



The Economic Impact of Universities in the Atlantic Provinces

The Current View 2006 - 2008

For:

**The Association of Atlantic
Universities**



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Consulting Economists Ltd**

May 2010



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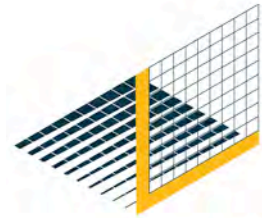
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SUMMARY

Operations

The Atlantic universities represent a **\$2.0 billion** industry, based on expenditures for annual wages and salaries, and operations and maintenance. The following provides an update of key indicators for an earlier study reporting on 2004 data. Information for this report was gathered from Atlantic Universities and Statistics Canada sources.

- ❑ **Operations: \$2.0 billion** – was spent by universities on operations in fiscal 2008, including \$1.1 billion on salaries and benefits (up 10% from 2004), and \$848 million on a wide range of other goods and services (up 34% from 2004).
- ❑ **Faculty and Staff Employment: 16,261 full-time equivalent (FTE)** – faculty and staff were employed by Atlantic universities (same as in 2004), 13,654 full-time and 5,214 part-time. This accounts for 1.3% of total employment in the Atlantic Provinces. Universities located in provincial capitals account for 3 to 7% of employment, while those found in smaller towns account for up to 35% of total employment.
- ❑ **Income: \$1.1 billion** – (up 10% from 2004) was spent by Atlantic universities on payroll (salaries and benefits). Universities located in provincial capitals generate 2 to 8% of earned income in their community, and those in other towns account for up to 90%.
- ❑ **Construction: \$110 million** – was invested in 2008 by Atlantic universities for new and renovated facilities to improve education services offered and to foster greater research capability. This is comparable to the average annual capital expenditure, 2000-'04.

Economic Impacts

The analysis captures the impacts of university expenditures, including impacts arising from student and visitor expenditures. Economic impacts are measured using conventional indicators: Gross Domestic Product (GDP), employment and labour income.¹

- ❑ **Gross Domestic Product (GDP): \$2.6 billion** – (up 31% from 2004) total value of local economic activity (excluding imports from other provinces or countries).
- ❑ **Total Employment: 38,371 jobs** – (up 40% from 2004) for every job created in the universities, nearly one other job is created elsewhere in the economy.
- ❑ **Income: \$1.9 billion** – (not reported in 2004) for every \$1,000 of wages and salaries on campuses, over \$650 is earned elsewhere in the economy.
- ❑ **Tax revenue: \$496 million** – (up 6.4% from 2004) total personal and corporate taxes collected by the federal and provincial governments as well as GST, HST and PST as applicable.

¹ The Statistics Canada Interprovincial Input-Output model is used to estimate economic impacts. This model is recommended for long-term consistency in future reporting.

Domestic and International Students

Atlantic universities register over 85,000 students (down 7% from '04/'05), many of who are from outside the region or the country and represent exports for each province.

- ❑ **Domestic students from out-of-province: 25%** – of total enrolments are Canadians from outside the province of study. This represents a domestic export for the provinces.
- ❑ **International students: 9.3%** – of total enrolments are from outside Canada.
- ❑ **International exports: 6.1%** – of all economic impacts are attributed to international students including: 2,425 jobs across the Atlantic region, \$120 million worth of income, and \$30 million in federal and provincial tax revenue.

Research and Development

Research and Development (R&D) Spending: The higher education sector in Atlantic Canada performs 57% of research (down from 63% in 2004), followed by the business sector (28%), the federal government sector (14%), and others (1%). Unlike other regions in Canada, the university sector occupies the central role for conducting R&D. This does not include the ultimate economic impact of R&D; the research results that drive innovation in support of industry and social growth.

Springboard Atlantic Inc and Spin-off Company Activity: Fourteen Atlantic Canadian universities and five community colleges have formed Springboard Atlantic Inc. (Springboard) with funding from the institutions themselves and from the Atlantic Canada Opportunities Agency (ACOA) through the Atlantic Innovation Fund (AIF) program. University members of Springboard Atlantic Inc report growth in key innovation indicators from 2005 to 2009:

- ❑ **Filed patent applications** - more than doubled to 66 per year,
- ❑ **New licences** – increased nearly four-fold to 27 per year,
- ❑ **Licensing and royalty income** – increased nearly four-fold to \$921,000 per year,
- ❑ **Industry-sponsored contract research** – increased 45% to \$33.4 million per year.

I UNIVERSITY EXPENDITURES

1. OVERVIEW

The Atlantic universities represent a **\$2.0 billion** industry (2008), based on their direct expenditures for wages and salaries, operations and maintenance, and a wide range of products and services they require annually. These expenditures support jobs and income both on campus and elsewhere in the local and regional economy. Further benefits arise from spending by students and visitors on goods and services from merchants and service providers in the community.

