



## Offshoring and Outsourcing of R&D and Business Activities in Canadian Technology Firms

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### Abstract

A substantial amount of empirical research has been conducted on the offshoring/outsourcing practices of U.S., European, South Korean, and Japanese technology firms. However, there is very little research evidence on the strategies of Canadian firms. This leaves a gap in the literature that we aim to fulfill by providing empirical evidence of the practice among Canadian manufacturing firms. The evidence presented is based on the 2009 Survey of Innovation and Business Strategy conducted by Statistics Canada. This survey provides the largest and most comprehensive data in Canada on this topic. The data suggest that only a very small proportion of Canadian manufacturing firms offshore/outsources their R&D and other business activities and only a select few countries. The primary motivations for Canadian firms to offshore/outsources their R&D and business activities are to reduce costs and to gain access to new markets. The managerial, policy, and research implications of the results are discussed.

**Keywords:** offshoring; outsourcing; research and development; manufacturing; Canada; business strategies; manufacturing firms.

## Introduction

The globalization of innovatory capacity by European and American multinational enterprises (MNEs) can be traced back to the early 1990s (Dunning, 1994; Athukorala & Kohpaiboon, 2010). In the old paradigm, R&D and innovation activities were centralized in the home country of the MNE (usually at the firm's headquarters) and foreign subsidiaries basically adapted products to suit the needs of overseas markets. In the era of globalization, foreign subsidiaries became more involved in conducting upstream R&D and developing innovatory capacity, which flowed from foreign locations to the HQ (Kuemmerle, 1997). The trend of performing more R&D outside the home country of the MNE is sometimes described as offshoring (Bardhan, 2006). More recently, as the R&D and innovation capabilities of foreign locations became more sophisticated, MNEs from the developed world began outsourcing R&D, manufacturing, and other business activities to firms and institutions in the developing world (e.g., India, China, South Korea, and Mexico) in order to capitalize on the relatively low costs for highly developed capabilities (Bardhan, 2006; Cantwell and Molero, 2003; Gerybadze and Reger, 1999). This trend is often described as outsourcing. Thus, offshoring and outsourcing are integral elements of a firm's internationalization strategies.

Since the trend towards offshoring/outsourcing of R&D and manufacturing has been led by American and European MNEs, it is, therefore, not surprising that much of the research focuses on MNEs from these countries (Gassman, 2002). Academic research on the offshoring/outsourcing of R&D and other business activities by Canadian firms are virtually non-existent except for anecdotal case studies. Therefore, the goal of this study is to present the most recent evidence of the internationalization strategies of Canadian technology firms. In 2009, Statistics Canada, the Government of Canada statistical agency, conducted its Survey of Innovation and Business Strategy, which focused on a comprehensive set of activities pertaining to the innovation and business strategies of Canadian firms from all sectors and all sizes – small, medium, and large. The goal of the survey was to provide statistical information on strategic decisions, innovation activities and operational tactics used by Canadian enterprises (Statistics Canada, 2009). One set of questions focused on the offshoring and outsourcing of R&D and other business activities of Canadian firms, the results of which are reported and discussed in this paper with respect to the manufacturing sector. The focus on R&D and business activities are motivated by the fact that R&D is one of the most strategic and closely guarded activities of technology companies and so companies tend to be very cautious with taking this activity in foreign countries where they may not have total control. It is also an activity that could lead to the harnessing and leveraging of new knowledge, talent,

and capability from foreign locations, which could generate significant competitive advantage to Canadian firms in terms of new product development and serving new markets. Hence, a delicate balance is often required to achieve the benefits without sacrificing strategic R&D to foreign competitors. The internationalization of other business activities to cheaper locations could result in significant cost savings, which could increase the overall competitiveness of Canadian products. However, it could lead to loss of expertise in the specific areas of business activities in the home country (Sydor, 2007) because these activities are no longer performed at the home country.

It is anticipated that the results presented in this paper will lead to a better understanding of the offshoring/outsourcing strategies and practices of Canadian manufacturing enterprises. This research is important because it contributes to filling a gap in the literature regarding the Canadian evidence and allows us to obtain a deeper understanding of the reasons for and extent to which Canadian enterprises choose to undertake R&D and other business activities in foreign locations. Moreover, the results could reveal insights that could inform government innovation policies and programs and shape the business strategies of Canadian enterprises.

