its economic share in the region.

7.2. The Mining Service and Supply Sector in Northern Ontario

Although there are numerous specialized capabilities, the service and supply sector in Northern Ontario is created around the following five value propositions:

- Mining Engineering and Mine Management,
- Mining Equipment Manufacturing,
- Customization of wheeled, tracked and flanged vehicles,
- Equipment Repair and Rebuild,
- Support: Consulting, Research, Training and Financing.

The total value of the mining supply and services sector in Northern Ontario is $5.65 billion in terms of annual output and is created by approximately 500 companies that employ approximately 23,000 individuals (ONEDC, 2010). Table 35 presents the geographic breakdown of the mining services providers across the four principal regions in Northern Ontario (ONEDC, 2010)[26].

[26] Note that these are the only four regions presented in the study. There was no mention of other cities, such as Sault Ste. Marie.

Table 35 – Mining Services and Supply Sector in Northern Ontario

	Output ($ billion)	Employment (number of jobs)
Sudbury	3.94	13,800
North Bay	0.77	2,990
Timmins	0.59	4,600
Thunder Bay	0.35	1,610
Total	5.65	23,000

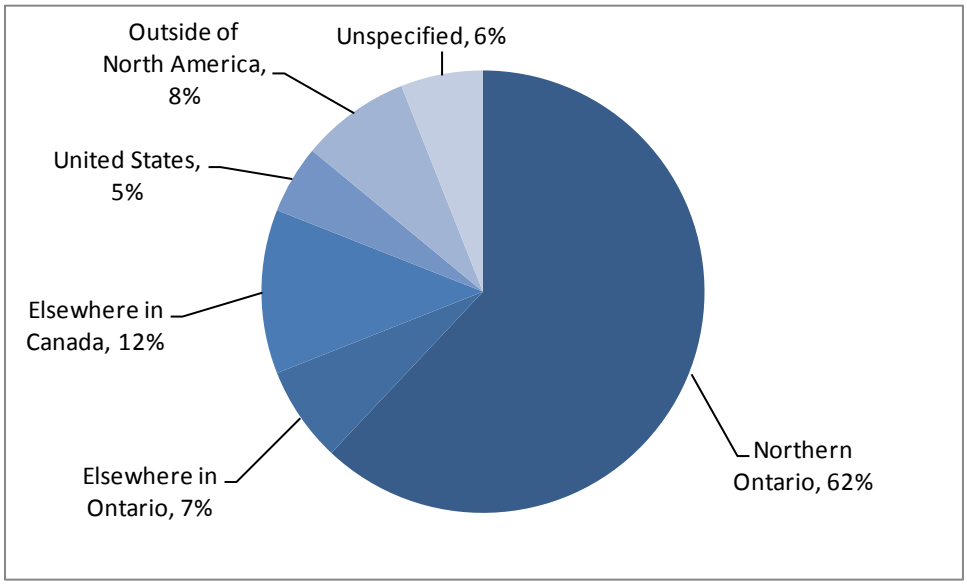
Source: ONEDC, 2010

The sector's average net output is approximately $124,000 per employee which is approximately 1.4 times greater than the Canadian average output per employee of $89,000 (ONEDC, 2010).

Table 35 reveals that firms in the Sudbury region produce the largest output and employ the most individuals. Sudbury's output and employment is greater than the three other regions (North Bay, Timmins, and Thunder Bay) combined.

The service and supply sector is primarily a domestic sector, with 81% of all sales being made to Canadian companies (ONEDC, 2010).

Figure 78 – Location of Sales Northern Ontario Mining Service and Supply Sector

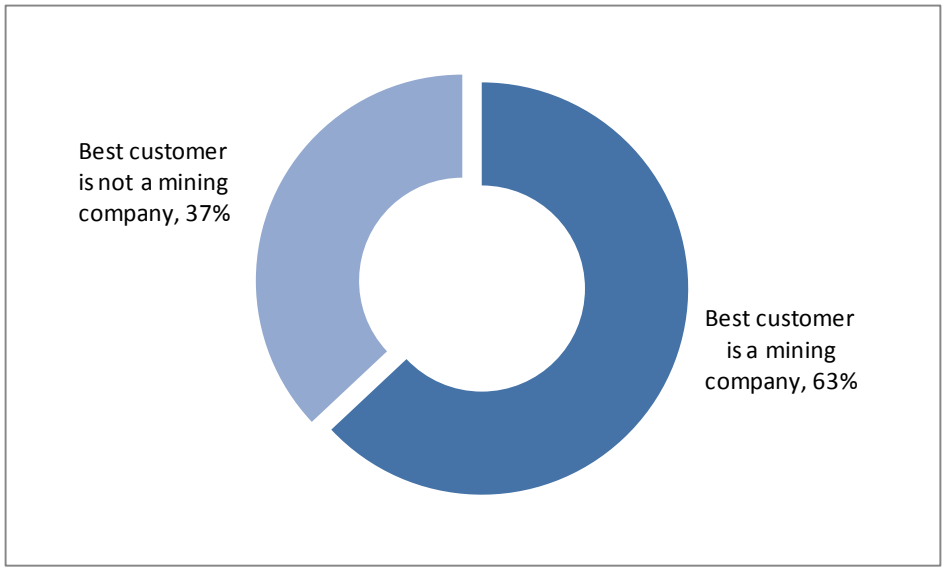


Source: ONEDC, 2010

Figure 78 presents the proportion of sales made to various domestic and international markets and reveals that 62% of all sales are made to companies that operate in northern Ontario (ONEDC, 2010).

Most of the companies in the mining service and supply industry make sales directly to mines. Figure 79 reveals that 63% of companies in the mining service and supply sector report that a mine is their best customer.

Figure 79 – Percentage of Service and Supply Companies with a Mine as Their Best Customer.

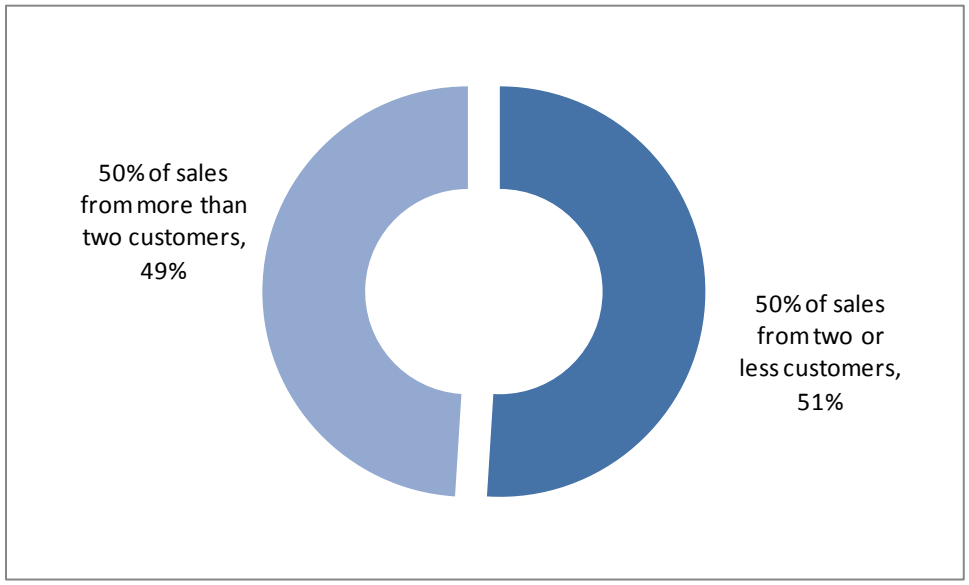


Source: ONEDC, 2010

Although the results are not presented in a figure, 53% of companies in the mining service and supply sector reported that a mine is their second best customer (ONEDC, 2010). Clearly, the service and supply company's operations are very directly linked to the mining companies.

In addition to being directly related to the mines, many firms in the mining services and supply sector have a high degree of economic dependence on a few of their key customers.

Figure 80 – Proportion of Firms that have an Economic Dependence on Two or Fewer Customers



Source: ONEDC, 2010

Figure 80 reveals that 51% of mining services and supply firms earn their revenues from two or fewer customers (ONEDC, 2010). This suggests that approximately half of the sector does not have a diversified revenue stream.

