

Hot Sectors/ Hot Markets Economic Forecast

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Canada



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**Global Research Study - FDI
Opportunities for the Greater
Toronto Area**

Greater Toronto Marketing Alliance

Contents

1	Executive summary
4	Introduction
5	Review of Digital Games sector in GTA
9	Brazil Information, Communications and Technology sector
12	Mobile Technology sector
16	Clean Technology sector
19	Summary conclusions

Executive summary

Emerging technologies, particularly in the field of information and communications, are considered to be key drivers of future economic growth and present opportunities for the Greater Toronto Area (GTA) to attract foreign direct investment (FDI). For the purposes of this study, a high level review of the performance of the Digital Games sector, currently considered a “hot sector” for FDI in the GTA, was undertaken.

In addition, the following three emerging sectors were identified as having high growth opportunity and FDI potential for the GTA:

- **Brazil's Information, Communications and Technology (ICT) sector:** This market sector generated more than US\$139 billion in revenues in 2008. Brazilian companies are increasingly investing abroad, including into Canada where their share of total FDI has grown rapidly.
- **Mobile Technology sector:** This sector is expected to revolutionize communications and business. The mobile applications market alone is expected to be a US\$58 billion worldwide business by 2014.
- **Clean Technology sector:** Global demand for clean technologies was estimated at US\$1 trillion in 2009, and is expected to continue to grow.

Further analysis of the Digital Games sector identified the following findings related to the GTA's current performance in the sector from an FDI perspective:

Digital Games sector

The worldwide market for digital games is expected to expand at a compound annual rate of 10.6% to reach US\$86.8 billion in 2014. The GTA is developing a strong digital games sector that has grown significantly over the past several years with key strengths in the mobile and online games subsectors, which are projected to account for more than half the total digital games market by 2014.

However, despite this growth and strong government support, the digital games sector in the GTA is relatively smaller compared to sectors in Montreal and Vancouver, primarily because both Vancouver and Montreal have had a “head start” in attracting large digital games companies. For example, Vancouver was the first Canadian city to establish a digital games sector given its close proximity to the Silicon Valley, while Quebec provided significant tax credits to attract large digital games producers to Montreal, many years prior to the introduction of Ontario tax credits for interactive digital media creation for large producers in 2009.

Ontario, and by extension the GTA, is now considered to be as competitive as other jurisdictions including Vancouver and Montreal, and is expected to see more FDI activity with larger players in the digital games sector.

Further analysis of each of the other three emerging sectors identified specific opportunities for attracting foreign direct investment to the GTA:

Brazilian ICT sector

Brazil has significantly increased its level of investment in Canada's economy over the past few years. Brazil, Russia, India and China (BRIC) have increased their share of total FDI into Canada from less than 1% to nearly 5% over the past 10 years, and Brazil accounts for about half of all BRIC FDI into Canada. The Brazilian economy is strong and growing rapidly,

and ICT has been a particular focus of Brazilian government strategic support. Combined with other factors, this has led to the development of strong capabilities in the ICT sector particularly in relation to financial services and e-government.

Brazilian IT companies are some of the largest in the world. Foreign takeovers of Brazilian companies by large multinationals have been increasing due to the attractiveness of its market and economy, and the remaining Brazilian IT companies have been expanding internationally to build additional scale and remain competitive. Some of the

largest Brazilian IT companies have already established operations in the U.S.

The GTA should be well positioned to compete for this investment for several reasons:

- The GTA is home to a high concentration of the financial services sector and the Ontario government.
- The GTA's existing skilled and multicultural IT workforce.
- The current focus of the provincial government on e-services.
- Competitive advantages in tax rates and withholding taxes.



Mobile Technology sector

The mobile technology sector continues to expand rapidly both in Canada and internationally. While sector growth has been strong, Canada's mobile penetration rates lag globally due to a combination of factors, such as high-cost rate plans and very high landline penetration rates as a low-cost alternative.

However, release of new bandwidth is increasing mobile competition in Canada, which is expected to drive lower cost rate plans and increased mobile penetration rates in the near future.

One of the fastest growing emerging subsectors globally is mobile commerce, including mobile ticketing, mobile marketing and mobile payments. Similar to overall mobile penetration rates, Canada also lags other jurisdictions in terms of its adoption of mobile commerce. As a result, Canada should be an attractive investment opportunity for foreign mobile commerce companies, as Canadians "catch up" to the rest of the world in terms of both mobile penetration and adoption of mobile commerce.

Furthermore, mobile commerce, like other mobile applications, depends heavily on a high degree of interaction across the whole mobile technology value chain. The GTA offers the infrastructure and strengths in related and supporting industries that make it attractive to new FDI from mobile commerce companies. Currently, mobile commerce companies are primarily located where there has been a high adoption rate of mobile commerce, such as in Japan and Europe.

Clean Technology sector

With global concerns about environmental and energy issues continuing to escalate, companies around the world are developing innovative technologies to address these concerns. Governments are also increasing their level of funding and program support for the "clean tech" sector.

While there are a wide range of clean technology subsectors, smart grid technology represents a clean technology subsector that leverages the GTA's strengths and has a high degree of FDI potential for the GTA. These strengths have already helped the GTA to attract smart grid investment, as evidenced by GE Canada's recent \$40 million investment into a Grid IQ Innovation Centre in Markham.

Emerging leaders that are investing in the smart grid subsector are large multinational ICT, electronics and power companies such as IBM, Cisco Systems, Siemens, GE and ABB Group, which are leveraging their existing industry strengths. Even companies such as Google that are not traditional players in this industry have recently entered the smart grid market. Many of these companies already have operations in the GTA related to their other business units. Accordingly, these large multinational companies, particularly those currently located in the GTA, represent a key opportunity to attract new FDI to the GTA.