The research question that we are looking to answer is how many Canadian manufacturing firms are outsourcing their R&D activities. Paired with the sub questions of what countries are Canadian firms selecting to outsource their manufacturing to as well as the reasons for these companies to outsource rather than perform this activity within Canada. To answer these questions we have divided the remainder of the paper into important four sections. Section one provides a brief overview of the relevant literature, Section two describes the data, Section three presents the results, and Section four discusses the findings and offers the conclusion.

## Theoretical background

The offshoring and outsourcing of R&D, manufacturing, distribution and logistics and other business activities by MNEs, especially from the developed world has been increasing over the last two decades (Calantone and Stanko, 2007). This trend was greatly facilitated by several key factors including the rapid developments in information and communication technologies (especially the Internet), technological sophistication and capabilities of key developing countries such as India and China, and increased transportation costs (Calantone and Stanko, 2007). Technological developments in information and communication technologies (ICTs) significantly reduced transaction costs associated with conducting high value-added R&D in foreign locations (Persaud et al. 2002). The increased technological capabilities of developing countries meant that MNEs can access highly qualified techni-

cal talent and sophisticated infrastructure at very low costs. Hence, some of the main drivers of the trend towards globalization of R&D, manufacturing, distribution and logistics and other business activities include access to specialized skill sets, cost-effectiveness of foreign locations for these activities, access to markets, increased competition, and harnessing and leveraging global knowledge and resources in order to reduce innovation cycle time, accelerate growth and enhance the innovatory capacity of MNEs (Kogut & Zander, 2002; Calantone and Stanko, 2007).

This fragmentation of the value chain (the process and activities from conception of a product to getting it to the final consumer) around multiple countries in the world is often described as global value chains (Sydor, 2007). Thus, offshoring and outsourcing are critical components of global value chains. The globally distributed nature of the modern value chain means increased transaction costs due to increased coordination across the entire globe that need to be offset by reducing the variable costs of other business activities. Moreover, in order to minimize transaction costs resulting from increased coordination of globally distributed innovatory capacity and maximize the benefits from the global decentralization, MNEs have employed a wide variety of organizational structures. These organizational structures include the network model, competence model, and hub model (Gassmann, 1998). The primary differences among the various models are in terms of the degree of autonomy and formalization in decision-making the foreign locations have, the nature of the innovation activities they perform, their importance in the MNEs global innovation chain, and the budget they have at their disposal (Persaud et al. 2002).

The literature seems to suggest that despite the increased coordination costs and the risks of losing highly strategic intellectual property or very sensitive information to foreign locations, the globalization of R&D, manufacturing and other business activities have had a positive impact on MNEs innovative capabilities and performance (Persaud et al. 2002). Another aspect of the globalization of R&D and other business activities that is quite common among MNEs is outsourcing of these activities to foreign countries. This may involve offshoring the activity to a local partner or may occur in the form of pure outsourcing involving very little or no presence of the R&D offshoring company in the foreign country. For example, ThyssenKrupp keeps system engineering in Germany and the detail engineering is outsourced to India to leverage cost advantages (Ohmayer, 2007). Similarly, Proctor and Gamble set an ambitious goal of having half of its new product ideas generated outside of the company by 2010 (Calantone and Stanko, 2007). These examples show that companies may not be nearly as concerned with outsourcing their core competencies as they are with seeing a greater return on investment.

Lewin et al. (2009) investigated this growing trend to outsource not only manufacturing activities but also more high value-adding activities like R&D. They suggest that outsourcing can be done domestically or abroad, however, for the intent and purpose of this paper, we are more concerned about outsourcing and offshoring outside of Canada, rather than that being domestically. They found that many of the same reasons that drive the decentralization of R&D among the global R&D units of MNEs are also the ones driving the trend towards outsourcing. These include accessing qualified personnel, accelerating growth, and increasing speed to market, becoming a global player, and prior experience, that is, firms that have previously outsourced R&D will continue to outsource R&D while firms that perform R&D internally will continue to perform R&D internally.

Although there are a variety of reasons why companies outsource or offshore their R&D, De Meyer (1993) suggests that there are some reasons why firms should not do so. De Meyer (1993) suggests that offshoring/outsourcing of R&D increases communication difficulties and may lead to a reduction in the size of the laboratory at each R&D location. These smaller R&D units might mean a smaller knowledge base, which in turn results in a smaller amount of base knowledge that can be used for creative growth and to foster new ideas. Moreover, the greater amount of decentralization that a firm has, the greater the chance of spillover of knowledge and the higher the chance that strategically sensitive information may be leaked.