7.3. The Mining Services and Supply Sector in Thunder Bay

Thunder Bay has 494 firms that operate in a diversity of sub-sectors within the mining services and supply sector. Table 36 presents the number of firms that operate in each of these sub-sectors as identified in the City Economic Development Corporation's (CEDC) document: Thunder Bay's Mining Sector Goods & Services Directory.

Table 36 – Number of Firms in Thunder Bay's Mining Service and Supply Sector

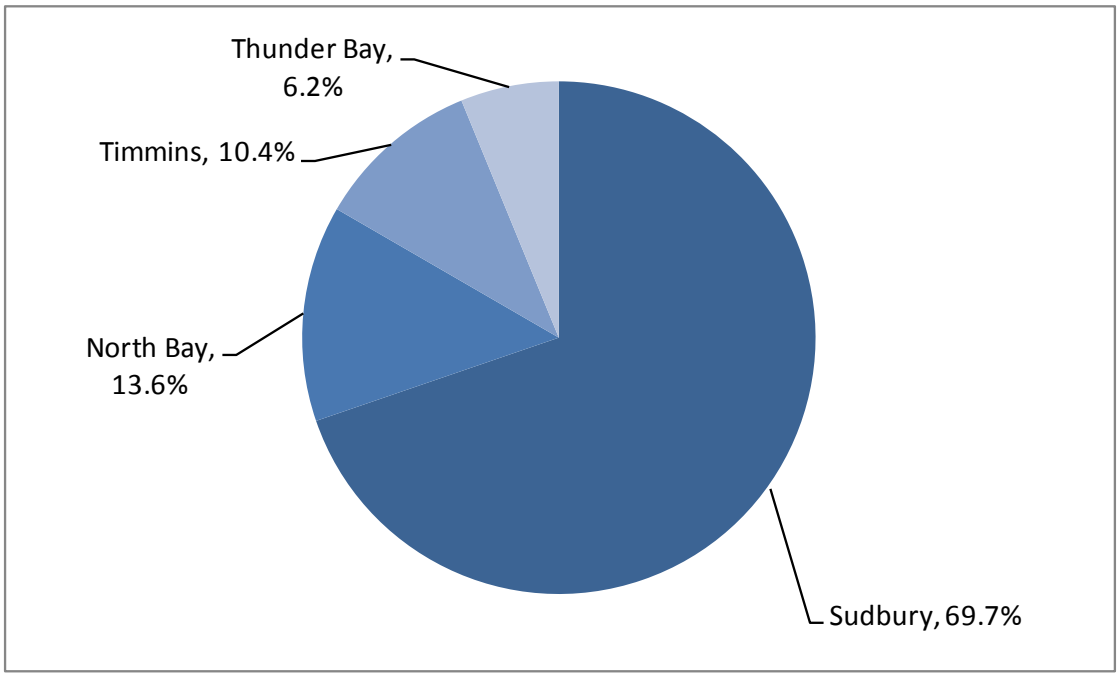
Firms	#
Assay Firms	5
Camp Management / Camp Supply	9
Consulting	20
Courier Services	4
Drillers / Driller Suppliers	17
Electrical Contractors and Suppliers	49
Engineering	12
Equipment Rentals	40
Exploration / Mining Companies	22
Financial Institutions	23[27]
Grocery Retailers	35
Industrial Supply	10
Machine Shop Fabrication	18
Medical	1
Meetings and Conventions	25
Mining Services	23
Mining Suppliers	10
Office Equipment and Suppliers	10
Plumbing	27
Storage	32
Towing	16
Trailers, ATVs, Snow machines	29
Transportation - Air	6
Transportation - Ground	51
Total Companies	**494**

As presented in Table 35, Thunder Bay's total output is $350 million annually in 2010 while employing 1,610 individuals. Thunder Bay's output and employment are the lowest of the four regions in Northern Ontario as Thunder Bay's mining services and supply sector is smaller than those of Sudbury, Timmins, and North Bay.

[27] Note that financial institutions include banks, credit unions, insurance providers, etc.

Figure 81 presents the market share of output from the mining services and supply sector in Northern Ontario across the four primary regions.

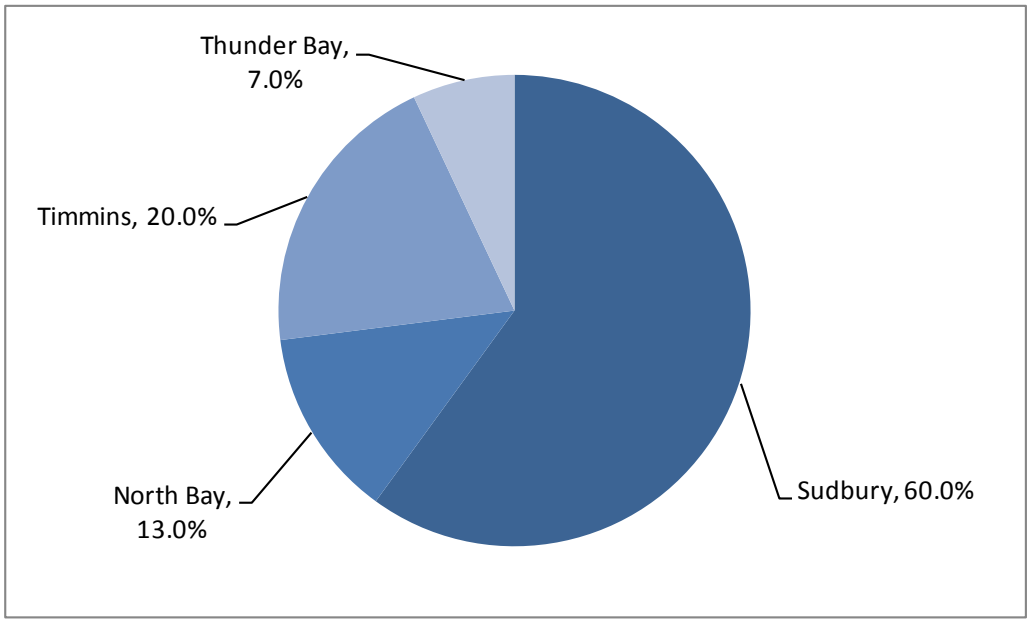
Figure 81 – Market Share of Output from Mining Services and Supply Sector in Northern Ontario



Source: ONEDC, 2010

Figure 81 shows that Thunder Bay has only 6.2% of the output market share of the Northern Ontario mining services and supply sector while Sudbury has approximately 70% of the entire output market. Figure 82 presents the market share of employment from the mining services and supply sector in Northern Ontario across the four primary regions.

Figure 82– Market Share of Employment from Mining Service and Supply Sector in Northern Ontario



Source: ONEDC, 2010

Figure 82 shows that Thunder Bay has only 7% of the employment market share of the Northern Ontario mining services and supply sector, which is consistent with the market share of total output. Conversely, Sudbury has approximately 60% of the employment market which is 10% below Sudbury's market share for total output. This suggests that the individuals employed by the companies in Sudbury's mining services and supply sector are more productive than those employed by Thunder Bay companies.

Figure 83 presents the average output per employee across the four principal regions from the mining services and supply sector (note, calculation based on data presented from ONEDC, 2010).

