Perspective

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What Quebec sectors have potential?

All sectors, or nearly all, can have growth potential. Is this going too far? Perhaps not, since developing and using new technologies substantially change how we think about an activity. Which sectors should Quebec focus on in the years to come to ensure growth? Some major fields of activity have more potential than others, including the environment, energy, security, health, information management and processing, and proximity. Here is a quick overview of the sub-sectors that hold promise for Quebec's economy over the coming decade.

HOW DO WE IDENTIFY SECTORS WITH POTENTIAL?

A few organizations and departments (Investissement Québec, the Montreal Clusters, Ministère des Finances et de l'Économie (through the niches of excellence[1] in particular) have, over the years, identified the sectors they wish to focus on. The choices are not identical across all entities, but there are similarities. Some of the most frequently mentioned are aerospace, ICTs (information and communication technologies) and biotechnologies.

One way to identify growth sectors, is to associate them with the major or fundamental trends that hold sway in Quebec, the Western world or even the entire planet (table 1). The growing concern about the environment is one of them. The search for better energy performance or reductions to consumption in an increasingly energy-hungry society is another. Concerns about safety and security for individuals, businesses and governments are increasingly central. The health issue is almost unavoidable at this point, while the issue of information and content management (data, images, sound and so forth) is an increasing one in this context. When the watchword is efficiency, the proximity of people and spaces becomes a challenge that must be met.

These major trends do not cover all of the undercurrents affecting Quebec. Rather, they are a way of examining a difficult issue, the matter of identifying sectors with potential.

[1] Regional niches of excellence identified for the purpose of the ACCORD program (concerted cooperative action for regional development) set up by the Ministère des Finances et de l'Économie du Québec (MFEQ)

Table 1 – Promising sectors: An initial evaluation grid by area of activity

Area of activity	Specific aspects
Environment	Prevention - Protection
Energy	Production - Economy
Security	People - Business - Government
Health	Human - Animal
Information management and processing	People - Business - Government
Proximity	People - Places

Source: Desjardins, Economic Studies

THE ENVIRONMENT TREND

If there's any category that could cover almost all types of businesses, it's this one. Concern for the environment is being expressed in a wide range of actions (table 2). Here are a few of them: prevention (avoiding waste from the design stage of products and services, preventing adverse impacts), protection (people, habitat, etc.) and remedial action, which involves recovery and clean-up once damage has been observed.

Table 2 – Environment: Prevention - Protection Sample sectors

- Clean technologies
- Environmental bioindustries (valorization of industrial materials, recycling)
- Eco-building
- Biomass valorization
- Plastics
- Composite materials, "green" chemistry

Sources: Ministère des Finances et de l'Économie, Investissement Québec and Desjardins, Economic Studies

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In this vein, many sectors seem to have a brilliant future, such as clean technologies (or Clean Tech), the production of energy that does not pollute as much as fossil energy (wind power, solar power, hydro power, tidal power and so forth), forest development, valorization of waste materials (from sludge to industrial waste, institutional waste, waste from the housing sector, etc.), biodegradable materials and eco-building are all promising sectors.

Currently, clean technologies are stealing the show, as they are associated with sustainable development. They cover many activities, from waste management and use of biomass to water and air clean-up and even operations intended to reduce emissions and waste. In short, solutions must be found to the problems plaguing Quebec businesses and its economy, problems that also affect the health of workers and the general public. According to the 2013 edition of the *Canadian Clean Technology Industry Report*, the global clean tech market is estimated at $1,000 billion; at the speed it is currently expanding, it may have tripled in size by 2020.

There are developments in "green chemistry": biocomposites, bioplastics, eco-materials, bioproducts and bioprocesses. In short, anything that strives to leave the smallest possible environmental footprint, to in some way minimize effects on the environment. With bioplastics, for example, the idea is to develop polymers from renewable resources so as to replace petroleum-based polymers.

Farming is one sector that has been under-recognized for its developments and the research effort that has been made to reduce its environmental impact. Here, research and trials have been ongoing for quite some time with respect to handling manure, as well as for calculating the amount of food required to produce each kilo of meat, known as the feed conversion ratio. In this sector, examples abound. As the farming issue touches on the health issue, the pressure is twofold.

ENERGY: MEETING GROWING DEMAND

Globally, access to energy is key at a time when demand from emerging economies is increasing almost exponentially. While Quebec is a hydro-power champion, we cannot simply sit on our laurels. We have to think efficiency and performance, and consider alternatives as well. Here, wind power has come a long way in the last few years and has already reached a good cruising speed. Due to recent events, the development potential is no longer the same.

Industrial design can also make a valuable contribution to the drive for efficiency and reducing energy costs, in more than just housing. There are many applications in transportation. Making carriers lighter (land and air, in particular) is a big challenge in reducing energy consumption. Here, developing new materials and using light metals are also potential avenues. The drive for better utilization of energy is not about to lose momentum.