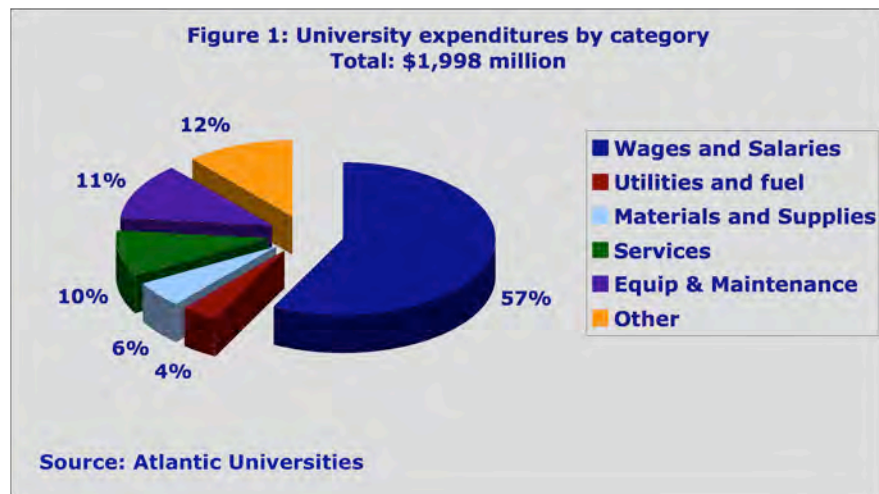
The analysis focuses primarily on the immediate economic impact of these expenditures, but will also include some discussion of further benefits from research and development (R&D) activities. The immediate impact refers to just the spending effects, not the broader and longer-term economic impacts resulting from increased knowledge. The knowledge impacts of universities result from the entry of graduates into the workforce where they influence productivity and innovation.

The data to support this analysis and the resulting impact estimates are drawn from the universities and Statistics Canada. Each university provided a breakdown of operating and capital expenditures according to specified categories, as well as employment figures for full- and part-time faculty and staff. They also provided detailed information on student enrollment by level, full-time and part-time status, and origin.

2. EXPENDITURE CATEGORIES

Wages and salaries represent the largest expense

The nearly \$2 billion in university expenditures (Figure 1) is mainly comprised of: wages and salaries (57%), other expenses (12%), equipment and maintenance (11%), and services (10%). The main operational expenditures (wages and salaries) and capital expenditures (building and land development) are described further in sections below.



Though most purchases are made from local (Atlantic Provinces) sources, the import content of the products varies widely.

- Among the goods and services with *high local content* are utilities, communications, engineering services, maintenance and food service. These have a greater impact on local economies.
- The goods and services with *high import content* tend to be specialized items, often purchased in limited quantities including laboratory equipment, computers, text books, insurance and travel services. These have reduced impacts on local economies.

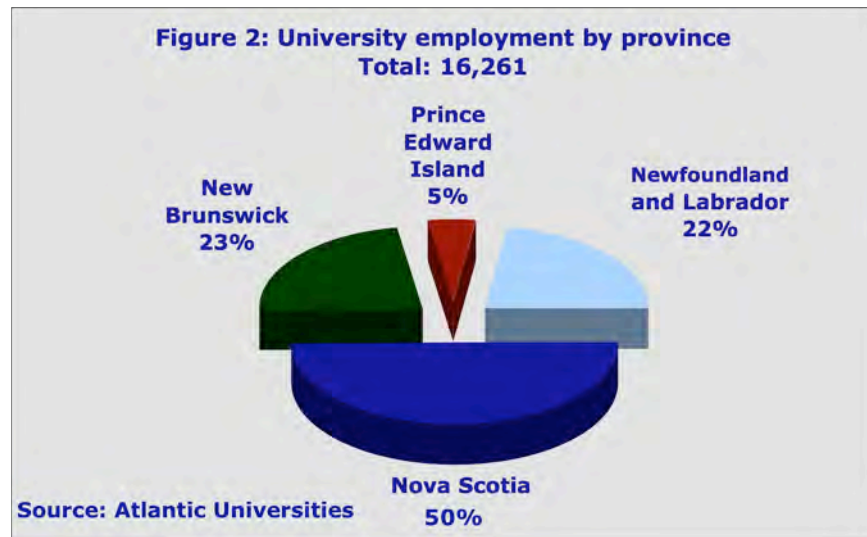
Within the "other" category the largest item is scholarships, bursaries, and prizes, but the category also includes other operational expenditures, interest payments, and costs associated with goods sold by the universities.