## Data

The data for this paper are drawn from Statistics Canada 2009 Survey of Innovation and Business Strategy (SIBS). This survey was created in conjunction with Industry Canada and Foreign Affairs and International Trade Canada with the aim of looking at the participation in global value chains and innovation by Canadian enterprises. The SIBS survey covers a wide range of industries including manufacturing, services, utilities, and information and cultural industries. Industries and sub-industries are classified by their NAICS (North American Industry Classification System) code. For example, manufacturing has a NAICS code that ranges from 31 to 33, and within that larger industry of manufacturing we have sub-industries like food manufacturing (NAICS code 311), tobacco manufacturing (NAICS code 3122) and paper manufacturing (NAICS code 322). For the purpose of this paper, we examined the manufacturing group as a sector rather than specific sub-industries. The sub-industries comprising the manufacturing industry and which are covered in this study include food and beverage; textile and clothing; chemical, petroleum, pharmaceutical pesticides, rubber, metal, machinery, and oil and gas manufacturing; electrical and ICT; and transportation equipment manufacturing.

In order to be eligible for selection in the sample, an enterprise must have at least 20 employees and revenues of at least \$250,000. This resulted in a sample of 4,394 manufacturing enterprises that were selected and surveyed from a population of 12,846 enterprises (about 35% of the population). Enterprises that received the questionnaire were required by law to respond, which resulted in an exceptionally high response rate of 71%. For the purposes of SIBS, Statistics Canada's classification of firms into small, medium and large enterprises is based on the number of employees with small enterprises having 20 to 99 employees, medium having 100 to 249 and large firms having more than 250 employees.

**Analysis**

The results presented in this paper focus on the subset of questions on the SIBS survey that deals with the location of business activities outside of Canada. Each of the following nine tables use percentages as the unit of measurement to indicate the distribution of respondents answers to each question from SIBS. Moreover, each table is broken down by the three enterprise classification categories, small, medium and large, to allow us to find the similarities and differences between the different sized enterprises. In instances where there is a shortfall to 100%, it is due to either rounding or not including the "does not apply" category of the data, which were usually very small. This exploratory study is based on cross-sectional data collected through the SIBS survey. The primary goal of the paper is to present a descriptive overview of the innovative practices and strategies of Canadian textile firms based on percentage distribution of firms responding to a variety of questions. A lack of access to the metadata restricted the ability of the researchers to conduct further quantitative or econometric analysis of key relationships.

The first question examined was where business decisions are made within the respondent's enterprise in order to get a sense of the extent to which the enterprise decision-making is done primarily at home or are subjected to foreign influences. For this question we combined the four possible responses into two different categories, namely, business decisions made within Canada (at the head office or other facility in Canada) and those made outside of Canada (at the primarily foreign parent or joint venture between Canadian head office and foreign parent).

Table 1 shows that all eight business decisions are made primarily within Canada. However, as the participation of foreign partners in decision-making increases with firm size, that is, foreign influence on decision making is positively related to firms-size, particularly with respect to R&D focus, location of R&D and production, technology adoption, and financing. For instance, the focus and location of R&D decisions are made outside of Canada by about 6% and 15% for small and medium firms respectively but by about 34% of large firms. This pattern of decision making where smaller firms make more decisions within Canada may be explained by the observation of Louart and Martin (2012) who argue that, "[the] business must have enough financing to be able enter a foreign market without qualms" and for the majority of small enterprises they do not have the financing available to them that would allow them to expand and enter other foreign markets. Larger enterprises, on the other hand, are more likely to make these decisions outside of Canada because they seem more equipped and capable of entering foreign markets.