As the economic core of Canada, the GTA provides the following advantages for attracting FDI in each of these sectors and subsectors:

- A large local market but also a gateway to the larger North American market. Canada has a corporate tax advantage over the U.S. but can also be a beachhead to the U.S. market.
- Many established and thriving supporting and related industries that are particularly relevant given the impact of technology on the interconnectedness and convergence of industries. The GTA's strong financial services industry facilitates the pursuit of financing and venture capital.
- A skilled, multi-ethnic, multi-lingual workforce, driven in part by an abundance of academic institutions offering advanced programs directly related to the sector opportunities identified above.
- Significant government support in the technology space that aims to help Ontario get a share of the highly profitable and high-growth emerging technology markets. Support is provided in various forms and ranges from direct funding to key industries to tax incentives.

Focused and targeted marketing strategies, value propositions and sales efforts for each of these sectors should help further scope, size and validate the GTA's ability to attract FDI in each of these sectors.

Introduction

The Greater Toronto Marketing Alliance's (GTMA) role is to help businesses explore opportunities to invest, expand or relocate to the Greater Toronto Area (GTA). As part of this role, one of the GTMA's key objectives is to identify "hot sectors and hot markets" as potential areas of focus in attracting Foreign Direct Investment (FDI) into the GTA.

PwC was engaged by the GTMA, in conjunction with the Ontario Ministry of Economic Development and Trade (MEDT) and Foreign Affairs and International Trade Canada (DFAIT), to conduct research and analysis into key market developments and trends in emerging sectors to assist the GTMA in better understanding future potential sectors and markets considered to have strong FDI opportunities for the GTA. Specifically, the following sectors were identified for further review and analysis:

- Digital Games sector
- Brazil ICT sector
- Mobile Technology sector
- Clean Technology sector

The Digital Games sector had previously been identified as a "hot sector" by the GTMA and has already been the focus of some of GTMA's FDI efforts. As a result, our focus for this sector was on providing

a high-level review of its performance, highlighting key strengths and challenges and opportunities to build, grow and strengthen the sector.

For the remaining three sectors identified, our focus was on examining these sectors and undertaking a preliminary high-level assessment as to whether or not there was a material opportunity for the GTA and therefore for the GTMA in terms of strategic and targeted focus on attracting FDI. As our analysis of these three sectors proceeded and more was learned, we collaborated with the GTMA to refine and limit the focus to specific subsectors that appeared to provide a strong and attractive opportunity for the GTA.

Our approach to undertaking market research and analysis for each of the identified sectors included the following activities:

- Consultation with PwC's "on-the-ground" industry specialists both in Canada and globally to obtain insights and information on key market dynamics in the sector.
- Interviews with sector companies and other industry experts to understand the key considerations in determining the attractiveness of the GTA.

- Additional research using PwC's industry resources and databases and publicly available online information to supplement the above.
- Ongoing discussions with the GTMA.

Our review was not intended to be a detailed and exhaustive review of each of the identified sectors. Instead, it was focused on providing a preliminary high-level assessment as to whether or not there are material opportunities for the GTA to attract new FDI within each of the identified sectors, and what those potential opportunities may be. More detailed analysis is required to further scope, size and validate the GTA's ability to attract FDI in each of these sectors.

Our work did not constitute an audit conducted in accordance with generally accepted auditing standards or other attestation or review services in accordance with standards established by the Canadian Institute of Chartered Accountants. Accordingly, we do not express an opinion or any other form of assurance with respect to our work or the information upon which our work is based. Our work was based on the information provided through the activities listed above and was carried out on the basis that such information is accurate and complete. Information was not subject to checking or verification procedures.

Review of Digital Games sector in GTA

Defining the Digital Games sector

The digital games sector includes the production and distribution of all electronic games with a user interface and visual digital feedback on a display device, including console games, Personal Computer (PC) games, online games and wireless games.

The digital games “value chain” includes many different players that work together to provide value to consumers. At the heart of the industry is the game developer who creates game content.

The sector is challenged by significant business risk due to lengthy and costly development cycles, a high degree of demand uncertainty and a complex and fragmented value chain. Like film and television, it is a “hits-driven” business.

Content convergence across the primary pillars of the entertainment and media industry is helping to reduce overall business risks. For example, successful film and TV productions are increasingly being adapted to digital games that have a high probability of succeeding in the marketplace. In addition, reality-based games may become as popular as reality-based TV and are made possible by the growth in new massive, multiplayer online games.

Large global developers play a central role in the overall value chain. These developers typically publish video games that have been developed internally by their own studio. They typically own the Intellectual Property (IP) and bear the risks associated with developing new titles.

Why is the Digital Games sector considered to be a hot sector?

The worldwide market for digital games has grown significantly in recent years and is forecasted to further expand at a compound annual rate of 10.6% to reach US\$86.8 billion in 2014.¹

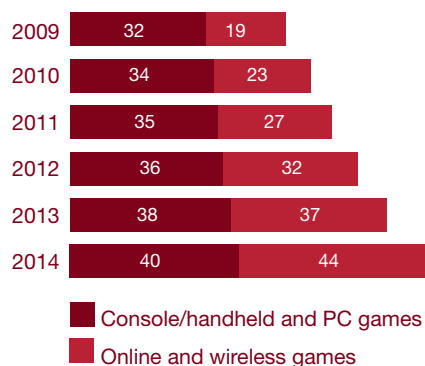
The structure of the market is also expected to continue to evolve. Online and wireless platforms are projected to be the fastest growing platforms, while the console, handheld and PC platforms are expected to grow at a far more modest rate.¹

The industry is highly competitive and its high growth potential has made it a priority sector for many countries that have supported the sector with generous tax breaks and other incentives.

Successful film and TV productions increasingly being adapted to digital games that have a high probability of succeeding in the marketplace is helping to reduce overall business risks.