3. EMPLOYMENT AND INCOME

Universities generate substantial employment in their communities

Wages and salaries represent the largest operational expenditure for the university sector. The Atlantic universities employ 16,261 faculty and staff, 13,654 full-time and approximately 5,214 part-time. In addition to faculty and staff, 3-4,000 students not included in these figures are employed as researchers, teaching assistants and demonstrators, and other support roles. This also does not include

additional employment generated directly from other operations and capital expenditures that are discussed later as part of total economic impacts. The universities accounted for 1.3% of about 1.2 million employed in the Atlantic Provinces in 2008. Universities represent about 2.2% of the full-time full-year employment, since proportionally more university jobs are available full-time compared to the rest of the economy. The distribution of university employment by province is depicted in Figure 2.



The employment impact intensifies as the focus narrows to the local economies where the universities are located. The employment impacts for universities in their communities are set out in Table 1. The figures for the universities combine full-time positions with an estimate of full-time equivalent employment for part-time positions (excluding students). Some universities have several campuses providing benefits broadly across the provinces, however the focus here is on the main campuses and the impacts in their communities.

- ❑ The universities in the provincial capitals account for 3 to 7% of total employment in their respective economic areas.
- ❑ The universities in some of the smaller towns dominate the town economies, accounting for up to 35% of total employment. The universities often are the largest employers in the community.

Table 1
Atlantic universities relative employment impact

University and economic area		Employment		University as % of economy
		University	Economy	
MUN	St. John's ¹	3,315 ²	88,130	3.8%
UPEI	Charlottetown	779	15,600	5.0%
DAL SMU MSVU NSCAD AST UKC	Halifax Regional Municipality	6,033	199,510	3.0%
ACA	Wolfville	554	1,635	33.9%
StFX	Antigonish	706	2,010	35.1%
CBU	Sydney area ³	332	23,732	1.4%
NSAC	Truro	299	5,280	5.7%
USteA	Clare	158	3,865	4.1%
UNB STU	Fredericton ¹	1,866	26,940	6.9%
UdeM	Moncton	999	33,445	3.0%
Mt. A	Sackville	455	2,640	17.2%

1. Employment data for Memorial and UNB include only faculty and staff at the St. John's and Fredericton campuses.

2. Employment at Memorial University is significantly lower than expected and this may relate to a change in the way the university reports employment levels.

3. Sydney area includes NW Sydney, SE Sydney, Sydney Mines, Sydney River, N Sydney, New Waterford, Glace Bay and Membertou. Data Source: Province of Nova Scotia, Community Counts

Another, and arguably more meaningful, way to understand the relative economic importance of the university "industry" in each economy is to compare it with employment levels in other key industries. The figures in Table 2 make it clear the universities are at least on a par with other leading industries, and in many cases exceed employment levels in those industries.

- ❑ Memorial University in St. John's is comparable to the provincial government, exceeding the employment levels in the wholesale trade and financial services sectors.

- ❑ UPEI in Charlottetown is comparable to the wholesale trade and financial services sectors.
- ❑ Employment at the cluster of six universities in Halifax exceeds that of the provincial government, and is equivalent to the federal government.
- ❑ Employment at UNB and St. Thomas exceeds nearly all other sectors listed, with only the provincial government showing higher employment.

Table 2
Employment levels – universities vs. other sectors in their community

	Halifax	St. John's	Fredericton	Charlottetown
Universities	6,033	3,315	1,866	779
Manufacturing	11,015	4,360	1,810	1,600
Wholesale trade	8,630	3,255	1,175	805
Finance & insurance	9,310	2,630	1,350	850
Federal government	6,105	3,925	1,275	2,040
Provincial government	4,370	3,530	3,440	1,905

Source: Statistics Canada and Atlantic universities

At the provincial scale, the full university complement can be compared to other sectors in each provincial economy (Table 3). Universities are mainly centered in larger communities therefore the impact at the provincial level is somewhat smaller. The size of the provincial government sector provides a benchmark for comparison and university employment ranges from one-third in Prince Edward Island, to nearly the same size as the provincial government in Nova Scotia.

Table 3
Employment levels – universities vs. other sectors in each province

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island
Universities	8,079	3,683	3,721	779
Manufacturing	37,228	14,972	32,074	5,734
Wholesale trade	17,410	5,778	10,460	2,188
Finance & insurance	14,968	5,943	11,802	1,755
Federal government	12,870	5,566	8,646	3,324
Provincial government	9,314	6,147	9,480	2,159

Source: Statistics Canada and Atlantic universities

University income impact reflects high average salaries

The Atlantic universities' total payroll (salaries and benefits) amounted to about \$1.1 billion. Virtually 100% of this was paid to residents of the towns and cities in which the universities are located.