Table 2 presents the distribution of the location – within or outside of Canada – where various business decisions are performed. These activities can be performed within Canada (either within the enterprise or outsourced to another enterprise located in Canada) or at an overseas location (either within the enterprises' foreign location or outsourced to an-

Business Activity	Small		Medium		Large	
	Canada	Overseas	Canada	Overseas	Canada	Overseas
What Suppliers To Use	86.2	3.3	81.6	12.7	73.3	25.3
Location of Production	79.1	5.2	73.6	16.4	59.3	37.6
Location of R&D	69.9	5.5	66.2	16.4	55.8	34.6
R&D Focus	73.0	5.5	72.0	14.7	58.9	34.2
Adoption Of Tech	74.9	7.2	71.9	19.4	56.7	39.5
Financing	81.2	7.3	71.7	21.1	52.8	44.6
Distribution	83.1	4.0	81.2	11.7	73.8	24.2
Support Services	85.8	4.1	81.7	12.8	70.5	28.5

Table 1. Geographic location of where business activities are made (represented by percentage)

other enterprise in a foreign location). For the purposes of our analysis, we aggregate the results into those performed within Canada and those performed outside of Canada in a foreign location. The results show that the overwhelming majority of Canadian firms of all sizes perform a disproportionately large part of their R&D and engineering services in Canada – approximately 71% of firms. Only between 1% and 7% of manufacturing firms, regardless of size, undertake overseas R&D and between 3 and 10% perform engineering

services overseas. Production of goods is the most prevalent business activity offshored/outsourced followed by distribution and logistics, marketing, and legal services, which are carried out by a relatively small proportion of firms (less than 20% in most cases). Overall, 42%, 60% and 70% of small, medium, and large firms respectively stated that they have business activities outside of Canada but these activities are undertaken primarily in support of their goods and services in those markets (see Table 3).

Business Activity	Small		Medium		Large	
	Canada	Overseas	Canada	Overseas	Canada	Overseas
R&D	70.3	1.1	74.3	2.3	72.2	7.4
Engineering Services	63.4	2.9	71.3	3.8	79.7	10.4
Production of Goods	92.8	10.3	95.2	15.3	95.7	21.0
Provision of Services	77.6	4.1	72.5	5.3	65.5	10.5
Call Centers	34.8	0.3	39.7	0.8	43.8	4.3
Distribution & Logistics	69.1	6.8	75.7	10.1	76.3	18.1
Marketing	86.2	3.3	84.2	5.9	82.9	8.3
Software Development	26.8	2.8	33.7	4.3	38.8	12.0
Data Processing	63.0	0.5	68.5	1.5	72.5	7.2
Information & Communications Technology	46.5	1.8	57.7	2.7	67.5	10.0
Legal Services	30.6	4.8	29.4	8.7	36.2	23.4
Accounting	82.1	1.3	-	-	88.6	4.7
Human Resources Management	85.0	0.4	87.3	1.6	91.2	3.0
Financial Management	83.7	0.5	85.5	1.3	87.3	2.3

Table 2. Location of business activities (represented by percentage)

Business Activity	Small		Medium		Large	
	2007	2009	2007	2009	2007	2009
R&D	24.7	27.9	33.0	36.0	43.2	47.1
Engineering Services	30.3	30.7	32.5	38.4	47.7	50.5
Production of Goods	55.4	60.3	63.1	69.5	69.3	71.0
Provision of Services	50.2	50.8	50.4	50.7	52.3	52.3
Call Centers	13.6	14.0	15.8	18.0	-	-
Distribution & Logistics	49.2	51.1	57.4	57.8	62.3	61.9
Marketing	59.7	59.1	65.9	65.4	70.3	69.7
Software	9.2	11.4	17.9	20.0	26.7	28.6
Data	18.6	20.7	20.6	23.6	34.9	38
Information and Communications Technology	12.8	17.9	24.6	28.5	37.9	39.5
Legal Services	15.5	17.9	21.2	23.1	34.2	39.3
Accounting	22.6	26.5	31.9	36.0	46.0	48.9
Human Resources Management	19.6	21.9	29.8	29.2	-	-
Financial Management	21.7	26.5	29.7	35.8	45.5	48.0

Table 3. Business activities carried out by enterprises in support of overseas operations between 2007 and 2009 (represented by percentage).

According to Table 3, marketing activities to support products and services was the most common business activity with about 60%, 65% and 70% of small, medium, and large firms respectively undertaking these activities overseas. This is followed by the production of goods, provision of services, distribution and logistics, and engineering services across all firm sizes except for the distribution and logistics for medium and large enterprises that jumps slightly above the provision of services. R&D was ranked 6th at virtually the same level with accounting and was only undertaken by between 25%, 33% and 40% of small, medium, and large firms. The results clearly indicate that the bulk of Canadian manufacturing firms perform their R&D at home rather than overseas and that most of the R&D conducted overseas is adaptive in nature since they are carried out in support of the overseas operations. Further, the changes in the proportion of firms undertaking these business activities overseas between 2007 and 2009 has changed marginally, which suggests stable or little growth in overseas operations.