Even a conventional sector such as mining has promise through the development of "rare earth". With respect to energy, it is used in the wind power and auto sectors. It is also prized in metallurgy, medical applications, and in the glass industry, to name just a few.

Lastly, the search for new ways to deal with the energy issue will lead to further developments that we cannot even conceive of today. It is a huge field that will affect many activity sectors (table 3).

Table 3 – Energy: Production - Economy Sample sectors

- Energy: production and transportation
- Chemicals
- Construction
- Industrial design
- Transportation logistics
- Wind power
- Light metals

Sources: Ministère des Finances et de l'Économie, Investissement Québec and Desjardins, Economic Studies

SECURITY, A GROWING CONCERN

Security is not a new issue. Since the start of the new millennium, security questions have frequently been tabled, from food security (quality, safety, quantity), people's safety (citizens, police officers, firefighters, military personnel), businesses (trade secrets, financial information) to governments (information on citizens, decision-making processes, management, public finances, etc.): all facets of this issue require answers. As means of communication evolve, solutions for maintaining and increasing the security that citizens, businesses and governments demand will have to be updated as well, making this type of activity almost perennial.

Help from many sectors is required in this context (table 4). IT firms and companies developing software to protect information and fight piracy are front and centre. While the manufacturing sector often takes centre stage, service firms can also claim the title of promising sector.

Table 4 – Security: People - Business - Government Sample sectors

- Agrosecurity
- Microelectronics
- Optics-photonics
- Technical textiles
- Information services and software
  Nanotechnology
- Information and communications technologies

Sources: Ministère des Finances et de l'Économie, Investissement Québec and Desjardins, Economic Studies

Physical security is another facet of the issue. The optics and photonics industry can provide detection and traceability tools, with numerous applications: human health, chemicals, medical environments, soil and air protection and so on.

Developments in this area are not limited to computer tools or upgrading measurement equipment (sensors, detectors, etc.). Upgrading "physical barriers" like technical textiles is a booming business. Some thought the textile sector was a dinosaur, but in fact it holds lots of promise with niche products developed in Quebec for fire protection, chemicals, liquid filtration and combating soil erosion. Today, safety and security concerns are elevated and are likely to remain so for some time to come. This is why companies operating in this niche are banking on their ability to develop relevant responses to current and future problems.

HEALTH, A CENTRAL TREND

Health is a huge concern from the media perspective as well as in government budgets, and it does not seem poised to diminish. In services, research and development and manufacturing, the businesses operating in this sector are proliferating (table 5). Life sciences and biotechnology are buzz words that cover a large number of activities associated with health.

Table 5 – Health: Human - Animal Sample sectors

- Life sciences
- Nanotechnology
- Information and communications technologies
- Pharmaceuticals
- Health food
- Health and biotechnology
- Medical technical textiles and technical clothing
- Optics-photonics

Sources: Ministère des Finances et de l'Économie, Investissement Québec and Desjardins, Economic Studies

In a way, the pharmaceutical industry is the figurehead for promising sectors in the field of health. It is much bigger, to the point that there was a need to tighten the connections. This is why a life sciences "cluster" was created: Montréal In Vivo. Fine-tuning products and services pertaining to health maintenance, patient care, convalescence or independence in the sunset years are facets that respond to needs that are growing and will continue to grow.

In health as elsewhere, research creates new opportunities. Nanotechnologies[2] have an eye on the health sector, as do the optics, photonics and laser sectors. Biophotonics is used to create imaging and diagnostics tools, to develop analytical tools, and also to provide therapy and intervention. These discoveries are often associated with business opportunities to market promising ideas or to provide equipment that supports the activities.

INFORMATION MANAGEMENT AND PROCESSING

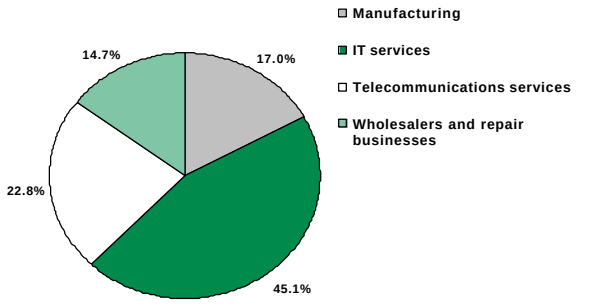
Currently, we have to handle a deluge of data, texts, images and sounds that are used at work, in government management, and in our personal lives. There is a consensus on the relevance of information and communication technologies (ICTs).

This sector appears on almost every list of "promising sectors." In Quebec, the sector has around 120,000 workers and 7,800 facilities in both manufacturing and services. It alone represents 5.1% of real GDP according to a survey carried out by the Ministère des Finances et de l'Économie du Québec (MFEQ). The industry is constantly reinventing itself and is making massive investments in research and development to keep pace. Moreover, the proliferation of platforms and applications being developed indicate huge future opportunities. Gartner assessed annual global spending on ICTs at US$3,600 billion in 2012, up by about 2.9% from the year before.