University faculty and staff tend to be paid above the average incomes in their respective communities. This reflects not only the additional investment faculty make in order to earn advanced degrees, but also the fact that universities have to compete to attract academics who combine the highest standards of teaching and research. Consequently, the university payroll creates an economic impact on local economies that exceeds substantially the relative employment impacts. This is evident by comparing the impact percentages in Tables 1 and 4, where Table 4 percentages are higher.

- ❑ Across university communities, the income of faculty and staff is about one-third greater than the average in their communities, and in some cases it is more than double.
- ❑ The universities generate from 2 to 8% of the earned income in the major urban centres in the Atlantic Provinces.
- ❑ In the smaller university towns, faculty and staff salaries account for up to 90% of the income generated in their communities.

Table 4
Atlantic universities relative income impact

University and economic area		Earned income (\$000s)		University as % of area economy
		University	Economy	
MUN ¹	St. John's	217,817	3,574,778	6.1%
UPEI	Charlottetown	56,349	1,020,354	5.5%
DAL SMU MSVU NSCAD AST UKC	Halifax Regional Municipality	350,121	7,811,524	4.5%
ACA	Wolfville	40,662	45,437	89.5%
StFX	Antigonish	48,715	126,603	38.5%
CBU	Sydney area ²	25,529	617,307	4.1%
NSAC	Truro	16,763	681,133	2.5%
USteA	Clare	10,139	126,242	8.0%
UNB ¹ STU	Fredericton	134,834	1,667,536	8.1%
UdeM	Moncton	74,876	2,338,161	3.2%
Mt. A	Sackville	28,607	94,535	30.3%

1. University income for faculty and staff at main campus only.

2. Sydney area includes NW Sydney, SE Sydney, Sydney Mines, Sydney River, N Sydney, New Waterford, Glace Bay and Membertou. Data Source: Province of Nova Scotia, Community Counts
Source: Statistics Canada and Atlantic universities

Universities represent not only a generator of high-paying jobs, but also highly stable jobs:

- ❑ Unlike many enterprises in the regional economy, universities tend to be less vulnerable to the swings in the business cycle. The Region experienced considerable job losses over the last decade as competitive forces resulted in corporate consolidations.

- University jobs are valuable as well because most are full-year and full-time. This may seem like a minor consideration to many observers who believe the vast majority of jobs in urban centres are full-year and full-time. But this is not the case. The 2006 Census data show that in the Atlantic region *only 49% of those reporting earned income held full-time jobs that lasted a full year.*

4. CONSTRUCTION

Development of buildings and land represents the largest capital expenditure for universities. The Atlantic universities invested just over \$110 million in construction of buildings and land development. These projects provide important work opportunities for the Region's contractors and construction trades. More importantly, these investments allow the universities to respond to three main drivers:

- **Increasing demand:** with a return to enrolment growth in the late 1990s, particularly among students from outside the Region, universities faced increased demand for expanded residential facilities and classroom space.
- **The need to compete:** in order to maintain a strong competitive position with universities elsewhere in Canada – both for students and faculty – the Atlantic universities needed to invest in specialized facilities in such areas as computer science, natural and physical sciences and management.
- **Foster research capability:** to take advantage of increased funding, the universities have invested in new facilities and equipment, thereby positioning themselves to play an even stronger role in Canada's innovation agenda. The Atlantic universities compete with institutions across Canada and the U.S. both for funds and the top-flight researchers to carry out the work. State-of-the-art facilities form a vital underpinning to success.

II ECONOMIC IMPACTS

1. DIRECT SPENDING AND EMPLOYMENT

Spending of \$2.0 billion and 18,868 jobs

Direct spending by Atlantic universities amounted to an estimated \$2 billion and employment of 18,868 jobs (Table 5). These figures are relatively unchanged since 2004. The university spending includes all wages and salaries, operations and maintenance, and capital projects. Student spending off-campus for accommodation, food, and other university-related goods and services amounted to \$454 million across the Atlantic region (up 13% from 2004).