Table 4 shows the distribution of firms that expanded their overseas capacity through a combination of mergers and acquisitions and the establishment of new facilities between 2007 and 2009. It can be seen that among the six business activities most frequently undertaken by Canadian manufacturing firms overseas, R&D was ranked last followed closely by engineering services. Production of goods and services were the top two activities where capacity was expanded. Indeed, less than 20% of small and medium firms and about

25% of large firms expanded their overseas capacity across these business activities. In addition, the vast majority of firms, regardless of size classification, listed the U.S. and China as the top two most important countries in which they made changes to their business operations. The U.K. was listed as the third country for the majority small firms and Mexico was listed for medium and large firms. Thus, it is clear that the overseas operations of Canadian manufacturing firms are highly concentrated in just three countries.

For comparison purposes, Table 5 presents the expansion in domestic capacity for the same set of business activities during 2007-2009 due to the combination of mergers and acquisitions and the creation of new facilities. This Table provides insights into the willingness of Canadian enterprises to grow and expand within Canada.

Again, the pattern of expansion domestically is very similar to overseas expansion with the production of goods and services leading the way followed by marketing and distribution and logistics. R&D occupied the 5th position followed by engineering services. Further, only about 10% of small and medium firms and 15% of large firms expanded their R&D capacity over the time period. Except for the production of goods and services, the vast majority of firms (roughly about 80%) did not expand their domestic capacity in the four other business activities. The results presented in Tables 4 and 5 indicate that not only are Canadian firms performing most of their R&D, manufacturing and other business activi-

Business Activity	Small	Medium	Large
R&D	3.8	4.4	16.0
Engineering Services	3.9	4.8	14.1
Production of Goods	13.7	19.6	37.6
Provision of Services	8.6	12.4	21.9
Distribution & Logistics	5.8	10.8	22.0
Marketing	8	13.5	22.5

Table 4. Expansion of business activities overseas between 2007 and 2009 (represented by percentage)

Business Activity	Small	Medium	Large
R&D	10.7	10.3	14.4
Engineering Services	8.5	10.5	11.9
Production of Goods	31.5	40.3	49.6
Provision of Services	17.4	15.0	19.4
Distribution & Logistics	11.7	16.4	19.9
Marketing	14.6	17.5	16.4

Table 5. Improvements to capacity in Canada between 2007 and 2009 (represented by percentage)

ties at home for the period under investigation but also that the vast majority (approximately 80%) did not expand their capacity either organically or through merger and acquisitions either at home or overseas. Moreover, fewer smaller firms compared to large firms stated that they expanded their capacity either domestically or overseas. This pattern raises serious questions regarding the business strategies and continued competitiveness of Canadian manufacturing firms, particularly among smaller firms.

In addition to focusing on the offshoring activities of Canadian manufacturing firms, the SIBS survey also asked a set of questions pertaining to the outsourcing activities. The results on the outsourcing of business activities by manufacturing firms are presented in Tables 6 through 8. Table 6 shows the distribution of firms that outsourced the top six business activities identified earlier and the three most important countries where these activities were outsourced.

The results show that production of goods was outsourced by the overwhelming majority of firms, especially smaller firms where the number averaged approximately 85% for small and medium firms. Only a very small proportion of firms, between 5 and 13 percent, outsourced R&D. In other words, in terms of actual counts of firms that outsource R&D, there were 27 out of the sample of 2,346 small firms, 14 out of 1031 medium firms, and 36 out of 1017 large firms. Further, less than 25% outsourced the other top business activities – marketing, distribution and logistics, and provision of services. It is also observed from Table 6 that the bulk of the outsourcing activities of Canadian manufacturing firms, regardless of size, were concentrated in three countries – the U.S., China and India.

Table 7 lists the most important reasons given by Canadian manufacturing firms for outsourcing business activities. Not surprisingly, cost reduction, access to markets, and access

Business Activity	Small	Medium	Large
R&D	6.2	4.8	12.7
Engineering Services	8.8	9.6	21.1
Production of Goods	80.7	87.5	70.3
Provision of Services	23.6	17.3	21.1
Distribution & Logistics	22.6	8.4	21.1
Marketing	18.9	12.9	9.7
Three Most Important Countries Where Business Activities Were Relocated To	U.S. China India	U.S. China India	U.S. China India

Table 6. Business activities that were outsourced between 2007 and 2009 (represented by percentage) and the three most important countries where business activities were relocated to.