Figure 83 – Northern Ontario Mining Services and Supply Sector Average Output per Employee

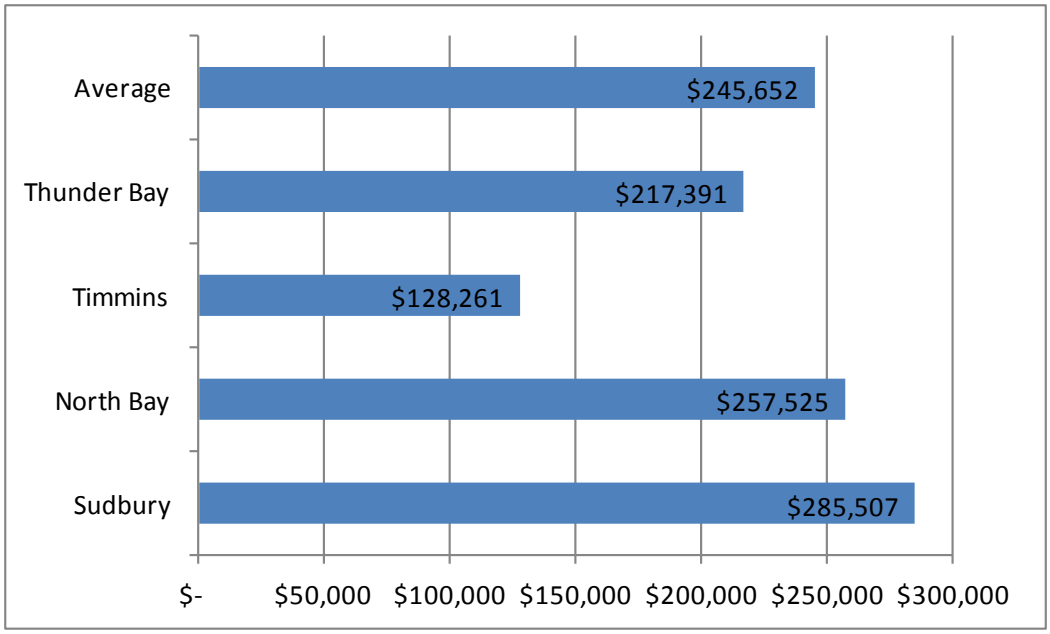


Figure 83 reveals that the average output per employee is $245,652. Sudbury and North Bay are both above average, suggesting that these two regions are the most productive in terms of output per unit of labour while Thunder Bay and Timmins are below average. Although Thunder Bay is below the average, the productivity is not significantly below average (e.g. Timmins average of $128,261 is almost half of the sector average).

The Aboriginal Community is also an important component of the region's mining supply and service industry. For example, organizations such as Wasaya Group, Nishnawbe Aski Development Fund, and Matawa First Nation Council all provide important services, such as winter roads, transportation, mining training courses, etc. (City of Thunder Bay, 2013).

7.4. Mining Services and Supply Associations

In general, services and supply associations promote the development of agglomeration economies. According to Porter (1998), "clusters of linked industries and institutions, from

suppliers to university to government agencies, enjoy unusual competitive success in a field," The cluster concept encourages growth in productivity and innovation.

A mineral deposit may not become an operating mine unless various preconditions exist. Although the deposit is necessary, it is not sufficient. Firstly, the commodity price is an important factor in determining whether the mineral deposit is profitable. At least four other factors can decisively influence the location and localization of mining (Eggert, 2001).

The preconditions for a deposit to become a mine are as follows:

1. Access to and costs of other inputs (Isard et al., 1998),
2. Access to and costs of transportation to markets. This is most often the decisive factor (Eggert, 2001),
3. The location and localization of economic activity in agglomeration of economies. (Isard et al., 1998, Krugman, 1991). This factor is often overlooked (Eggert, 2001), and
4. The historical legacy of the mining area (Eggert, 2001). This is the least decisive factor.

Agglomeration economies have been shown to be a driving force behind urbanization and economic benefits (Porter, 1991), including fostering development in the mining industry (Eggert, 2001). The following example of Perth, Australia, illustrates how agglomeration economies can foster the development of the mining industry:

> Consider Perth as a center or staging point for mining in the state of Western Australia. Perth and Western Australia benefit from labor-market pooling in

> Perth. A significant number of mines in Western Australia are run as long-distance commuting operations in which the majority of workers at a mine have their households in Perth and commute to the minesite on some type of rotation (e.g., 10 days at the mine, 4 days at home). The labor-market pool in Perth serves a large number of mines, which in turn reinforces the localization of mining in the state of Western Australia. Perth also is home to a large number of specialty suppliers of mine services such as mining software companies, drilling companies, and contract-mining firms. These suppliers, as well as the mining companies themselves, benefit from the knowledge spillovers that result from being located close to one another. All of these agglomeration effects reinforce mining in Western Australia. To be sure, mining could not occur there without mineral deposits. But the reinforcing effects of the agglomeration economies mean that an undeveloped mineral deposit in Western Australia is more likely to be developed than a similar deposit located somewhere without these economies *(Eggert, 2001, pp. 19 - 20).*

An example of a mining service and supply association in Northern Ontario is the Sudbury Area Mining Supply and Service Association (SAMSSA). The City of Greater Sudbury is the regional centre for Northeastern Ontario. It has a population of approximately 160,000 (Canada Census, 2011) people with an industrial base in the resources sector dominated primarily by two major mining companies, Vale and Xstrata. Sudbury has a wide range of mining-related and support activities as well, such as distributors of products, supply services and technologies, fluid handling, inspection services, education, environmental consulting, a university, etc., all of which have been clustered together under the umbrella group, SAMSSA.

This umbrella group helped to position Sudbury as a "one stop shop" for the mining industry and a regional service centre for North Eastern Ontario.

SAMSSA's mission is to "Provide the most innovative and highest quality mining supply/products/services for domestic and worldwide markets."

This year (2013) marks the tenth anniversary of SAMSSA, and it is the recipient of the city's Community Builder Award. According to a Canadian Chambers of Commerce 2013 Mining Study, the mining supply and services sector contributed over $6.5 billion to the local economy and employs approximately 12% of the population or 20,000 people.

Over the past 10 years, membership in the SAMSSA has grown from 4 in 2003 to 120 in 2012. The organization has a mailing list of over 400 contacts world-wide (http://samssa.ca). The typical small size of northern Ontario supply firms is being supported by this cluster concept through SAMSSA which not only functions to share information and knowledge and strengthen linkages between its member organizations but also supports an education and research focus through institutional development.

In terms of agglomeration economies, Sudbury is also the home of The Centre of Excellence in Mining Innovation, the Canadian Mining Industry Research Organization, the Northern Centre for Technology and Mining, and the Laurentian University's School of Mining, along with the Ministry of Northern Development and Mines head office. Economies of scale enable many local companies to compete internationally, as well as domestically.

7.5. Northwestern Ontario Mining Supply and Services Association (NOMSSA)

The large number and diversity of firms in Thunder Bay's mining services and supply sector provides an array of mining knowledge, support services, skills and abilities that

contribute to Thunder Bay's position as a supply centre for the region of Northwestern Ontario. Table 36 suggests that there are enough resources and competencies located within the city that when combined would reach a critical mass that would contribute to enhancing Thunder Bay's location based competiveness through commercial advantage for servicing the mining industry.

Currently, however, there is no umbrella organization or network established in Thunder Bay with the purpose of bringing together these various firms and fostering the development of a mining agglomeration services and supply sector. The example provided from the Sudbury region demonstrates the competitive success of creating inter-organizational co-operation. In addition, considering that every direct job created in mining creates three to four indirect and induced jobs in the supply and services sector (Dadgostar, et al., 2012), so it is important for Thunder Bay to develop an agglomeration economy in order to keep a large percentage of the indirect and induced positions in Thunder Bay.

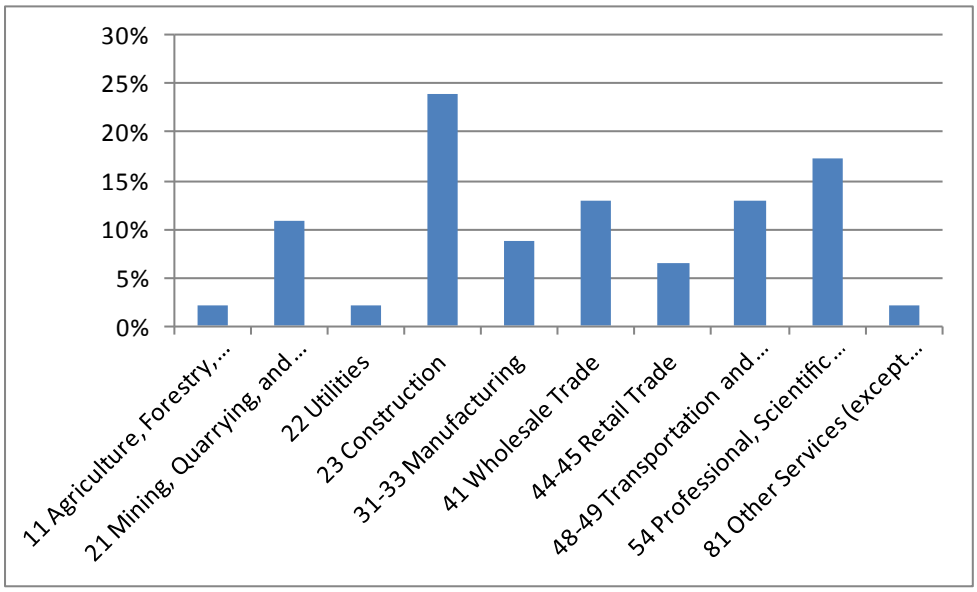
To enhance the opportunities associated with the potential for mining development in Northwestern Ontario and for Thunder Bay to function as a hub for mining activity, the prospect of developing a network or an association of businesses similar to SAMSSA was considered. Accordingly, a survey has been administered in order to gauge interest in and possible mandate of a service and supply organization in Thunder Bay. For the purposes of this study, the potential association is referred to as the Northern Ontario Mining Supply and Services Association, or NOMSSA.