Table 5
Atlantic universities summary of direct spending and employment
(expenditures are in \$ millions)

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
University expenditures					
Operations	\$835	\$462	\$479	\$111	\$1,887
Capital	\$52	\$13	\$28	\$18	\$110
Total	\$887	\$475	\$507	\$129	\$1,998
Student off-campus expenditures					
Accommodation	\$83	\$19	\$42	\$7	\$151
Food	\$79	\$32	\$44	\$8	\$163
Other	\$67	\$27	\$38	\$7	\$139
Total	\$228	\$79	\$124	\$22	\$454
University employment					
Full-time	6,386	3,471	3,143	654	13,654
Part-time	3,386	424	1,155	249	5,214
Total	9,772	3,895	4,298	903	18,868

Source: Atlantic universities

2. TOTAL ECONOMIC IMPACTS

Impacts extend beyond direct employment and income

University spending generates immediate economic activity, and also so-called “spin-off” activity in the wider economy through what is commonly known as the multiplier effect. Economists divide these activities into three categories according to the type of expenditure:

- **Direct** – this captures the impact from university spending on goods and services including the employment of faculty and staff, the income they earn and the taxes they provide to governments. It also captures the increase in economic activity through the purchases required for operations and delivery of academic and research programs.
- **Indirect** – this captures the increase in economic activity occurring elsewhere in the economy in the production of the primary and intermediate goods and services purchased as inputs by suppliers of direct goods and services to the universities. These indirect or inter-industry effects can take weeks or months to work their way through the economy.

- **Induced** – this captures the increase in economic activity in the broader economy resulting from spending of incomes gained by those employed in direct and indirect activities related to the universities.

Several indicators are commonly used to measure economic impact: gross domestic product (GDP), employment, income and tax revenue. These indicators, and their values for the Atlantic universities, are set out below with results summarized by province (Table 6).

Table 6
Economic impact of Atlantic universities
 (all values in \$ millions except employment)

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
Gross domestic product					
Direct	\$707	\$351	\$410	\$101	\$1,569
Indirect	\$139	\$63	\$78	\$18	\$298
Induced	\$330	\$195	\$185	\$55	\$766
Total	\$1,177	\$609	\$673	\$174	\$2,633
Employment (FTE)					
Direct	11,578	5,137	5,815	1,138	23,667
Indirect	2,883	1,317	1,513	1,162	6,875
Induced	4,057	1,856	1,545	372	7,829
Total	18,518	8,309	8,872	2,672	38,371
Income					
Direct	\$523	\$259	\$300	\$74	\$1,157
Indirect	\$67	\$33	\$40	\$9	\$150
Induced	\$273	\$135	\$156	\$39	\$602
Total	\$863	\$428	\$496	\$123	\$1,909
Tax Revenue					
Direct	\$78	\$46	\$40	\$10	\$175
Indirect	\$18	\$6	\$10	\$1	\$34
Induced	\$124	\$76	\$68	\$20	\$287
Total	\$220	\$127	\$118	\$31	\$496

Source: Statistics Canada Interprovincial Input-Output Model

- **Gross Domestic Product (GDP): \$2.6 billion** – GDP is the most widely used indicator of economic activity, measuring the income captured in the economy through the production of the universities' output – knowledge in the form of graduates and research results.
- **Total Employment: 38,371 jobs** – for every job created in the universities, almost 1 other job is created elsewhere in the economy. This flows from the spending by universities that triggers activity amongst suppliers of goods and services and their suppliers, as well as all of these employees spending income to support their households.
- **Income: \$1.9 billion in salaries and wages** - For every \$1,000 of salaries and wages on campus there is over \$650 earned elsewhere in the economy as a result of university spending.
- **Tax revenue: \$496 million** – total personal and corporate taxes collected by the federal and provincial governments as well as GST, HST and PST as applicable.

III DOMESTIC & INTERNATIONAL STUDENTS

Universities attract 25% of enrolments from out-of-province

University productivity can be considered an economic export of Atlantic Canada when students and researchers register from elsewhere in Canada or abroad. Total student enrolment figures (Table 7) are presented for Atlantic universities with breakdowns by province of study, full-time or part-time status, and level of study (undergraduate or graduate). Undergraduates represent 86% of all students, and most students regardless of their level of study are registered full-time (81%).

Table 7
Student enrolment by province, status, and level of study

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
Undergraduate					
Full-time	29,410	12,269	17,223	3,207	62,109
Part-time	5,130	2,208	3,654	638	11,630
Total	34,540	14,477	20,877	3,845	73,739
Graduate					
Full-time	3,673	1,410	1,456	164	6,703
Part-time	2,888	1,005	849	122	4,864
Total	6,561	2,415	2,305	286	11,567
Grand Total	41,101	16,892	23,182	4,131	85,306

Sources: Maritime Provinces Higher Education Commission (www.mphec.ca); Centre for Institutional Analysis and Planning, Fact Book 2008 (www.mun.ca/ciap/fact_book.php)

Enrolment figures for out-of-province Canadian students show that these represent 24% of undergraduates, 31% of graduates, and 25% of students overall (Table 8). The percentage is highest for Nova Scotia (32%) and lowest for Newfoundland and Labrador and Prince Edward Island (both 17%). This signifies that about 25% of Atlantic university enrolments represent a domestic export benefit for their province. This is augmented further by international student enrolments as discussed below.