[2] "Nanotechnology" is a generic term that describes applications in many scientific fields; in general, it covers research into the properties and principles that exist at the nanometric level, that is, at the atomic and molecular level (source: www.actu-environnement.com).

The image of Quebec's ICT industry has changed a lot since the start of the 2000s, prior to the sweeping consolidation that hit the sector. Currently, ICT workers are primarily employed in services (graph 1); manufacturing now only accounts for a smaller proportion of the jobs. According to the MFEQ's look at the industry, Quebec has expertise in telecommunications, micro-electronics and instrumentation at both the product development and manufacturing levels. In terms of computer services and software, two niches are booming: development of Web services and applications such as video games. For telecommunications services, development of online services is ongoing. Moreover, mobile applications are legion; who knows what the next few years will bring? One of Quebec's major assets is its proximity to the U.S. market, which accounts for more than 20% of global spending on information technology.

Graph 1 – Number of jobs per ICT sub-sector in Quebec – 2009



Sources: Statistics Canada's CANSIM database and the Ministère des Finances et de l'Économie du Québec

Quebec has the advantage of creative, stable, expert and multilingual labour as well as having a multitude of competitive, agile small and mid-sized businesses. Moreover, it can support the efforts of business through a wide range of research infrastructures and advantageous fiscal measures. ICTs are entrenched in Quebec, as shown by the various regional agreements and niches of excellence that join forces, and the Information Technology cluster in the metropolitan area.

The strength, creativity and even the future of ICTs depends on demand. However, it is also based on the ties it can create with other technologies (table 6). Combining expertise makes opportunities in ICTs proliferate. The major information management trend must therefore also include optics, photonics and laser technology among the applications that reach well beyond detection and traceability. Nanotechnology must also be considered. Applications are already emerging in the miniaturization of micro-electronic components.

Table 6 – Information management and processing: People - Business - Government Sample sectors

- Information processing (sound, images, data)
- Nanotechnology
- Telecommunications equipment
- Optics, photonics
- Computer services
- Software (all sectors combined: from accounting to video games)
- Multimedia
- Development of new communications platforms

Sources: Ministère des Finances et de l'Économie, Investissement Québec and Desjardins, Economic Studies

PROXIMITY OF PEOPLE AND PLACES

The larger need for proximity of people and places may not seem to be a priority and could be overlooked. Why spotlight it along with the other trends? Because seeking proximity opens up prospects for certain sectors of activity. The success of social networks in recent years is an indicator of the need to bring together people and ideas. In this spirit, information and communication technologies are once again becoming a promising sector (table 7).

Table 7 – Proximity: People - Places Sample sectors

- Logistics and transportation
- ICTs
- New materials (including aerospace)
- Marine transportation
- Land transportation
- Advanced technologies in transportation equipment and logistics
- TOD (Transport Oriented Development) area projects

Sources: Ministère des Finances et de l'Économie, Investissement Québec and Desjardins, Economic Studies

However, the major trend to reduce energy consumption and make it more efficient is also driving towards greater proximity of people and places. Applications that are designed to streamline and speed up travel are promising. More than ever, transportation logistics are required. Lighter materials in aerospace, land, rail or marine transportation are all avenues for meeting both the growing need for proximity and the need for efficiency in the use of fuel.

Similarly, residential "TOD" (Transit Oriented Development)[3] projects are another way to cover several trends, including proximity. They aim to develop urban nodes around public transit poles.

AN ACTIVITY SECTOR ISSUE?

This brief analysis does not claim to be a comprehensive review of promising sectors. The idea is rather to set the stage for contemplating the question. Decompartmentalization seems to be a cornerstone in expanding the opportunities a given sector has. Combining sectors is promising. Moreover, if an activity can deal with more than one concern, from environment, energy, security, health, information management and processing to proximity, it is more appealing yet.

A sector has potential insofar as it is possible to expect substantial spinoffs in the area of employment, revenue, business creation or even the development of internationally renowned expertise. However, the best idea in the world may go nowhere if not properly organized. It must meet a need, be part of a promising trend and create a real edge over the competitors. Success is also dependent on the quality of the workforce. This aspect depends on both entrepreneurs and the educational environment. Another asset is the presence of research centres, regardless of whether or not they are tied to the educational sector. Other factors can help promising projects see the light of day: membership in a network, knowledge of the markets and, as needed, for those oriented towards foreign markets, levers for export (marketing, financing, procedures, etc.). In short, a good idea does not stand alone.

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[3] A TOD is a medium- to high-density development sector that is located within walking distance (400 metres) of a major point of access to the public transit network; it offers opportunities for housing, employment and trade, and is designed around pedestrians but does not exclude automobiles. A TOD can be a new project or a redevelopment of a sector whose design makes it easy to use public and active transportation (Source: www.forumurba2015.com).