The email survey was sent to 185 of the approximately 500 companies in the mining service and supply industry, as outlined in Table 36. This represents 37% of the sector. The surveys were sent to all companies that had publicly available email addresses and were directly

related to service and supply of the mining industry. Financial services, grocery stores, and other ancillary industries did not receive the survey. A copy of the survey is presented in Appendix V.

A total of 46 responses were received, resulting in a response rate of approximately 25%, which is comparable to various other survey-based research studies.

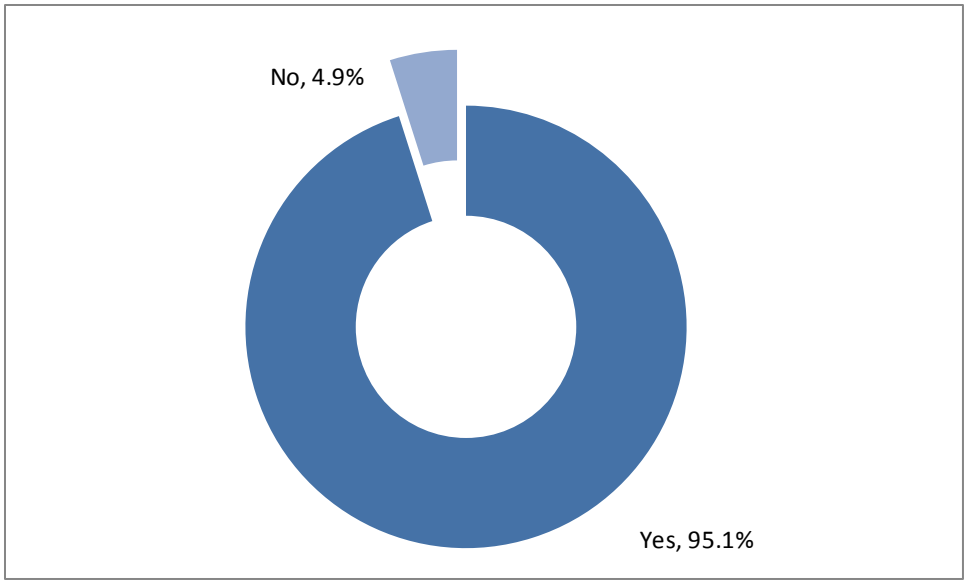
Figure 84 – NOMSSA Survey Respondents Across NOC Industry Classifications



The most common industry classifications are construction (24%); professional, scientific, and technical services (17%); wholesale trade (13%); and transportation and warehouse (13%).

Of all the respondents, 95.1% reported that they provide products or services to the mining industry (Figure 85).

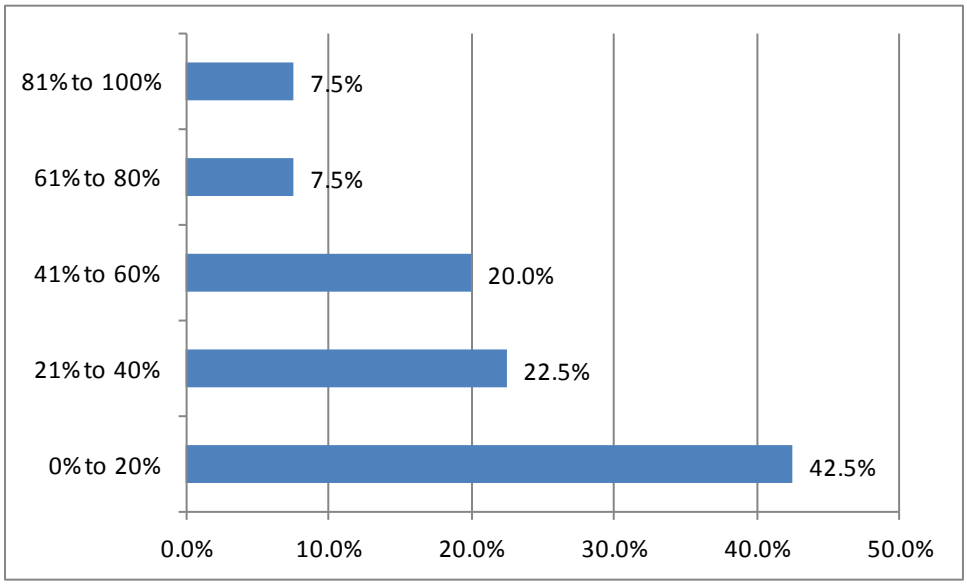
Figure 85 - Do You Provide Products or Services to the Mining Industry?



The range of services provided by these companies is diverse, ranging from concrete, drilling, engineering, geological and GIS mapping, heavy equipment, transportation, warehousing, supplies, towing, transportation/logistics, among other product and service offerings.

Figure 86 presents the percentage of revenue from the mining industry for companies in Thunder Bay's mining service and supply sector. The majority of companies in Thunder Bay's mining service and supply sector have only up to 20% of their business focused on mining related activities. Only 7.5% of the companies reported that virtually all of their business (80% to 100%) is focused on mining related activities.

Figure 86 - Percentage of Revenue from the Mining Industry for Companies in the Mining Services and Supply sector



The remaining survey questions focus on the development of the NOMSSA. The first question on the NOMSSA is *Do you think businesses in Thunder Bay and Northwestern Ontario would benefit from an organization such as NOMSAA?* Figure 87 presents the responses to this question.

Figure 87 – Would Businesses Benefit from an Organization like NOMSSA?