Table 8
Enrolment for out-of-province Canadians by province of study, status, and level of study

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
Undergraduate					
Full-time	9,461	1,897	3,535	583	15,476
Part-time	1,322	382	504	51	2,259
Total	10,783	2,279	4,039	634	17,735
Graduate					
Full-time	1,597	382	320	51	2,350
Part-time	950	191	95	34	1,270
Total	2,547	573	415	85	3,620
Grand Total	13,330	2,852	4,454	719	21,355

Sources: Maritime Provinces Higher Education Commission (www.mphec.ca); Centre for Institutional Analysis and Planning, Fact Book 2008 (www.mun.ca/ciap/fact_book.php)

International student enrolment accounts for 9% of total

Enrolment figures for international students are presented with the same breakdowns as for domestic students (Table 9). International students represent 9.3% of all enrolments, however full-time international undergraduates are 8.3% of all full-time undergraduates, and 10.4% in the case of part-time undergraduates. This suggests international students are somewhat more likely than the average to pursue undergraduate degrees on a part-time basis. The reverse is true at the graduate level where full-time international graduate students are 21.4% of the total in this category, and only 4% of the total in the case of part-time graduates.

Table 9
International student enrolment by province, status, and level of study

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
Undergraduate					
Full-time	2,772	485	1,592	279	5,128
Part-time	536	58	565	50	1,209
Total	3,308	543	2,157	329	6,337
Graduate					
Full-time	621	401	388	22	1,432
Part-time	141	4	51	-	196
Total	762	405	439	22	1,628
Grand Total	4,070	948	2,596	351	7,965

Sources: Maritime Provinces Higher Education Commission (www.mphec.ca); Centre for Institutional Analysis and Planning, Fact Book 2008 (www.mun.ca/ciap/fact_book.php)

International students account for 6% of economic impacts

The economic impact of international students is important because attracting foreign students represents an international export opportunity for the university sector. Atlantic universities offer an excellent education and research opportunity to many students from other countries that may not have access at home to leading faculty or technology in their field of study.

International students are also of special interest due to the increased revenues from differential tuition fees they are expected to pay. International students may spend up to double the tuition fees that Canadians are charged for full-time studies at the undergraduate or graduate levels.

Economic impacts of international students are estimated based on the differential fees applied to international students at each university as well as spending by these students on accommodation, food, materials, supplies, and books at the university (not including expenditures outside the university). The economic impact of international students (Table 10) can be compared to the total economic impacts of universities (Table 6) to determine their relative importance.

International students support employment of about 2,425 across the Atlantic region, \$120 million worth of income, and \$30 million in federal and provincial tax revenue. Their share of university economic impacts across the Atlantic region is 6.1%, and the share by province attributed to international students is:

- **Nova Scotia:** 8.2%,
- **Newfoundland and Labrador:** 0.6%,
- **New Brunswick:** 8.6%, and
- **Prince Edward Island:** 3.5%.

This does not include any research funds international students may bring to the graduate programs they pursue. This also does not include broader economic impact of spending outside the university by the students or any visiting friends and relatives.

Table 10
Economic impact of international students enrolled at Atlantic universities
 (all values in \$ millions except employment)

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
Gross domestic product					
Direct	\$58	\$2	\$35	\$4	\$99
Indirect	\$11	\$0	\$7	\$1	\$19
Induced	\$27	\$1	\$16	\$2	\$46
Total	\$96	\$4	\$58	\$6	\$164
Employment (FTE)					
Direct	944	33	502	40	1,520
Indirect	235	8	131	41	415
Induced	331	12	133	13	489
Total	1,510	53	767	94	2,425
Income					
Direct	\$43	\$2	\$26	\$3	\$73
Indirect	\$5	\$0	\$3	\$0	\$9
Induced	\$22	\$1	\$13	\$1	\$38
Total	\$70	\$3	\$43	\$4	\$120
Tax Revenue					
Direct	\$6	\$0	\$3	\$0	\$11
Indirect	\$1	\$0	\$1	\$0	\$2
Induced	\$10	\$0	\$6	\$1	\$17
Total	\$18	\$1	\$10	\$1	\$30

Source: Statistics Canada Interprovincial Input-Output Model

IV RESEARCH & DEVELOPMENT

1. R&D SPENDING

Total direct spending of \$615 million

Universities in the Atlantic provinces occupy the central role in conducting research and development (R&D). This is unlike universities at a national level, which account for only 30% of the R&D, and therefore government researchers and the private sector play the central role.