Reasons for Outsourcing	Small	Medium	Large
Reduction of Labor Costs	51.1	45.6	59.2
Reduction of Non-labor Costs	54.1	50.9	50.7
Access to New Markets	31.1	28.6	19.6
Following competitors or clients	16.9	7.7	N/A
Improved Quality	16.3	16.0	7.7
Focus On Core Business	15.2	15.0	16.1
Access Specialized Knowledge	22.3	15.1	13.0
Tax or financial	16.3	7	4.1
Improved logistics	N/A	12.7	13.2
Reduced delivery times	21.7	16.3	16.2
Lack of available labor	13.2	2.2	7.8

Table 7. Most important reasons for outsourcing business activities (represented by percentage)

to specialized knowledge are the primary reasons for outsourcing business activities, which is primarily the production of goods, provision of services, marketing, and logistics and delivery.

Linking these reasons with the top three countries for outsourcing, it can be reasonably concluded that Canadian manufacturing firms outsource activities to India and China in order to benefit from the low costs of production. China and India are emerging economies with huge market potential and offer technologically advanced manufacturing capabilities at relatively low costs than in Canada. Locating business activities in these countries also put them into close proximity to customers in these markets. It seems that Canadian firms are trying to reach new markets in India and China cost-effectively. The reason for outsourcing to the U.S. maybe due to its close proximity to Canada in terms of geography, culture, and language coupled with the fact that the U.S. is a technology leader. Also, the U.S. is still our major trading partner and the market of first choice for most Canadian suppliers.

Table 8 lists the main obstacles Canadian firms faced when trying to outsource business activities. The results suggest that they range greatly for the three different sized enterprise groups. Small enterprises seem to have faced the most difficulties since a higher proportion of small firms identified more factors as being obstacles. For example, trade tariffs and distance to producers were faced by about 40% of small firms followed by difficulties identifying potential or suitable providers at 33%. For medium-sized enterprises, distance to producers (36%) and foreign legal (26%) were

the two biggest obstacles they. For large-sized enterprises, linguistic obstacles (22%) and distance to producer (21%) were the two biggest obstacles.

Although distance was stated to be a major obstacle by all firms, it affected a higher proportion of smaller firms than larger firms. Similarly, smaller firms found it substantially more difficult than larger firms to identify potential or suitable suppliers. Canadian legal system affected small firms particularly hard (27% versus 10% and 6% for medium and large firms respectively). Trade tariffs, which was the most important barrier for small firms (42%) was roughly four times more than the average of medium and large firms combined (11%). Interestingly, about 20% of each small and large firms indicated that lack of financing was a major obstacle compared to just 4% for medium firms. Overall, the results indicate that large firms faced fewer obstacles than smaller firms

Table 9 shows the proportion of firms that have relocated business activities from a foreign country back into Canada and the countries from which the relocation originated.

As can be observed from Table 9, production of goods was the activity most frequently brought back (or inshored), followed by distribution and logistics, provision of services, and marketing. In fact, for the manufacturing sector as a whole, inshoring of production of goods (85%) is more than doubled that of distribution and logistics (34%), the next most important activity. It was also more than 2.5 times more than R&D and engineering services combined (30%). Moreover, the pattern between firm sizes is fairly similar in terms

Obstacle to Outsourcing	Small	Medium	Large
1. Canadian legal obstacles	27.3	9.8	6.1
2. Foreign legal obstacles	19.9	26.1	11.1
3. Taxation	18.5	4.4	5.5
4. Trade Tariffs	41.8	16.9	6.0
5. International Standards	15.0	21.7	0.0
6. Concerns of employees	12.4	13.6	14.9
7. Concern of violation of patents	2.8	9.7	11.2
8. Conflict with social values	1.8	2.6	0.0
9. Distance to producer	39.4	35.5	20.9
10. Distance to customers	12.7	19.2	8.1
11. Linguistic obstacles	16.3	17.1	22.1
12. Identifying potential providers	33.3	18.2	9.2
13. Lack of financing	19.8	4.0	20.3

Table 8. Most important obstacles to outsourcing (represented by percentage)

of the activities relocated but smaller firms show a high propensity for inshoring than larger firms in most of the activities except for R&D. Comparing the patterns of offshoring and inshoring of these activities, the data suggests that there seems to be a fair bit of balancing or circularity between offshoring and inshoring. For example, 60%, 69.5%, and 71% of small, medium, and large firms outsourced the production of goods in 2009 (refer to Table 3) compared to 84.8%, 92.8%, and 77.7% of small, medium, and large firms that have inshored this business activity (Table 9). Similarly, 50% of small and medium firms and 52% of large firms offshored the provision of services and between 33% and 20% of small and medium firms respectively relocated this activity back to Canada. This suggests, that offshoring or even outsourcing (refer to Table 6, which shows numbers that are significantly higher than those in Table 9) is not an outflow process only.