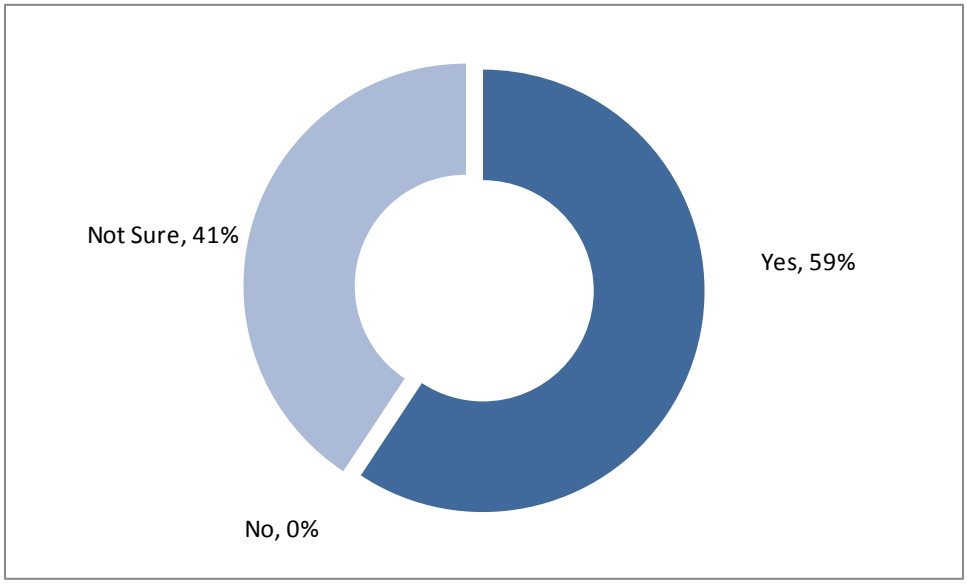
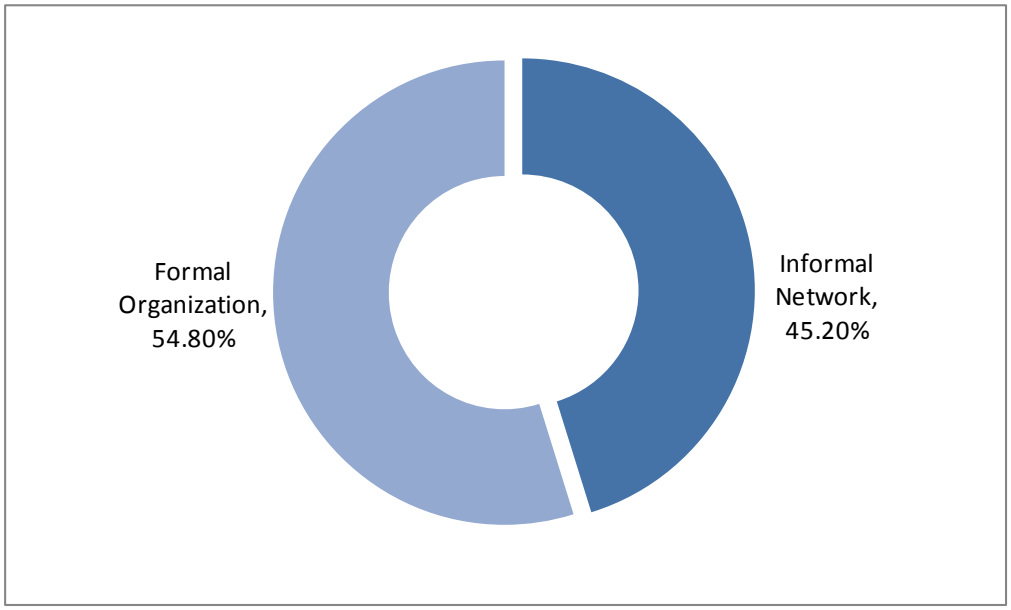


Figure 87 reveals that approximately 60% of the responded indicated that NOMSSA would be beneficial, with the remaining 40% unsure. None of the respondents indicated that NOMSSA would not be beneficial for the mining service and supply sector in Thunder Bay.

The second question on NOMSSA is whether NOMSSA should be organized as a formal or informal organization? Figure 88 presents the respondents' results and reveals that there is not a general consensus on this question. Overall, the majority (54.8%) recommended a formal organization as an approach to developing NOMSSA.

Figure 88 – Should NOMSSA be a Formal or Informal Organization?



The third question on NOMSSA is who should be the central planner for the association? Figure 89 presents the results of the responses and reveals that the majority suggest that it should be the private sector that organizes the NOMSSA. The Thunder Bay Chamber of Commerce was selected by 32% of the responses, while only 12% indicated that the City of Thunder Bay should be the central planner.

Figure 89 – Which Organization Should be the Central Planner for NOMSSA

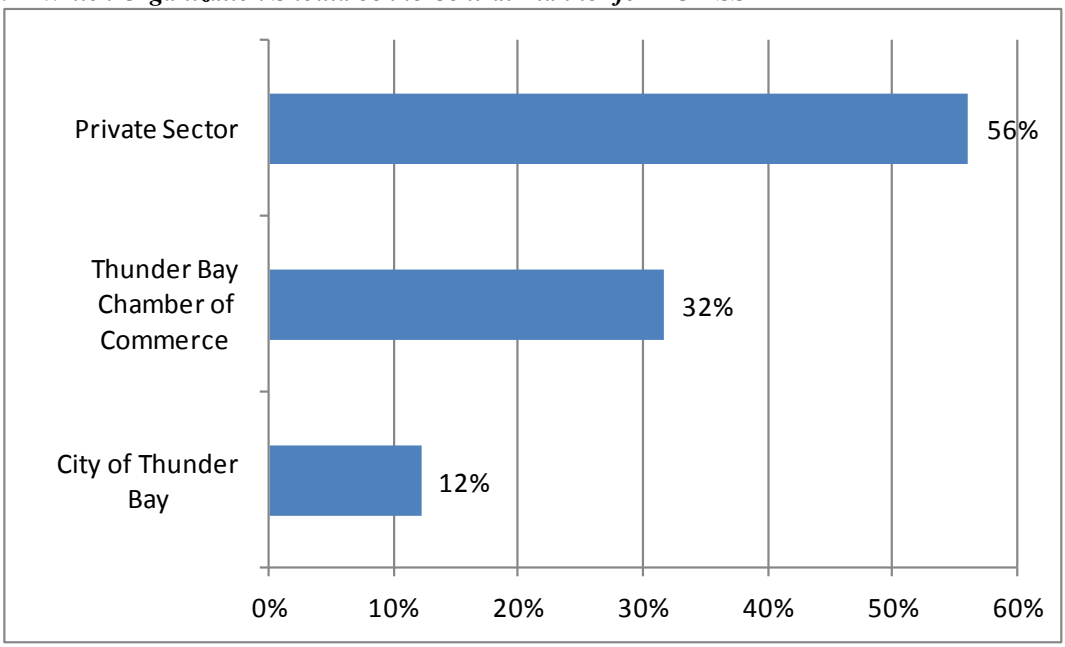


Table 37 presents the Likert-scale responses to a series of activities that can be offered by the NOMSSA. The results have been organized from what has been perceived as the most to least important.

Table 37 - What Activities Would You Like an Organization Such as NOMSSA to Provide?

	Not Important (1)	Neutral (2)	Very Important (3)	Rating Average
Promote member companies	0.0%	22.0%	**78.0%**	2.78
Network with customers, clients and potential partners	0.0%	22.0%	**78.0%**	2.78
Maximize sales opportunities	2.4%	26.8%	**70.7%**	2.68
Web access for members and customers	0.0%	32.5%	**67.5%**	2.68
Create a catalogue of suppliers/products and services	0.0%	36.6%	**63.4%**	2.63
Promote tradeshows	4.8%	33.3%	**61.9%**	2.57
Encourage research and development	4.8%	45.2%	**50.0%**	2.45
Provide educational opportunities	4.8%	47.6%	47.6%	2.43

Table 37 reveals that the most important activities that should be offered by the NOMSSA are to 1) help promote the member companies, and 2) network with customers,

clients, and potential partners. The next most important activities are to help to maximize the sales opportunities of the member companies and to provide a website presence for members.

The least important activities are to provide educational opportunities to members and to encourage research and development. It is interesting to note that research and development was perceived to be such a low priority for the respondents. A survey administered by the Ontario North Economic Development Corporation (ONEDC, 2010) revealed that almost 90% of Northern Ontario mining service and supply sector companies indicated a strong research and development effort, equal to 5% of sales, could significantly increase revenues.

7.6. Opportunities for Aboriginals in the Mining Service and Supply Sector

Recently, the City of Thunder Bay, Thunder Bay CEDC, and Fort William First Nation launched a Mining Readiness Strategy that outlines the following four opportunities for First Nations in terms of the Mining Supply and Service Sector (City of Thunder Bay, 2012):

- "Fort William First Nation can become a mining development hub for other First Nation communities in Northwestern Ontario and Thunder Bay region. This will allow for remote or smaller First Nation communities to gain access to supplier services and government services."
- "Prospective entrepreneurs from remote First Nation communities can partner with individuals in the Fort William First Nation hub to be able to enter the supply chain."

- "Working with the Matawa First Nations Council and their Regional Development Corporation to access opportunities provided by the Ring of Fire through new businesses and joint ventures."
- "Individuals from remote communities who wish to fill the job openings presented by the expanding mining supply chain may attend access training courses and funding through Aboriginal Training Institutions, such as Anishinabek Employment and Training Services; Kiikenomaga Kikenjigewen Employment and Training Services; Sioux Lookout Area Aboriginal Management Board; Shooninyaa Wa-Biitong Training and Employment Centre for Treaty #3 Area; Oshki-Pimache-O-Win; or Fort William First Nation Employment and Training Division)."
- "Partnerships between First Nations [Aboriginals] entrepreneurs or start-up companies with supplier companies when tendering – this not only presents opportunities."