Statistics Canada reports spending on R&D according to funders and performers of the research (Table 11). The largest funders in Atlantic Canada are the higher education institutions (31%) and the federal government (31%), followed by the business sector (29%), and others (10%). The higher education sector in Atlantic Canada performs 57% of the research, followed by the business sector (28%), the federal government sector (14%), and others (1%).

Table 11
Spending by research & development funders and performers in 2006 by province (\$ millions)

Sector	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Total
Funder					
Federal government	\$158	\$74	\$65	\$35	\$332
Provincial government	\$12	\$7	\$8	\$2	\$29
Provincial research organi:	\$0	\$0	\$0	\$0	\$0
Business enterprises	\$102	\$100	\$107	\$11	\$320
Higher education	\$171	\$68	\$84	\$18	\$341
Private non-profit	\$22	\$3	\$7	\$2	\$34
Foreign	\$22	\$7	\$2	\$0	\$31
Total	\$487	\$259	\$273	\$68	\$1,087
Performer					
Federal government	\$73	\$27	\$30	\$26	\$156
Provincial government	\$6	\$4	\$2	\$0	\$12
Provincial research organi:	\$0	\$0	\$2	\$0	\$2
Business enterprises	\$91	\$96	\$104	\$11	\$302
Higher education	\$317	\$132	\$135	\$31	\$615
Private non-profit	\$0	\$0	\$0	\$0	\$0
Foreign	\$0	\$0	\$0	\$0	\$0
Total	\$487	\$259	\$273	\$68	\$1,087

Sources: Statistics Canada, CANSIM, table 358-0001 and Catalogue no. 88-221-X.

The real economic significance of R&D lies not in the spending, but in the *results*. Results are measured in terms of contribution to innovation, where innovation is a key determinant of economic and social growth and development.² Universities contribute to innovation and economic wealth primarily by producing highly qualified people who are instrumental to the success of technology or knowledge transfer. Universities also contribute to innovation by building partnerships for commercializing R&D discoveries and inventions.

² In its report, *Performance and Potential 2005-06, The World and Canada, Trends Reshaping Our Future*, the Conference Board of Canada notes that innovation is critical to building knowledge and fuelling breakthroughs, but that Canada ranks among the lower-performing industrial countries in terms of R&D expenditures and is losing ground to its OECD trading partners who are not only investing more but are better at extracting value from their R&D investments.

2. R&D COMMERCIALIZATION

Springboard Atlantic Inc.

Fourteen Atlantic Canadian universities and five community colleges have formed Springboard Atlantic Inc. (Springboard) with funding from the institutions themselves and from the Atlantic Canada Opportunities Agency (ACOA) through the Atlantic Innovation Fund (AIF) program.

The university members of Springboard are: Dalhousie University, Memorial University, University of New Brunswick, University of Prince Edward Island, St. Francis Xavier University, Saint Mary's University, Nova Scotia Agricultural College, Acadia University, Cape Breton University, Université de Moncton, Mount Allison University, Mount Saint Vincent University, NSCAD University and St. Thomas University. According to Research InfoSource, eight of these universities are listed among Canada's top 50 research institutions.

The members of Springboard have a collective mandate to increase commercialization capacity, work with industry, and form new ventures. During its initial five years, Springboard has become an important regional innovation driver, with a number of significant results.

Springboard's university members have reported progress in creating and building commercial opportunities, drawing from Atlantic Canada's reservoir of higher education expertise: research, and facilities, combined with management by commercialization professionals at the university-industry liaison offices.

The 2008 and 2009 industry contracts data reflect 18% and 35% increases over the previous years. The contributors to this increase include the larger institutions such as Dalhousie University, as well as the smaller institutions, and correlates with a recently reported increasing national trend in industry contracts as contained in "Survey of Intellectual Property Commercialization in the Higher Education Sector 2008" (Statistics Canada 88-222-X). The report states that the Atlantic provinces are responsible for 9% of national research contracting activity, whereas the Atlantic provinces comprise only 7% of Canada's population.

Spin-off Company Activity

Statistics Canada reports that since 1999, Atlantic Canada universities were responsible for the creation of 93 spin-off companies, representing 9% of all spin-off companies in Canada. Spin-off companies are particularly important in community economic development due to their innovative culture, attraction and retention of skilled human resources, and associated financial and infrastructure investments.

Atlantic Canada's universities have increased their activities to create new ventures over the past few years, and both small and larger institutions are participating. Based on Springboard's 2009 information, University of New Brunswick is placing a strong emphasis on spin-off companies and in 2009 was solely responsible for the creation of five new companies. The creation of a new company is an intensive process, with an engagement over several years where university-industry liaison or commercialization offices play crucial roles to set the foundations and broker the early collaborations and financial arrangements.