**Discussion and implications**

This paper presented recent evidence of the pattern of the offshoring and outsourcing in the Canadian manufacturing sector based on data for the period 2007-2009, which were collected by Statistics Canada. The data show that only an extremely small proportion of firms in the manufacturing sector offshored/outsourced key business activities. Only, 10% manufacturing firms outsourced a business activity compared to 5% that offshored a business activity. Interestingly, 5% of manufacturing firms also indicated that they relocated (inshored) a business activity from a foreign location back to Canada. This indicates that in terms of proportion of firms, net offshoring is roughly zero for manufacturing firms. The business activity that was most offshored/outsourced is the production of goods, which was outsourced by substantially more firms relative to the top 6 offshored/outsourced activities.

In terms of R&D, the activity that is most closely linked to innovation, only 1.8%, of Canadian manufacturing firms outsourced their R&D. It was also the least outsourced or offshored of the top 6 business activities examined in this study. In addition, most of the offshoring and outsourcing was undertaken in support of the enterprises' overseas operations. Moreover, larger firms are more engaged in offshoring/outsourcing and inshoring than smaller firms, which would indicate that they are relatively more embedded in the global supply chains than smaller firms in this regard.

The evidence presented above seems to be at odds with the image portrayed in the media and in some policy circles regarding the extent of offshoring/outsourcing and the possible negative impacts of this business strategy by Canadian firms. Indeed, the evidence suggests that offshoring and outsourcing are much more muted or subdued than is often portrayed. These results have profound implications for government policies and firm strategies and suggest the need for more careful consideration of benefits and risks of offshoring and outsourcing.

From the perspective of firm strategies, the evidence suggests that Canadian firms are not as deeply embedded in the global supply chain as they should, even though these firms stand to gain more than lose by participating in global supply chains (DFAIT, 2011; Sydor, 2007) show that by sourcing intermediate inputs or services abroad, Canadian operations can become more efficient and survive, if not expand, in an increasingly competitive global environment. In similar vein, Baldwin and Wu (2005) show that Canadian multinationals are generally more productive than are purely domestic companies. Further, by participating in global supply chains, Canadian companies are not only able to spread their R&D dollars over a larger market but are also exposed

Business Activity	Small	Medium	Large	All
R&D	15.3	12.6	18.3	15.2
Engineering Services	19.4	9.5	11.6	15.3
Production of Goods	84.8	92.8	77.7	84.8
Provision of Services	32.8	19.5	27.7	28.4
Distribution & Logistics	40.5	21.0	32.9	34.0
Marketing	32.7	9.4	11.0	22.4
Three Most Important Countries Where Business Activities Were Relocated From	U.S. China Mexico	U.S. U.K China	U.S. U.K Japan	

Table 9. Business activities relocated to Canada between 2007 and 2009 (represented by percentage) and the three most important countries where business activities were relocated from.

to some of the best companies in the world thereby forcing them to become more innovative and transfer some of that knowledge back to Canada (Sydor, 2007). These observations seem to suggest that Canadian needs to do more to deepen their participation in global supply chains. Areas where firms could improve their participation include engineering services and R&D, where Canadian firms have a competitive advantage. Marketing and sales is another area where they can deepen their involvement in order to learn from foreign affiliates and customers, which could result in greater market opportunities.

In terms of job loss resulting from Canadian firms outsourcing/offshoring business activities, the data suggests that the main activity that is outsourced/offshored is the production of goods and not high-valued added work like R&D or engineering services. A recent survey by the Canadian Manufacturers and Exporters Association identified the lack of skilled workers as one of the most important issues facing manufacturers (Sydor, 2007), which would suggest that not only are the high-skilled manufacturing jobs not leaving Canada, but quite the opposite, there currently appears to be excess demand (DFAIT, 2011). Even if there are job losses, Sydor (2007) argues that such loss is minimal and the loss of low-skill, low-wage jobs to foreign locations maybe beneficial since Canada can focus on creating high-value, high-knowledge service industries involving R&D, science and technology, which is key to attracting and retaining world class innovative companies in Canada. Further, this could lead to improved competitiveness and productivity, which would translate into higher paying jobs and a better standard of living for Canadians (DFAIT, 2011).