Global Digital Games Market, 2009 – 2014

Sales (US\$, Billions)



Source: PwC, 2010

Current State of the Digital Games sector in Canada and the GTA

Canada is among the top digital games-producing countries in the world, along with the U.S., Japan, South Korea, Britain and France, and is the third-largest employer in the digital games industry.²

Canada has experienced the highest growth in the industry: the sector nearly doubled in size from 2006 to 2008 while staff working in digital games development increased by 42% over the same period. The Entertainment Software Association (ESA) of Canada estimated that the industry generated more than \$1.7 billion in annual revenues in Canada in 2009.³ This growth has been partly driven by generous tax credits and other support offered by the various provinces, including Ontario.

While Canada's support for the digital games sector is competitive on an international scale, the digital games industry is also a priority sector for a number of countries, partly as a result of demonstrated high impacts on the economy. Generous support programs also exist in many of these countries.

In Canada, British Columbia, Quebec and Ontario account for 95% of employment in the industry. The GTA is one of the top three Canadian centres in the digital games industry behind Vancouver and Montreal and is comprised of a large number of small, innovative and fast-growing firms.

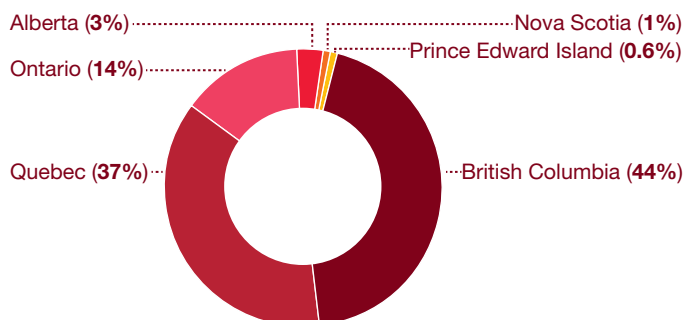
Montreal and Vancouver's digital games industry, on the other hand, comprises larger companies as they have had a "head start in attracting these companies. For example, Vancouver was the first Canadian city to establish a digital games sector given its close proximity to the Silicon Valley, while Quebec provided

significant tax credits to attract large digital games producers in Montreal, many years prior to the introduction of Ontario tax credits for interactive digital media creation for large producers in 2009.

However, Ontario, and by extension the GTA, is now as competitive as other jurisdictions including Vancouver and Montreal, and is expected to see more FDI activity with larger players in the digital games sector.

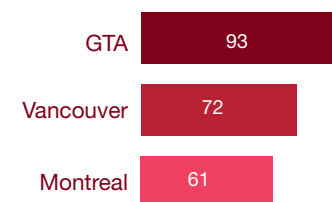
Even despite lower employment levels than B.C. and Quebec, Ontario hosts the greatest number of firms. Firms in the GTA are highly innovative, generating 93% of revenue from new products, compared to 61% and 72% of Montreal-based and Vancouver-based companies.⁴ These GTA-based firms also experienced high growth, with a three-year growth rate of 27% on average compared to 14% in the Vancouver area⁴ and 32% in the Montreal region.⁴

Distribution (%) of employment in Digital Games industry by province, 2008



Percentage of revenues from new products, 2008

(Percentage)



Source: Hickling Arthurs Low Corporation, 2009

GTA strengths and challenges in attracting FDI to the Digital Games sector

The GTA brings many strengths to the digital games sector from an FDI perspective:

- The worldwide digital games market is expected to expand at an annual rate of nearly 11% over the next several years, and with a large number of innovative firms, the GTA is positioned to be a major player.¹
- The mobile games subsector, a specific area of strong expertise in the GTA, is one of the fastest growing components of the digital games industry and is expected to account for more than half of all digital games revenues by 2014.¹
- Digital games companies in the GTA benefit from the highly skilled and specialized talent pool in digital games and related industries that are supported by strong and relevant educational and training institutions.
- Strong government support, at least as competitive as other digital games developing countries, is currently available to assist in attracting investment in the region. This has contributed to foreign digital games

developers establishing operations in the GTA. For example, to attract Ubisoft to the GTA in 2009, the Ontario government provided the firm with \$263 million in tax breaks and other subsidies in 2009.

- The GTA has strong infrastructure and key competencies in most aspects of the digital games value chain.
- Increasing convergence and collaboration among different forms of media present strong growth potential for areas with diversified entertainment and media industries such as the GTA, which benefits from strong film and television production industries.

While the GTA brings many strengths, there are also several challenges that the GTA needs to address in order to attract FDI in the digital games sector:

- Strong digital games sectors are anchored by developers operating on a global scale. The GTA has lagged in this area, with the exception of a few players such as Ubisoft and more recently Gameloft. However, with the introduction of Ontario tax credits for interactive digital media creation for large producers in 2009, the GTA is now in a better position to compete more effectively.⁵

- International competition to attract key players in this sector is fierce. The GTA must compete effectively with other Canadian and global jurisdictions that also offer generous tax incentives and other government support. For example, despite current tax incentives in Ontario, Montreal has recently captured a significant amount of the FDI from digital games companies such as Warner Bros., Funcom and Playfish.
- Jurisdictions that have failed to maintain tax incentives and other government supports (e.g., the U.K.) have seen the decline in employment in the sector.⁶ Maintaining such incentives in Ontario will therefore be critical to the sector's future success.
- Digital games developers in the GTA rely on exports for a majority of their revenue making them susceptible to exchange rate fluctuations. For example, more than 50% of Canadian video-game companies surveyed reported relying on foreign sales for 90% to 100% of their revenues.⁴

Conclusions

The GTA is developing a strong digital games sector that has grown significantly over the past several years with key strengths in the mobile and online games subsectors. These two subsectors are projected to account for more than half the total digital games market by 2014.

This growth is due to a number of factors including strong government support, a highly skilled labour force and an abundance of relevant post-secondary educational programs.

The GTA is also well positioned to take advantage of the convergence trend with related and supporting industries such as film and television production and the mobile sector.