Section VIII - Summary and Recommendations

8.1. Summary

Summary of Economic Indicators

Thunder Bay's GDP has grown by 3.4 percent between 2002 and 2012. This represents a 0.30% cumulative annual growth rate (CAGR). Over the same period, the Canadian GDP grew by 19.8%, or a 1.92% CAGR. Clearly, Thunder Bay has underperformed the greater Canadian economy over the past ten years. Increase in the value of Canadian dollars and the global credit crisis has had a more severe impact on the economy of Thunder Bay than that of Canada as a whole.

Over the next three years, the wholesale and retail trade sector is expected to have the largest GDP CAGR in Thunder Bay, with the lowest growth expected from the personal services sector. Total GDP is expected to grow at a CAGR of 1.5 percent from 2014 to 2016.

Thunder Bay's labour productivity peaked in 2006, which is also the peak of total GDP. Labour productivity declined significantly from 2006 to 2009, and has not regained its previous high. Labour productively declined by 3% from 2011 to 2012. The decline in the productivity caused an increase in the unit labor cost.

The three dominant employment sectors are the retail trade industry, construction, and hospitals. In regards to the trends and shifts in Thunder Bay's employment, the goods sector has experienced a shift from the manufacturing sector to primary industries and utilities. This shift is expected to continue during the period of 2013 to 2016. Employment in the service sector increased significantly in finance, insurance and real estate, but this occurred at the expense of

other sectors, such as transportation and communication, wholesale and retail trade, and commercial services, all of which lost employment. However, forecasts suggest that wholesale and retail trade should improve, as a result of an increased mining activity in the region that is expected to create gains in employment.

The population of Thunder Bay has experienced essentially zero growth from 1971 to 2011. This is in stark contrast to the growth experienced by the Province of Ontario (66.8%) and in Canada (55.2%) over the same time period. Thunder Bay's population has remained relatively stagnant over the past forty years, but the composition of the population has changed. A larger portion of Thunder Bay's population is Aboriginal, and the Aboriginal population is younger than the non-Aboriginal population.

The per capita income in Thunder Bay increased by approximately 6% from 2006 to 2012, and it reached $ 37000 which is comparable with the same figure for Canada.

The real estate market in Thunder Bay has been very strong over the past ten years. The housing starts index is greater for Thunder Bay than for Canada for the 2005 to 2012 period. However, the housing starts index for Thunder Bay and Canada are highly correlated. Since 2004, resale prices have reported an increase in each year, with the most significant growth occurring in the more recent years of 2007 to 2012. From 2002 to 2012, the median single family home resale price increased by approximately 42%. The rising prices have likely been a driving force behind the affordability of housing in Thunder Bay steadily declining from 2002 to 2008.

Shift and Share Analysis

Based on the analysis and statistics presented in this report, it has become evident that Thunder Bay's economy has undergone significant structural changes. The following is a brief summary of the key changes:

- Over the past decade, the forestry sector has experienced significant declines in terms of total output and employment. Recently, this sector has stabilized and began to experience moderate growth.
- The mining sector has helped to offset some of the job losses experienced by the forestry sector. The mining sector continues to offer much potential in terms of future economic growth and employment.
- A shift in the goods sector employment is also evident from manufacturing to construction and primary/utilities sector employment.
- An analysis of the components of the service sector reveals that financial, insurance and real estate have experience growth while transportation and communication experienced a decline.
- The largest sector of employment in the city is retail trade, followed by construction and hospitals.
- In terms of direct investment, commercial and residential investments have been increasing over the past eleven years, while industrial investments have been decreasing.
- In regards to population, the proportion of Aboriginal people in the Thunder Bay's population has been increasing. This trend is expected to continue into the future.

Summary of Key Sector Analysis

The contribution of the Aboriginal workforce to Thunder Bay's GDP was estimated to be around 5.09% in 2012 (when median earnings were used) and 7.67% (when average earnings were used).

The Aboriginal population is having a significant impact to all sectors in terms of total purchasing power as residents, visiting students, political organizations, social service agencies and businesses located in Thunder Bay, and as the individuals, businesses, organizations, agencies and governments in the region who come to Thunder Bay for business and personal purposes. The structure of the Aboriginal economy provides employment opportunities for both Aboriginal and non-Aboriginal residents in Thunder Bay. Aboriginal people are a significant part of the urban landscape and are expected to increase in population over the decades to come. Given these trends, it may well be expected that the Aboriginal contribution to the city's GDP will experience future growth and continue to contribute to urban sustainability as regional economies develop and labour force participation rates continue to rise.

The average annual investment from residential, commercial, industrial, and institutional building permits is approximately $124.1 million. In terms of the composition of direct investment, residential, commercial and institutional investments are fairly equal, whereas industrial investments are significantly smaller. Direct investments displayed an upward trend from 2002 to 2012. Since the global credit crisis in 2008, investment in Thunder Bay has been steadily increasing. Investments in the past three years were above the historical (2002 to 2012) average, with the largest annual investment over the past ten years occurring in 2012.

In terms of structural shifts in the composition of direct investment, commercial and residential investments have been increasing over the past eleven years, while institutional and

industrial investments have been decreasing. Commercial investments spiked significantly over the past three years. From 2009 to 2012, commercial investments increased from $15.5 million to $133.9 million. Residential investments have also been steadily increasing over the past eleven years, with a more significant increase in the past three years. Institutional investments experienced the most significant decline, dropping from $111.9 million in 2002 to $15.8 million in 2012, while industrial investments declined from $20.8 million to $7.1 million over the same period.

Direct investment is shown to be related to changes in employment of specific industries. Specifically:

- Total direct investments are associated with changes in the employment of trades, transport and equipment operators and related occupations (NOC code H). Total direct investments of $1 million lead to the creation of roughly 10 – 12 direct jobs in the trades, and 20 to 25 indirect and induced jobs, for a total of 30 to 37 new jobs.
- Total institutional investments are associated with changes in the employment of occupations in social science, education, government service and religion (NOC code E). Total direct investments of $1 million lead to the creation of about 12 – 15 direct jobs in the NOC code E classification, and 18 to 22 indirect and induced jobs, for a total of 30 to 37 new jobs.
- Total commercial investments are associated with changes in employment in management, business, finance and administrative occupations (NOC A & B). However, the relationship was not robust enough to allow for the reliable estimation of direct, indirect, and induced employment changes.

Thunder Bay's knowledge economy was analyzed across six different indicators: 1) the number of businesses that operate in the knowledge economy, 2) total employment in the knowledge sector, 3) education levels of the population, 4) diversity of the population, 5) patent generation, and 6) infrastructure requirement. These indicators were analyzed, and their performance was compared against six other cities in Ontario: 1) Kitchener-Waterloo, 2) Sudbury, 3) Sault Ste. Marie, 4) Hamilton, 5) Ottawa, and 6) London.

Thunder Bay ranks fifth of the seven cities but is the highest of three Northern Ontario cities. Ottawa had the highest ranking, following by the Kitchener-Waterloo area. In regards to Thunder Bay's performance on the individual rankings, the employment and diversity indicators were the highest ranking. The diversity indicator was driven by the Aboriginal population and to a lesser extent by the immigrant and visible minority populations. Thunder Bay's two lagged indicators are the knowledge generation (i.e. Canadian and US patent filings) and total businesses. For example, a total of 522 Canadian patents have originated from Thunder Bay from 1869 to 2012, of which 115 are from 1975 to 2012. This is comparable to the other Northern Ontario cities of Sudbury and Sault Ste. Marie; however, this is a significantly lower number of the patents relative to Ontario's knowledge economy leaders, like Ottawa, Kitchener and London.

A SWOT analysis of Thunder Bay's most innovative companies reveals that the key institutions, such as the Thunder Bay Regional Research Institute, Lakehead University, and Confederation College, are seen as strengths/opportunities to further develop the sector. The main weaknesses/threats are the ability to attract and retain qualified and skilled labour and access to capital for product development and/or research and development.

The mining service and supply sector in Ontario is estimated to be $5.65 billion in terms of annual output, employing approximately 23,000 individuals. Thunder Bay's share of the output and employment is 6.2% and 7.0%, respectively. The average output per employee in Thunder Bay's mining service and supply sector is $245,652 which is below the average output from Sudbury and North Bay, but above that of Timmins.