The evidence presented in this study does not lend support to some of the policy prescriptions articulated by some industry analysts and researchers. For example, Treffer (2005) proposed a wide range of policies aimed at restricting or slowing outsourcing by Canadian firms. These policies include better protection of intellectual property against abuse by foreign manufacturers, tax incentives for R&D-intensive firms that remain in Canada, and labeling requirements that provides information to consumers on the labor standards used to produce foreign goods (Treffer, 2005). The evidence presented here show that only a very small proportion of firms (5.8%) expressed high concerns regarding the violation of patents and/or intellectual property rights. Conflict with social values (e.g. corporate social responsibility issues) was identified as a high concern for an even smaller set of firms (1.8%). Thus, it seems that these policy prescriptions are based more on lack of understanding than facts and are unwarranted. Furthermore, tax incentives for R&D-intensive firms to remain in Canada is unnecessary and ill-conceived since overseas R&D, both offshoring and outsourcing combined, was undertaken by a mere 1.5% of firms. Indeed, it is

contended here that instead of focusing on policies to limit offshoring and outsourcing, Canadian policymakers should implement policies that encourage and reward Canadian firms for participating more deeply in global supply chains, since the net benefits seem to be positive for Canada. Areas where governments can play a crucial role pertain to the obstacles to outsourcing/offshoring, which include assistance to identify potential or suitable suppliers, negotiating better trade tariffs and foreign trade rules, and easing restrictions resulting from Canadian laws. This would be particularly useful to smaller firms wishing to increase their participation in global supply chains.

In addition to the policies discussed in the preceding paragraph, Treffer (2005) also prescribed policies aimed and developing the innovative capacity of Canadian firms through taxation and other policies. In particular, it was proposed that business investments in R&D, machinery, and equipment be increased and government should provide subsidies for innovation and retention of knowledge workers (Treffer, 2005). Some analysts suggest that R&D taxes and subsidies should be used to encourage Canadian firms to stay in Canada rather than to give away their technologies in joint ventures with Chinese firms. Interestingly, there were no policy recommendations aimed at expanding innovative capacity through outsourcing and offshoring. Research by the Conference Board of Canada (Munn-Venn and Mitchell, 2005) using Statistics Canada data show that Canadian firms that are better inserted in the global supply chain tend to be more innovative and spend more on R&D. Similarly, Sydor (2007) articulated the benefits to innovation of participating in global supply chains, which include more efficient use of R&D investments, improved innovatory capacity in the home country, and increased competitiveness due to cost reductions and being close to the market. Essentially, from a policy perspective, the evidence presented support the proposition that Canadian governments should implement proactive policies to encourage manufacturing firms to grow through offshoring and outsourcing.

From a research perspective, this paper raises several issues that warrant further investigation. One pressing issue pertains to what should be the requisite mix of policies that are needed to enable Canadian companies to participate more effectively in global supply chains, especially in high-value adding activities. In order to develop and implement such policies effectively, the current research, which only focuses on the manufacturing sector, needs to be extended to include services and other sectors. Also, it may be beneficial to investigate sub-industries within the manufacturing or services sector to determine important nuances in the patterns of offshoring and outsourcing, for example, if they are more intense in some industries (electrical, information and communications, computers, and electronics) than oth-

ers (e.g. oil, gas, textile, and beverage). Another avenue for further research relates to the extremely low level of R&D offshored/outsourced by Canadian firms especially since the bulk of their offshoring and outsourcing is concentrated in just three countries - the U.S., India and China. India is regarded as a key source for very sophisticated science, engineering, and technology talent at relatively cheap rates and for this reason, many global MNEs from the U.S. and Europe have established R&D facilities in India. It was expected that the proportion of Canadian R&D offshored or outsourced to India to be higher – why not? Finally, it would be very useful to benchmark the level and patterns of offshoring/outsourcing of business activities undertaken by Canadian firms with those of other OECD countries to in order to gauge our relative performance and where Canada could be doing better.

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