The digital games sector in the GTA has been heavily supported by the Ontario Government and this has contributed to foreign digital games developers establishing operations in the GTA. However, despite this growth and strong governmental support, the digital games sector in the GTA is smaller compared to sectors in Montreal and Vancouver, primarily because both Vancouver and Montreal have had a “head start” in attracting large digital games companies. For example, Vancouver was the first Canadian city to establish a digital games sector given its close proximity to the Silicon Valley, while Quebec provided significant tax credits to attract larger digital games producers to Montreal, many years prior to the introduction of

Ontario tax credits for interactive digital media creation for large producers in 2009.

Yet Ontario, and by extension the GTA, is now as competitive as other jurisdictions such as Vancouver and Montreal, and is expected to see more FDI activity with larger players in the digital games sector.

In summary, the digital games sector in the GTA has performed well over the past several years and is poised to take advantage of the increasing shift to mobile and online games. However, it will likely continue to face strong competition from other jurisdictions in Canada and internationally that have more established digital games sectors.

The worldwide market for digital games is expected to expand at a compound annual rate of 10.6%.

At that rate it will reach US\$86.8 billion in 2014.

Brazil ICT sector

Defining the Brazilian ICT sector

Information, communications and technology (ICT) represents around 7% of Brazil's GDP. Information Technology-Business Process Outsourcing (IT-BPO), as defined by Brasscom (the ICT industry association in Brazil), is a large subsector of ICT in Brazil and includes all IT services (not just business process outsourcing) excluding communications.

More specifically, the IT-BPO sector in Brazil can be categorized into the following four broad subcategories: applications (IT consulting, system development, integration, expansion and management); infrastructure; business process outsourcing and hardware services.⁸ Our analysis has focused primarily on this subsector of the Brazil ICT sector.

In 2008, the Brazilian IT-BPO sector generated more than US\$59 billion in revenues.⁷ If the communications sector is included, the ICT sector yielded in excess of US\$139.1 billion. That same year, the sector employed approximately 1.7 million people.

The success of Brazil's IT-BPO sector is attributable to its technological expertise as well as its sector-specific knowledge of business processes in various sectors such as banking, fiscal and tax operations, agribusiness, the aerospace and automotive industries, health services, e-commerce and insurance.

Why is the Brazilian IT-BPO subsector considered to be a hot sector?

Brazil has significantly increased its level of investment in Canada's economy over the past few years. For example, BRIC countries have increased their share of total FDI into Canada from less than 1% to nearly 5% over the past 10 years, and Brazil accounts for about half of all BRIC FDI into Canada.⁹ On a global scale, Brazil's investments abroad increased by 20% in both 2007 and 2008.

Brazil's ICT sector is growing rapidly and benefits from large amounts of Brazilian government support. Over the last 10 years, the Brazilian government has identified the IT-BPO subsector as strategic, which has led to various targeted incentives as well as the creation of institutions supporting the industry.

Foreign takeovers of Brazilian companies by large multinationals have been increasing due to the strength of its economy. The remaining Brazilian IT companies have been expanding internationally in order to build additional scale that will help them remain competitive and lessen vulnerability to foreign takeover.

Some of the largest Brazilian IT companies, notably Stefanini IT Solutions, have already established operations in the U.S. and are increasingly looking for other foreign investment opportunities.

Current activities in the Brazilian IT-BPO subsector

The Brazilian government set a goal for 2010 to boost IT-BPO exports from US\$2.2 billion to US\$3.5 billion and has provided significant support to help drive this goal.⁷ Incentives have included direct and indirect fiscal stimulus, as well as government financing and private investment incentives.

Brazil's IT services companies are highly export-oriented. In 2008, offshore services accounted for 8.5% of all outsourced processes.⁷ Offshore services are expected to grow at a compound annual rate of 20% from 2007 to 2012. The main market for Brazilian ICT services is the U.S., which represents more than 80% of all offshore revenues.⁷

Brazilian IT companies have been increasingly investing abroad, primarily through the acquisition of operations in the U.S. The country is internationally recognized as a global leader and pioneer in business-related technology solutions for the financial-services sector. The companies that constitute the financial system, including banks, private pension, insurance, finance and brokerage firms, represent about 20% of total IT spending in Brazil.

The Brazilian government is increasingly relying on IT to provide public services to its citizens, at all levels of government (federal, state and municipal) and in a diverse range of areas such as health, education, public safety and finance. As a result of this endorsement by the Brazilian government, Brazilian IT firms have developed key competencies in the segment of e-government.

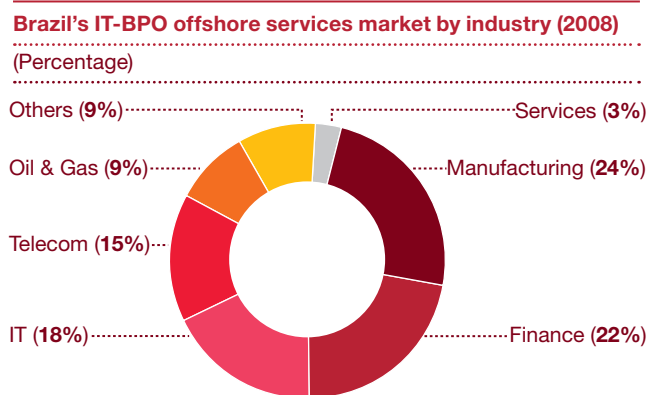
FDI opportunities for the GTA

Brazil's increasing international focus presents significant opportunities for the GTA (and Canada) from an FDI perspective:

- Boosted by high economic growth and increasing globalization and competition, Brazilian companies have dramatically increased their investments abroad. Canada is a growing recipient of Brazilian outward FDI: more than 2% of Canada's FDI is now from Brazil.
- The implementation of free trade agreements, particularly the North American Free Trade Agreement (NAFTA), provides any Brazilian company expanding into Canada with access to more than 442 million consumers and a combined GDP of more than US\$17.0 trillion.⁸
- Brazilian firms are increasingly investing in Ontario to expand their market. For example, Brazil Votorantim Cimentos acquired St. Marys Cement, headquartered in Toronto, in 2001 in order to expand into North America, and since then has expanded its presence to more than 50 locations across Canada and the United States.⁹
- The GTA provides competitive tax rates while providing access to the larger North American market. Not only does the GTA benefit from a tax treaty that allows Brazilian companies to offset Canadian corporate taxes against income taxes, but by 2012, Canada will also have a statutory corporate tax rate advantage over the United States of almost 12 percentage points.¹⁰

Brazil's IT-BPO subsector also has key competencies in areas of relevance to the GTA. For example, driven by a history of instability in prices and a government committed to the development of ICT, Brazil is a front-runner in technology solutions for the financial services sector and the use of technology in the provision of public services. As a result:

- Brazil is internationally recognized as a global leader and pioneer in business-related technology solutions for the financial services sector. For example, Brazil is one of the only countries in which inter-banking fund transfers can be made electronically in real time through its Brazilian Payments System (SPB). The IT sector serves large Brazilian enterprises such as Itaú/Unibanco, Bradesco, Banco do Brasil and Caixa Econômica Federal, as well as international leaders such as ABN/Amro/Real, Santander, HSBC and Citi.⁷



Source: Brasscom, 2008

Source: PwC, 2011

Brazilian companies are increasingly investing abroad, including into Canada where their share of total FDI has grown rapidly.

This market sector generated more than US\$139 billion in revenues in 2008.

- Brazilian IT firms have developed key competencies in the segment of e-government. For example, Brazil's electronic voting system and internet-based tax-return system are internationally recognized as leading-edge successes.

The GTA has many strengths that would be considered attractive for Brazilian IT-BPO companies focused on the financial services industry:

- The GTA represents the economic core of Canada and the heart of its financial services industry, thereby offering a large market to prospective investors. Canada is already one of the most attractive markets for IT/business process outsourcing in the financial services industry.
- The GTA is the third largest financial centre in North America behind New York and Chicago.
- Canada's five largest banks are all headquartered in Toronto; they are stable, well capitalized and independent of government investment.
- The Toronto Stock Exchange is North America's third largest exchange and the world's seventh largest based on market cap.¹¹

- Toronto boasts 205,000 people working in the financial services sector alone. The clustering of financial services has attracted highly skilled knowledge workers and a multilingual labour force.
- The GTA is a world-class competitor in the ICT industry, with strong linkages to the financial services industry and related supporting industries.

In addition, the Government of Ontario's e-government initiatives may be attractive to Brazil's IT-BPO companies focused on e-government. For example, the Government of Ontario is proactively moving towards expanding online services and recognizes the complexity of transforming the way government operates.¹² With this perspective, the Government of Ontario has developed an e-government strategy aimed at facilitating this transition. As the e-government strategy evolves, the Government of Ontario will experience increasing demand for the use of IT services that support the delivery of online services.

Lastly, large Brazilian IT companies are looking to invest in foreign jurisdictions through acquisition in order to expand their markets and diversify their capabilities. Recent acquisitions of U.S. companies in the ICT sector are a positive indication of this trend but also highlight the need for the GTA to showcase its appeal to foreign investment relative to the U.S.

Conclusions

Brazil has significantly increased its level of investment in Canada's economy over the past few years. BRIC countries have increased their share of total FDI into Canada from less than 1% to nearly 5% over the past 10 years, and Brazil accounts for about half of all BRIC FDI into Canada.

Due to a combination of factors, Brazil has developed strong capabilities in the ICT sector, particularly in relation to financial services and e-government. Brazilian IT companies are some of the largest in the world.

Foreign takeovers of Brazilian IT companies by large multinationals have been increasing due to the strength of its economy. The remaining Brazilian IT companies have been expanding internationally to build additional scale and remain competitive.

Some of the largest Brazilian IT companies have already established operations in the U.S.. The GTA is well positioned to compete for this investment for several reasons:

- The GTA is home to a high concentration of the financial services sector and the Ontario government.
- The GTA's existing skilled and multicultural IT workforce.
- The current focus of the provincial government on e-services.
- Competitive advantages in tax rates and withholding taxes.

By showcasing the GTA's competitive advantages and leveraging the increasing international focus of Brazil's government on its ICT sector, the GTA has an opportunity to attract focused Brazilian ICT FDI into the GTA.

Mobile Technology sector

Defining the Mobile Technology sector

The mobile technology sector encompasses all types of cellular communication technology. The foundation of the industry consists of a few large companies led by RIM, Microsoft, Google and Apple, which supply the platforms and will be key players in future developments in the industry.

Mobile platform providers have been searching extensively for valuable content and for talented content creators in order to capture a large segment of the market and become the leading platform. At the front end, media companies, health-care services, utility companies, transit services, game publishers and other companies in a vast array of industries are developing these applications for various mobile platforms.

Carriers also play a significant role by investing in networks that enable rich multimedia content to flow at broadband speeds regardless of location. Mobile commerce (m-commerce) is a rapidly growing application of mobile technology that provides significant benefits to both businesses and consumers.

Mobile commerce is defined as any transaction with a monetary value that is conducted using a mobile device, such as a mobile phone, a Personal Digital Assistant (PDA), a smartphone, or other emerging mobile equipment such as dashtop mobile devices in cars. Our analysis has focused primarily on this subsector of the Mobile Technology sector.

Why is Mobile Commerce considered a hot sector?