Agglomeration economies, or clusters of linked industries and institutions, usually enjoy a competitive advantage. Sudbury, the market leader in Ontario's mining service and supply sector with approximately 60% to 70% of total output and employment, has promoted the development of an agglomeration economy through the development of a mining service and supply association (Sudbury Area Mining Supply and Service Association, SAMSSA). The development of a mining association in Thunder Bay (Northern Ontario Mining Supply and Service Association, NOMSSA) was explored by surveying key companies in Thunder Bay's mining service sector.

Approximately 60% of the respondents indicated that NOMSSA would be beneficial with the remaining 40% unsure. None of the respondents indicated that NOMSSA would not be beneficial for the mining service and supply sector in Thunder Bay. The majority of respondents suggested that the private sector should organize the NOMSSA. The Thunder Bay Chamber of Commerce was selected by 32% of the responses, while only 12% believe that the City of Thunder Bay should be the central planner.

Respondents indicate that the most important activities that should be offered by the NOMSSA are to 1) help promote the member companies and 2) network with customers, clients, and potential partners. The next most important activities are to help to maximize the sales opportunities of the member companies and to provide a website presence for members.

Respondents feel that the least important activities are to provide educational opportunities to members and to encourage research and development.

8.2. Recommendations

Based on the above analysis, the following recommendations are provided. These recommendations are not specific to any single sector of the industry due to the interdependent nature of an economy. Therefore, a single recommendation will have implications for the economy as whole.

Recommendation #1 *Monitor the economy of Thunder Bay on a regular basis using the Thunder Bay Economic Activity Index (as developed in this report).*

Recommendation #2a *Create awareness in the business community and general population of the significance of Aboriginal population's economic contributions to the city of Thunder Bay.*

Recommendation #2b *Create a welcoming urban environment for newcomers to the city.*

Recommendation #2c *Undertake a comprehensive study to define the impact of Aboriginal economic activity, lead by a coalition of Aboriginal partners in the CMA with the support of the Municipal, Provincial, and Federal governments.*

Recommendation #3 *Establishment of a Northwestern Ontario Mining Supply and Service Association (NOMSSA), headquartered in Thunder Bay.*

Recommendation #4 *Diversify the economy by retaining, expanding and attracting private enterprise into Thunder Bay.*

Recommendation #5 *Enhance human capital by providing training for skills in demand.*

Recommendation #6 *Increase the availability of professionals and skilled labour.*

Recommendation #7 *Foster an entrepreneurial culture in the city.*

Recommendation #8 *Focus on moving past business incubation*

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Appendix I – List of the 55 Largest Employers in Thunder Bay

	Employers	Employees
1	Thunder Bay Regional Health Sciences Centre	2,694
2	Lakehead District School Board	2,200
3	Lakehead University	2,100
4	City of Thunder Bay	1,855
5	Government of Ontario	1,849
6	St. Joseph's Care Group	1,700
7	Thunder Bay Catholic District School Board	1,500
8	Bombardier Transportation	1,300
9	Confederation College	785
10	Government of Canada	653
11	Tim Horton's	600
12	Metro Foods	597
13	McDonalds	525
14	Wal-Mart (MemorialAvenue)	500
15	Resolute Forest Products	480
16	Dilico Anishinabek Family Care	450
17	TBayTel	440
18	Community Living Thunder Bay	430
19	Revera Home Health	400
20	The Real Canadian Superstore	360
21	OLG Casino Thunder Bay	349
22	Bearskin Airlines	315
23	Canadian Pacific Railways	300
24	Teleperformance	300
25	McKevitt Trucking	250
26	Valhalla Inn	228
27	Wasaya Airways LP	205
28	RBC Royal Bank	201
29	Resolute Forest Products (Sawmill)	200
30	OLS Online Support (Call Centre)	200
31	Roseview Manor Long Term Care	200
32	Robin's Foods	194
33	Lakehead Manor	193
34	Home Depot	180
35	Iron Range Bus Lines	180

36	Sears Canada	170
37	Children's Centre Thunder Bay	160
38	Canada Post Corporation	157
39	Victorian Order of Nurses	150
40	Union Gas Inc.	150
41	Ontario Power Generation (Thermal and NW Plant)	230
42	Travelodge Airlane	120
43	Canadian Imperial Bank of Commerce	130
44	RAS Foods (Pizza Hut and Applebees)	240
45	Wal-Mart (Country Fair)	130
46	Canadian Tire (Intercity)	120
47	Canadian Tire (Arthur Street)	120
48	Apex Investigation	115
49	Fort William First Nation	110
50	The Keg	110
51	The Chronicle Journal	100
52	Loch Lomond Ski Area Resort	100
53	Bell Alliant	98
54	Wal-Mart (Arthur Street)	95
55	Canadian National Railways	90
	Total	27,608

Appendix II –Aboriginal Organizations Survey

TBay Ventures Organization Survey

Introduction

Poised for Development, Ready for Growth
Economic Impact Study for Thunder Bay
Sponsored by Thunder Bay Ventures in Partnership with Nishnawbe Aski Development Fund

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Thunder Bay Ventures (TBV), in partnership with Nishnawbe-Aski Development Fund (NADF), is conducting a study pertaining to the nature of the economy of Thunder Bay. The research team is being led by Dr. Dadgostar, Dean Faculty of Business, with team members Camillo Lento, Nikola Gradojevic, Sam Garofalo and Karen Peterson. An objective of this study is to identify the economic impact of the local workforce of Aboriginal residents, the Aboriginal organizations located here as well as an estimate of the Aboriginal people living in the region who come to the City for shopping, health, social services, entertainment, sports, work, etc. The purpose of this information is to inform the general public and local businesses regarding the significance of the contribution that Aboriginal people make to the economy of Thunder Bay as customers, clients, business owners, students and residents.

This survey has been designed for Aboriginal Organizations located in Thunder Bay. The information you provide will be aggregated with all data collected pertaining to the Aboriginal service organizations. Your answers will be held in strictest confidence and there will not be any identifying marks to determine who has completed the survey.

Please answer the questions with your best average estimate. If you have any questions, please do not hesitate to contact me at (807) 622-1340. Your participation in this study would be greatly appreciated.

Chi Meegwetch!

TBay Ventures Organization Survey

1. How long has your organization been in operation in the City of Thunder Bay?

2. What is the main purpose of your organization?

3. How many employees do you have in a Thunder Bay office?

Full Time	
Part Time	
Total Salaries	

4. Statistics Canada doesn't collect information regarding non- Aboriginal people who work within Aboriginal organizations. Please indicate how many non-Aboriginal employees you have in a Thunder Bay office.

Full Time	
Part Time	

TBay Ventures Organization Survey

5. In a typical year, how much would you spend on meeting, conferences and workshop space?

- ☐ Less than $1,000
- ☐ $1,000 – $5,000
- ☐ $5,000 – $10,000
- ☐ $10,000 – $20,000
- ☐ More than $20,000
- ☐ _____ (Please Specify)

TBay Ventures Organization Survey

6. Approximately, how much money would you spend in Thunder Bay for meals, hotel/motel accommodations over a one year period?

- [ ] Less than $1,000
- [ ] $1,000 – $5,0000
- [ ] $5,000 – $10,000
- [ ] $10,000 – $20,000
- [ ] More than $20,000
- [ ] _____ (Please Specify)

TBay Ventures Organization Survey

7. In a typical year, approximately how much would you spend for conferences, meetings, and/or workshop space in Thunder Bay?

- [ ] Less than $1,000
- [ ] $1,000 – $5,0000
- [ ] $5,000 – $10,000
- [ ] $10,000 – $20,000
- [ ] More than $20,000

8. In a typical year, approximately how much would you spend for office supplies, furniture, etc. in Thunder Bay.

- [ ] Less than $1,000
- [ ] $1,000 - $5,000
- [ ] $5,000 - $10,000
- [ ] $10,000 - $20,000
- [ ] more than $20,000

9. In a typical year, approximately how much would you spend for professional services such as accountants, lawayers, consultants in Thunder Bay?