The recent trends in spin-off company activities among university members of Springboard Atlantic Inc. have been strong and positive, particularly related to efforts that support new licences, and licence and royalty revenues (Table 12). Comparing 2005 to 2009, records indicate that:

- ❑ **Filed patent applications** - more than doubled to 66 per year,
- ❑ **New licences** – increased nearly four-fold to 27 per year,
- ❑ **Licensing and royalty income** – increased nearly four-fold to \$921,000 per year,
- ❑ **Industry-sponsored contract research** – increased 45% to \$33.4 million per year.

Table 12

Trends in innovation activities among university members of Springboard Atlantic Inc.

Trend indicator	2005	2006	2007	2008*	2009*
Filed patent applications	27	45	53	57	66
New licenses	7	14	17	22	27
Licensing and royalty income (\$000)	\$226	\$852	\$896	\$961	\$921
Industry-sponsored research (\$000)	\$23,000	\$22,000	\$25,300	\$30,500	\$33,400
New companies	N/A	N/A	6	4	9
Expanded companies	NA	NA	10	8	13

Source: Springboard Atlantic Inc., 2010

*Includes some provisional data and projections.

Some examples of spin-off companies illustrate how commercialization initiatives taken by Atlantic Canada’s universities provide a range of social and economic benefits to Atlantic Canada and beyond:

- ❑ **BlueLight Analytics (NS)** - A new dental technology from Dalhousie University resulted in a spin-off venture launched from concept to company in a record time of eleven months. Blue Light’s technology will make resin teeth fillings last longer through accurate curing technology.
- ❑ **NewLab Technologies Company (NL)** - Genetics breakthroughs at Memorial University allow for the prevention of sudden cardiac death in susceptible individuals. The cardiac diagnostic technology, now being commercialized by NewLab Technologies Company both saves lives and fuels new developments in other disease areas.
- ❑ **ScreenScape (PEI)** - is commercializing digital signage technology from University of Prince Edward Island and has operations in both Toronto and Charlottetown with 40 people employed.
- ❑ **Green Imaging Technology (NB)** - has moved to commercial premises after being “incubated” at University of New Brunswick. Green Imaging does testing on core samples from oil and gas industry samples world-wide.

The sustained, intensive and region-wide cooperative effort in commercialization over the past several years is demonstrating significant tangible results and contributing to regional competitiveness.

3. LEVERAGING THE R&D INVESTMENT

Universities contribute most to economic development through what they produce - knowledge. Knowledge is the result of conducting research, and also of equipping students with the abilities to put knowledge to work. Both form part of the innovation process. In their seminal study of the importance of innovation to sustaining growth and development, Porter and Stern³ identify several factors contributing to a high capacity to innovate. Among these, four stand out in the context of this report:

- ❑ **Aggregate personnel employed in research and development** - A critical determinant of the underlying innovative capacity of an economy is the overall supply of scientific and technically trained individuals available. Both private and public entities engage the skills of these individuals, whose continuing learning builds on their formal training. An intermediate measure of the more fundamental process by which individuals choose to invest in scientific and technical skills, the level of personnel employed in R&D-related activities in a nation reflects the baseline level of human resources that can be utilized for purposes of innovation across the economy.
- ❑ **Share of Gross Domestic Product spent on secondary and tertiary education** - The availability of high quality workers, with both technical and non-technical backgrounds, is an additional and basic element of a nation's common innovation infrastructure. Investment in higher education creates a base of highly skilled personnel upon which firms and other institutions across the economy can draw; in both formal R&D activities and more informal problem solving, skilled workers are better able to recognize, choose and execute innovation-oriented strategies in the pursuit of economic advantage.
- ❑ **Percentage of R&D expenditures funded by private industry** - The extent of R&D funding by private firms is a reflection of whether cluster-specific conditions are conducive to investment. Across clusters, the more favourable the innovation environment, the higher national private R&D spending will be.
- ❑ **Percentage of R&D performed by universities** - One commonality across countries is the leading role that universities play in mediating the relationship between private industry and elements of the innovation infrastructure. A strong university sector provides an important conduit through which basic, fundamental research results serve to catalyze the emergence of innovation-oriented domestic clusters. Conversely, by placing pressure on universities to conduct relevant research and produce high quality students with specific technical skills, private funding and involvement in the university sector serve to foster a key reverse linkage from the clusters to the common innovation infrastructure.

Attention to these factors will continue to set the conditions for successful university research and development in support of an innovative economy and vibrant community in Atlantic Canada.

³ Porter, M. and Stern, S., 1999. *The New Challenge to America's Prosperity: Findings from the Innovation Index*, Council on Competitiveness, Washington. p. 26-28.