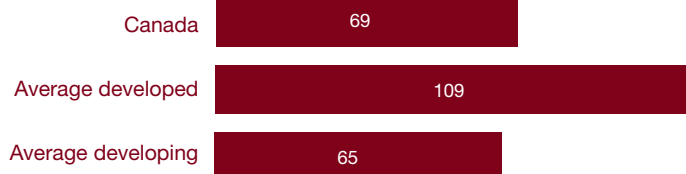
The mobile and wireless industries are largely seen as the new disruptive media, similar to the Internet in the 1990s.¹³ Mobile technology is expected to have a revolutionary impact on human interaction, communications and business by creating an interconnected network of mobile users.

The mobile technology sector is expected to grow significantly as technologies are refined and their applications expanded. The number of mobile connections is expected to increase from around 5 billion, representing a global mobile penetration rate of 74%, to 6 billion in the first half of 2012.¹⁴

Growth in mobile penetration rates has been the largest driver of overall sector growth averaging 20% annually in some emerging markets.

Mobile penetration rates, Canada and other countries

(Percentage)



Source: CBC, 2010

Historically, growth in mobile penetration rates has been the largest driver of overall sector growth. Indeed, the growth in the mobile market has averaged 20% annually in some emerging markets. Continued growth in mobile penetration, particularly in developing areas, is expected to continue to drive this overall market growth.

The mobile commerce subsector is also expected to grow significantly on a global basis over the next few years – mobile commerce revenues are estimated to reach US\$119 billion in 2015 or 8% of the total e-commerce market¹⁵. Mobile payments, mobile ticketing and mobile marketing provide significant advantages to both businesses and consumers by enabling context-specific and time-critical services as well as enhancing user efficiency.

Mobile marketing is growing in importance as it is an inexpensive instrument to increase sales and carry market research. While mobile commerce in Canada is currently lagging relative to other countries, it is also expected to grow significantly in the next few years driven by the growth in mobile penetration due to increased competition, including the increased adoption of mobile commerce, thus offering the prospect of a higher than average growth market for mobile commerce companies.

Current state of Mobile Commerce globally and in Canada

Despite being a large consumer of online data, Canada has been lagging other jurisdictions in terms of the number of mobile units per capita and the use of mobile data plans. Canada has a mobile penetration rate of 69% compared to an average among developed countries of 109% and an average of 66% among developing countries.¹⁶

The lower mobile penetration rate is primarily due high-cost rate plans and very high landline penetration rates as a low-cost alternative. However, mobile penetration rates in Canada are expected to increase at a pace faster than any other developed country in the coming years due to the increased competition among carriers in Canada, which is expected to drive lower prices for mobile and data plans.

The global mobile commerce subsector is expected to grow significantly in the next few years, whether in terms of mobile payments, mobile ticketing or mobile marketing. It is estimated that m-commerce will reach US\$119 billion in 2015 or 8% of the total e-commerce market.¹⁵ By 2014, it is estimated that 340 million global mobile users will use mobile payments.¹⁷

Around the world, retailers are increasingly implementing m-commerce applications, and success stories are growing. For example, 74% of online retailers in the U.S. are planning for m-commerce and one in five has a fully implemented mobile strategy in place.¹⁸ On average, retailers spent US\$170,000 on their mobile sites in 2010, with large multichannel retailers spending several times that amount.

eBay is currently the leading retailer in m-commerce in North America and is an example of how profitable m-commerce can become. In 2010, eBay consumers bought and sold more than US\$2 billion worth of merchandise on their mobile devices, up from \$600 million in 2009.¹⁹

Mobile ticketing (m-ticketing) is becoming an increasingly predominant aspect of m-commerce, particularly within the transportation industry. The market for mobile ticketing is expected to reach 15 billion delivered tickets by the year 2014²⁰, when it is anticipated that more than one in 10 mobile subscribers (more than 400 million) will use m-ticketing.

Mobile marketing is another area of mobile commerce area that is expected to grow significantly. The total value of the global mobile marketing and advertising market was estimated at US\$2.5 billion in 2009.²¹ With a compound annual growth rate of 41%, this subsector is expected to be worth US\$19.6 billion in 2015, representing 15.7% of the total digital advertising market.

Asian countries (particularly Japan) are leading the way in mobile payments. Mobile shopping in Japan exceeded US\$10 billion in 2009, in comparison to US\$1.2 billion in the U.S.¹⁵. European countries are heavily implementing mobile ticketing initiatives, and some African countries are at the forefront of mobile banking.

Canada lags other jurisdictions in terms of its adoption of mobile commerce. Only 8% of Canadians reported having made purchases using a mobile phone, compared to 28% for the average global consumer.²²

Mobile Commerce leaders

Leading companies in mobile commerce are predominantly located in Japan, Europe and Africa, depending on the sub-sector. For instance:

- Japanese companies are leaders in mobile payments and near-field communication (NFC). For example, since 1997, Sony's Felicia technology has enabled contactless mobile payments in Japan. Since 2004, NTT DoCoMo, Japan's biggest mobile operator, has led the massive rollout of contactless-mobile phones and contactless point-of-sale terminals in Japan based on this technology.

- European companies are leaders in m-ticketing. For example, Masabi built mobile ticketing software for the U.K. rail system, Plusdial provides mobile ticketing services to the Helsinki City Transport and HanseCom is providing and operating the nationwide mobile ticketing solution to Germany, which is coordinated by the Association of German Transportation Companies.
- Companies in Africa are at the forefront of mobile banking. For example, in Kenya and Tanzania, M-Pesa is a very popular mobile-phone-based money transfer service operated by Safaricom and Vodacom respectively. The technology was developed by U.K.-based Sagentia.

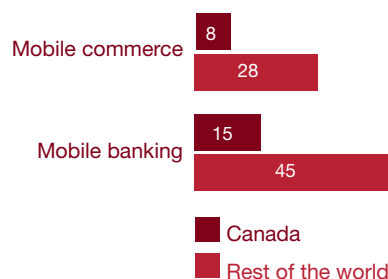
As illustrated above, mobile commerce companies are typically located where the demand for the technology is high. For instance, the Japanese are heavy mobile users, European governments are eager to gain efficiencies in their large public transit systems and there is a high demand for mobile banking services in Africa.