- [ ] Less than $1,000
- [ ] $1,000 – $5,000
- [ ] $5,000 – $10,000
- [ ] $10,000 – $20,000
- [ ] more than $20,000

10. Do you rent or own your office space in Thunder Bay?

- [ ] Rent
- [ ] Own

11. Other Comments

Appendix III – Aboriginal Community Survey

Wequedong Lodge

1. Which community do you come from?

2. How often do you visit Thunder Bay in one year?

- [ ] more than once a week
- [ ] once a week
- [ ] twice a month
- [ ] once a month
- [ ] once a year
- [ ] twice a year
- [ ] three times a year

Wequedong Lodge

3. The main reason(s) you visit Thunder Bay is for...

- [ ] shopping (groceries, household goods, etc.)
- [ ] work (meetings, conferences)
- [ ] major purchases 9cars, snowmobiles, furniture)
- [ ] education & training
- [ ] health - medical appointments
- [ ] entertainment (movies, sports)

Other (please specify)

Wequedong Lodge

4. On average, how much would you spend in total each time you visit Thunder Bay?

- [ ] less than $500
- [ ] $500 - $1,000
- [ ] $1,000 - $2,000
- [ ] More than $2000

Other (please specify)

5. For each activity below, indicate what portion % you would spend in one year in Thunder Bay.

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Entertainment (movies, CLE, sports, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Shopping 9groceries, household goods)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Electronics (TVs, computers)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Services (Hair Cuts, Banking, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Major Purchases (cars, snowmobiles, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Travel Expenses (taxis, hotel, food)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

6. How much would you spend each month on communications such as your telephone, cell phones, faxes, and internet?

- [ ] 0
- [ ] 0 - $100
- [ ] $100 - $500
- [ ] $1,000

7. Any Comments?

Appendix IV – Thunder Bay's Knowledge Economy Survey

Thunder Bay's Knowledge Economy

Introduction

The purpose of this survey is to obtain information regarding Thunder Bay's knowledge economy. This survey is part of a larger research study commissioned by Thunder Bay Ventures entitled Poised for Development - Ready for Growth.

The research team consists of myself (Dr. Camillo Lento), Dr. Dadgostar, Dr. Gradojevic, and Dr. Petersen, along with the Small Business Consulting Services students.

The results of this survey will be made publicly available, and hopefully will help develop policies to further develop the Knowledge Economy in Thunder Bay.

Please note that no information will be collected or disclosed in regards to specific companies from specific individuals/companies.

Next

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Thunder Bay's Knowledge Economy

Business Demographics

1. In what year did you begin operations?

2. What industry would you classify your business to be in

- Advanced Health Technologies
- Agriculture
- Digital Media and ICT
- Environmental - Water Technologies
- Forestry
- Green Energy Technologies
- Materials and Advanced Manufacturing
- Nanotechnology
- Other

3. About how many employees work at your organization?

Prev Next

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Thunder Bay's Knowledge Economy

SWOT Analysis

4. What do you feel are your company's greatest strengths in regards to operating in Thunder Bay's Knowledge Sector?

5. What do you feel are your company's greatest weaknesses in regards to operating in Thunder Bay's Knowledge Sector?

6. What do you feel are greatest opportunities in regards to operating in Thunder Bay's Knowledge Sector?

7. What do you feel are greatest threats in regards to operating in Thunder Bay's Knowledge Sector?

Prev Next

Thunder Bay's Knowledge Economy

SWOT Analysis - Continued

8. How would you rate each of the following factors as they relate to your business?

	Threat/Weakness		Neutral		Opportunity/Strength
Availability of Skilled Labour					
Availability of Financing					
Availability of Governmental Support					
Availability of ICT Infrastructure					
Availability of Business Expertise					
Con. College & Lakehead University					

Prev Done

Appendix V – Northern Ontario Mining Supply and Services Survey

Northwestern Ontario Mining Supply and Services Organization (NOMSSA)

Introduction

Recently, Thunder Bay Ventures commissioned a study entitled Poised for Development - Ready for Growth. The research team consists of Bahram Dadgostar (Dean of the Faculty of Business at Lakehead University), Sam Garofalo, Nikola Gradojevic, Camillo Lento and Karen Petersen. The study focuses on the economy of Thunder Bay with a view to enhance the opportunities associated with the potential for mining development in Northwestern Ontario where Thunder Bay could function as a hub.

Part of this research pertains to the prospect of developing a network or an association of businesses similar to the one in Sudbury which is known as SAMSSA (Sudbury Area Mining Supply and Service Association). This association in Northwestern Ontario may be referred to as NOMSSA: Northwestern Ontario Mining Supply and Service Organization, and could have a mission statement as follows:

"To provide the most innovative and high quality mining supply/products/services for domestic and worldwide markets."

The purpose of this study is to gauge the interest in the community to further pursue the development of an organization such as NOMSSA. The survey should take no more than 5 - 10 minutes to complete.

The results of this survey, and study as a whole, will be made available publicly, free of charge, by Thunder Bay Ventures on their website. Additionally, a formal release of the study's results is being planned for Spring, 2013.

Please note that no information will be collected or disclosed in regards to specific companies from specific individuals/companies.

Thank you for your participation.

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Northwestern Ontario Mining Supply and Services Organization (NOMSSA)

Industry Classification

1. What industry classification (2-digit NAICS) best describes your business:

- 11 Agriculture, Forestry, Fishing and Hunting
- 21 Mining, Quarrying, and Oil and Gas Extraction
- 22 Utilities
- 23 Construction
- 31-33 Manufacturing
- 41 Wholesale Trade
- 44-45 Retail Trade
- 48-49 Transportation and Warehousing
- 51 Information and Cultural Industries
- 52 Finance and Insurance
- 53 Real Estate and Rental and Leasing
- 54 Professional, Scientific and Technical Services
- 55 Management of Companies and Enterprises
- 56 Administrative and Support, Waste Management and Remediation Services
- 61 Educational Services
- 62 Health Care and Social Assistance
- 71 Arts, Entertainment and Recreation
- 72 Accommodation and Food Services
- 81 Other Services (except Public Administration)
- 91 Public Administration

Prev Next

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Northwestern Ontario Mining Supply and Services Organization (NOMSSA)

Ties to the Mining Industry

2. Do you provide products or services to the mining industry?

- Yes
- No

3. If you answered "Yes" to Question 2, please specify (e.g., supplies, engineering services, labour, etc.):

4. If you answered "Yes" to Question 2, what percentage (approximately) of your business is focused on the mining sector?

- 0% to 20%
- 21% to 40%
- 41% to 60%
- 61% to 80%
- 81% to 100%

5. Do you think businesses in Thunder Bay and Northwestern Ontario would benefit from an organization such as NOMSAA?

- Yes
- No
- Not Sure

6. Which would be your preference?

- Informal Networking
- Formal Organization

7. Who do you feel should be commissioned to oversee an organization such as NOMSSA?

- City of Thunder Bay
- Thunder Bay Chamber of Commerce
- Private Sector

8. What activities would you like an organization such as NOMSSA to provide?

	Not Important	Neutral	Very Important
Maximize sales opportunities			
Promote member companies			
Encourage research and development			
Network with customers, clients and potential partners			
Create a catalogue of suppliers/products and services			
Provide educational opportunities			
Promote tradeshows, and			
Web access for members and customers			

Prev Next

Northwestern Ontario Mining Supply and Services Organization (NOMSSA)

Thank you

Thank you for responding to this survey.

As mentioned in the introduction page, the results of this survey, and study as a whole, will be made available publicly, free of charge, by Thunder Bay Ventures. A formal release of the study's results is being planned for Spring, 2013.

Prev Done

List of Acronyms

AUTM - Association of University Technology Managers

CAGR - cumulative annual growth rate

CMA – Census Metropolitan Area

(see http://www12.statcan.gc.ca/census-recensement/2011/ref/dict/geo009-eng.cfm)

GDP – Gross Domestic Product

NAICS – North American Industry Classification Codes

NOC – National Occupation Classifications

(see http://www.hrsdc.gc.ca/eng/jobs/lmi/noc/index.shtml)

NOIC - Northern Ontario Innovation Centre

NOMSSA – Northwestern Ontario Mining Supple and Service Association

SAMSSA - Sudbury Area Mining Supply and Service Association

SME – Small and Medium Enterprises