FDI opportunities for the GTA

The growth in mobile commerce presents significant opportunities for the GTA from an FDI perspective:

- Although Canada is lagging other jurisdictions in terms of the number of mobile units per capita and the use of mobile data plans, growing competition among carriers is expected to increase mobile penetration rates in the coming years, thus offering the prospect of a higher than average growth market to players in the mobile industry. The GTA represents the economic core of Canada and therefore offers the largest Canadian market to prospective foreign investors.
- The GTA offers potential demand for mobile commerce from large and numerous retailers.
- The proximity to the U.S. market also creates an ideal beachhead for new applications.

Use of Mobile Commerce and banking, Canada and rest of the world
(Percentage)



Source: KPMG, 2010

- One example of an m-commerce opportunity is in the area of mobile marketing. According to the Canadian Marketing Association, mobile marketing holds great promise for business. The association is collaborating with other stakeholder groups such as the Mobile Marketing Association and Canadian Wireless Telecommunications Association to support the growth of mobile marketing in Canada.
- Mobile commerce applications require numerous and diverse partnerships in order to be brought to market and the GTA benefits from the presence of potential partners at all levels of the value chain, from large telecoms to small highly specialized shops. Moreover, the GTA is the centre of Canada's financial services industry, which combined with an established ICT sector creates an ideal environment for companies in pursuit of financing and venture capital.

- The GTA is a world-class competitor in the ICT industry, with strong capabilities in wireless technologies and mobile applications and thus provides talent and know-how for companies establishing in the GTA. Several multinational telecom companies have already established facilities to take advantage of R&D capabilities in the GTA.²³ The GTA boasts a concentration of activity and a large infrastructure in mobile technology, with multiple educational and research institutions, generous government support and a concentration of ICT talent.

Despite these opportunities provided by the GTA both in terms of market opportunity and competencies in the mobile space, certain limitations and uncertainties exist:

- Canadians currently have a stronger preference for electronic commerce rather than mobile commerce. Growth in m-commerce transactions may continue to lag other countries.
- The subsegment of mobile banking may be challenging to exploit in Canada due to growing privacy and security concerns of consumers.

Conclusions

The mobile technology sector continues to expand rapidly. Canada has lagged in terms of mobile penetration rates due to a combination of factors including high-cost rate plans and very high landline penetration rates as a low cost alternative.

However, mobile competition is increasing due to the auction of new bandwidth in 2008, and this is driving lower prices for mobile and data plans, which is expected to drive increases in penetration rates.

One of the leading emerging mobile technology subsectors globally is mobile commerce, including mobile ticketing, mobile marketing and mobile payments. While Canada is currently behind other jurisdictions in terms of its adoption of mobile commerce, this lag, combined with Canada's lower mobile penetration rates, could provide an attractive investment opportunity for foreign mobile commerce companies as Canadians "catch up" to the rest of the world in each of these areas.

In addition, mobile commerce, like other mobile applications, depends heavily on a high degree of interaction across the whole mobile value chain. The GTA offers the infrastructure and strengths in related and supporting industries that would make it attractive to new FDI from mobile commerce companies.

The Mobile Technology sector is expected to revolutionize communications and business.

The mobile applications market alone is expected to be a US\$58 billion worldwide business by 2014.

Clean Technology sector

Defining the Clean Technology sector

Clean Technology is a diverse industry that spans a range of technologies. The definitions and types of technologies that comprise this sector often vary. For the purposes of this report, Clean Technology is defined as a range of products, services and processes to simultaneously achieve the following goals:

- Provide superior performance at lower cost.
- Greatly reduce or eliminate negative ecological impact.
- Improve the productive and responsible use of natural resources.

The International Energy Agency (IEA) estimates that US\$45 trillion worth of clean technology investments will be needed to achieve a 50% reduction in global emissions by 2050.

Why is Clean Technology considered to be a hot sector?

With global concerns about environmental and energy issues continuing to escalate, companies around the world are developing innovative technologies to address these concerns. Governments are also increasing their level of funding and program support for the “clean tech” sector.

The development of clean technology is not simply a “nice thing to do” for the environment. It provides a range of market opportunities. The International Energy Agency (IEA) estimates that US\$45 trillion worth of clean technology investments will be needed to achieve a 50% reduction in global emissions by 2050.

Companies are not only investing domestically but are also expanding into foreign markets. For example, European and American companies are currently investing in clean technologies in the GTA.

Both public and private sector development have helped to support the sector. For example, in 2010, venture capital investments in the renewable energy sector have been estimated to total US\$5.6 billion.²⁴

Additionally, over the last several years, many governments have allocated a green technology component to stimulus packages. For example, Sustainable Development Technology Canada estimates that globally, US\$430 billion for clean technologies was allocated as part of these government stimulus packages.

Current state of Clean Technology globally and in Canada

Clean Technology is an emerging sector, demonstrating growth around the world. While many countries are sharing in this growth, California in the U.S., Denmark and Germany possess particular strengths across the sector. For example, there are an estimated 432,000 jobs within California’s clean technology sector.²⁵ In Europe, Denmark is not only developing the clean technology sector domestically, it tripled its energy efficiency exports between 1998 and 2008. Additionally, Germany was a top exporter of clean technology in 2010 and environmental technology is expected to contribute 14% of Germany’s GDP by 2020.²⁶

Globally, there are numerous clean technology companies, from small R&D-based companies to large multinational companies that are leveraging their existing strengths and entering the market.

Both domestic and foreign companies are currently investing in clean technology in Ontario and the GTA, including large companies with operations in multiple jurisdictions. The GTA has already proven itself as an attractive option for clean technology investment. For example, GE Canada recently committed to investing \$40 million into a Grid IQ Innovation Centre in Markham.²⁷ Similarly, foreign companies, such as Denmark’s The Rockwool Group, an energy efficiency company, have invested in Ontario.

Government policy and initiatives in Ontario, specifically incentives for the development of renewable energy, are also helping to facilitate the development of a clean technology cluster in the province.

FDI opportunities for the GTA

While there are a wide range of high-growth clean technology subsectors, Smart Grid Technologies was identified as a subsector having a high degree of FDI potential for the GTA.²⁸ The smart grid is a combination of technologies designed to modernize electricity grids and allow for two-way communication between the generator and the consumer. This market is expected to grow to US\$100 billion by 2030.

Industry leaders investing in the smart grid subsector include large multinational ICT, electronics and power companies such as IBM, Cisco Systems, Siemens, GE and ABB Group. Even companies such as Google that are not traditional players in this industry are leveraging their existing industry strengths to enter the smart grid market. Many of these companies already have a presence in the GTA, however their current operations relate to their other business units. Accordingly, attracting additional clean tech investments from these companies represents a key opportunity to increase new FDI in the GTA.

The GTA has many strengths that would be considered attractive for companies focused on investing in smart grid technologies:

- The GTA shares many of the same characteristics as the jurisdictions leading in the clean technology sector including:
 - Supportive government policy including mandating the use of smart meters.
 - Vibrant related and supporting industries.
 - Research and development expertise.
- Ontario has introduced legislation that has set targets, standards and requirements aimed at reducing the environmental impacts of energy production in the province. These have the potential to generate an increase in the demand in many of the clean technology segments, including the smart grid subsector.
- Ontario is implementing government policy and initiatives aimed at addressing climate change and environmental issues. Factors such as provincial greenhouse gas emissions targets, renewable energy growth and water-related concerns help to provide the demand for clean technologies. For example, the *Green Energy Act* introduced in 2009 prioritizes the importance of achieving a high level of energy efficiency and outlines the importance of the smart grid. In support of the smart grid, the Ontario government is expected to provide \$50 million in funding in 2011.
- The need to modernize Ontario's aging electricity distribution grid provides the opportunity to integrate smart grid technologies into an existing project.
- Ontario also offers a financial incentive (a feed-in tariff) for renewable energy developers. While this support does not directly impact the smart grid, it does help to facilitate the development of a clean technology cluster. As renewable energy companies invest in opportunities within the province, other clean technology companies may recognize Ontario as an appealing location to harness related knowledge and expertise and build upon the success of renewable energy companies. Similar to other countries with renewable energy incentives, it is anticipated that over time the incentive will decrease, however the clean technology cluster will remain.
- Ontario's strong R&D expertise across a number of industries combined with a highly educated workforce provides an attractive environment for developing and advancing clean technologies. Numerous organizations involved in R&D and commercialization are located in the GTA. For instance, the Ontario Centres of Excellence has developed a centre of excellence focused on energy.
- Ontario is home to several supporting industries including ICT that are related to smart grids.

While the GTA has many strengths that it could leverage in attracting FDI in smart grid technology, there are also challenges:

- Many jurisdictions are now focused on clean technology and there is increasing competition in the sector.
- While venture capital has helped support the development of clean technology in leading jurisdictions, particularly in California, venture capital is not as prevalent in Ontario and the GTA in this emerging sector.

Global demand for clean technologies was estimated at US\$1 trillion in 2009, and is expected to continue to grow.

Conclusions

With global concerns about environmental and energy issues continuing to escalate, companies around the world are developing innovative technologies to address these concerns. Governments are also increasing their level of funding and program support for the clean technology sector.

Smart grid technology represents a clean technology subsector having a high degree of FDI potential for the GTA that leverages the GTA's strengths.

These strengths have already helped the GTA to attract smart grid investment, as evidenced by GE Canada's recent \$40 million investment into a Grid IQ Innovation Centre in Markham. Emerging clean technology leaders in the smart grid subsector include large, multinational conglomerates that are leveraging related strengths to focus on smart grid technology. Many of these companies already have operations in the GTA related to their other business units.

Accordingly, these large multinational companies, particularly those currently located in the GTA, represent a key opportunity to attract new FDI in the GTA.



Summary conclusions

The Digital Games sector in the GTA has performed well over the past several years and is poised to take advantage of the increasing shift to mobile and online games. However, it will likely continue to face strong competition from other jurisdictions in Canada and internationally that have more established digital games sectors. Our analysis of the three emerging sectors initially selected for review – Brazil's ICT sector, Mobile Technology sector and Clean Technology sector – indicates that there are strong potential FDI opportunities for the GTA in each of these sectors, particularly in the following subsectors:

- **Brazil ICT sector** – with a focus on the IT subsector relating to financial services and e-government.
- **Mobile Technology sector** – with a focus on the Mobile Commerce subsector.
- **Clean Technology sector** – with a focus on the Smart Grid Technology subsector.

As the economic core of Canada, the GTA provides the following advantages for attracting FDI investment in each of these sectors and subsectors:

- A large market locally but also a gateway to the larger North American market. Canada has a corporate tax advantage over the US but can also be a beachhead to the US market.
- Many established and thriving supporting and related industries which are particularly relevant given the impact of technology on the interconnectedness and convergence of industries. The GTA's strong financial services industry also facilitates the pursuit of financing and venture capital.

- A skilled, multi-ethnic, multi-lingual workforce, driven in part by an abundance of academic institutions offering advanced programs directly related to the areas of opportunity discussed above.
- Significant government support in the technology space that aims to help Ontario get a share of the highly profitable and high-growth emerging technology markets. Support is provided in various forms and ranges from direct funding to key industries to tax incentives.

Focused and targeted marketing strategies, value propositions and sales efforts for each of these sectors should help further scope, size and validate the GTA's ability to attract FDI in each of these sectors.



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