

# PRODUCT INNOVATION BY SMALL AND MEDIUM-SIZED FIRMS THROUGH OUTSOURCING AND COLLABORATION

Arup K. Sen, D'youville College  
Kushnood Haq, D'youville College

## ABSTRACT

*This paper assesses the role of outsourcing and inter-firm collaboration to product innovation in Western New York's small and medium-sized firms (SMFs). Results of an exploratory survey of 100 small and medium-sized manufacturing firms are presented. A major finding of the paper suggests that SMFs are involved in external collaboration to support new product development. A large majority of these firms collaborate with networks of external partners for their core and non-core activities. A collaborative relationship with external entities was hypothesized to support product innovation; however this was not confirmed by the survey results. The results also indicate that in comparison to the levels ten years ago, outsourcing by SMF increased in all five categories of Research and Development (R&D), product development, manufacturing, marketing/sales, and distribution. Comparatively, medium-sized firms tend to outsource non-core activities while smaller firms tend to outsource their core organizational competencies.*

**KEYWORDS:** SMFs, collaboration, outsourcing, innovation, R&D

**JEL:** M16

## INTRODUCTION

A substantial body of literature now highlights that there has been a fundamental and systematic change in the way SMFs undertake product innovation activities. Furthermore, use of external networks through collaboration and outsourcing has witnessed a substantial growth by the SMFs (Hagedoorn, 2002). Increased competition in the global marketplace, the advancement of manufacturing technologies, and increasingly limited life cycle of products, have greatly impacted product innovation strategies of the small and medium-sized manufacturing firms. Duysters et al. (1999) indicate that external alliances and collaboration has become a cornerstone of the firm's product innovation strategy by which we refer specifically to the use of outsourcing and strategic alliances to undertake product innovation (Tidd and Trehwhella, 1997) and Narula (2002). The role of collaboration and outsourcing in the small and medium-sized manufacturing sector has been emphasized by several academic and professional studies (Powell et al, 1996; Staropoli, 1998). The importance of external alliances is discussed especially in relation to SMFs that lack the necessary resources and expertise to effectively manage the new product development process, from innovation to commercialization stages (Baum et al. 2000). Despite mostly having limited resources, SMFs have generally overcome external barriers to growth by using external alliances. This paper examines the role of collaboration and outsourcing in the innovation performance of Western New York (WNY) small and medium-sized manufacturing firms. The results of a recent telephone survey show that the propensity to successfully bring new products to the market place is often contingent upon the use of external expertise. The results also suggest that a firms' size can influence the depth and nature of its outsourcing activity.

Small firms tend to augment their internal competencies by engaging with networks of external innovation support (Howells, 2008). These networks are designed to access human knowledge and expertise, new processes and technologies, and manufacturing facility. In addition to strategic benefits

like flexibility and product quality, a major motivating factor for collaboration has been comparative cost of production. Our interest in the SMF segment of manufacturing firms stems from two factors highlighted in the literature. First, the extent of engaging external sources is much greater for SMFs than their larger counterparts (Seget, 2002). Second, the strong emphasis to develop external relationships is arguable stronger for SMFs than for their larger firms because SMFs contain limited in-house knowledge and resources (Yasuda, 2005).

Set against this backdrop, the following analysis addresses three main questions. First, to what extent does collaboration vary by firm size? Second, do firms of different sizes exhibit different approaches toward outsourcing? Finally, what are the key factors in outsourcing and other services for effective implementation? Data for the inquiry come from an empirical investigation of small and medium-sized manufacturing firms in Western New York.

It should be noted, however, that this paper does not attempt to contribute to ongoing theoretical debates regarding motives behind outsourcing or external collaboration (see Howells et al., 2008). Instead, the focus of this study is empirical, exploratory, and descriptive. Even so, some of the findings may be of interest to R&D managers and/or students of industrial organizations. In particular, the study finds that R&D outsourcing is no longer as popular as it once was, regardless of firm size. It is also important to differentiate between outsourcing and collaboration from the outset, as outsourcing is driven primarily by the need for cost-containment, whereas collaboration is more strongly motivated by the need to access knowledge that cannot be readily generated via in-house investment.

On this note, the remainder of our paper is organized as follows: The next section discusses the literature review on SMFs. Next describes the survey methodology and gives a descriptive snapshot of the main characteristics of the sample followed by the results of the survey firms on external collaboration and assess the contribution of these linkages to the product development process. Following this section, we describe the current outsourcing patterns of SMFs as compared to ten years ago. This paper concludes with a brief discussion of the implications of the survey results, research limitations, and future research.

## **LITERATURE REVIEW**

Evidence dating back to the 1960s dictates that SMFs can enhance their technological skills by outsourcing specialized work such as product innovation to external experts. (Sen, 2007). Specific literature on this subject further indicates that internal resources are best allocated to the core competencies that match the firms existing skills, whereas non-core competencies are better handled by external firms (Sen and MacPherson, 2009). The notion that external alliances can augment the competitive advantage of small and medium-sized firms is well documented in literature (DeJong and Marsili, 2006). Increasingly, outsourcing has evolved as a common practice in the global economy (Hitt et al. 2000) and firms have been outsourcing their non-core activities of their operation to both domestic and foreign firms in order to focus on their core competencies which will provide these firms with a stronger source of competitive advantage (Lei et. al. 1992). However, these SMFs have limited knowledge and experience in outsourcing (Murray and Kotabe, 1999).

Outsourcing as defined by Gilley and Rasheed (2000) is the purchase from an external supplier of a value creating activity that the outsourcing firm could have done in-house. This concept is derived from Ricardo's (1817) Law of Comparative Advantage in which he indicates that the value of the entire economy would significantly increase if firms would focus on the activities in which they have a relative comparative advantage while outsourcing the activities to those providers who had the relative comparative advantage in performing and delivering those activities. Much of the literature on outsourcing is either conceptual or anecdotal and has focused primarily on the larger firms (Alvarez and Barney, 2001). Such external linkages to access specialized knowledge and other operational activities

have become increasingly common among larger companies (Howells et al. 2008); Lane and Probert, 2007). For several decades, outsourcing has been implemented primarily for cost-containment, but recent evidence suggests SMFs are not outsourcing to access knowledge, expertise, and technology (Sen, 2009).

For small firms, the decision to engage networks of external partners is rarely a simple make-or-buy decision (MacPherson, 1997). Instead, the decision is typically powered by sheer necessity because in-house resources are fully stretched. Moreover, SMFs need to combine multiple strengths of expertise's for any given product development initiative (Freel, 2006) – rendering the need for external collaboration quite critical. Among SMFs that operate in knowledge-intensive industries, the resource-based perspective on external sourcing offers a more powerful explanation for collaborative activity than the transactions-cost approach (Vanchan, 2006; Yasuda, 2004). A common dominator across recent studies is that SMFs must develop external partnerships or collaborative arrangements in order to bring new products to the marketplace. Such arrangements often involve intricate layers of intermediaries to broker information (Howells, 2006), giving rise to complex networks that are not always easy to manage (Britton, 2003).

## **DATA AND METHDOLOGY**

Obtaining systematic information from small and medium-sized firms is a major challenge for researchers because of lack of updated contact information. Past experience has showed that SMFs are reluctant to respond to mail surveys because of time constraints faced by a typical SMF owner/manager. Other obstacle may include the respondents lack of understanding and interpretation of terminology used in the questionnaire. Because of these limitations, a telephone survey was launched to collect data from 100 small and medium-sized manufacturing firms.

For this study, SMFs were classified as firms with less than 500 employees (small firms were defined as having 1-50 employees, whereas medium-sized firms were allocated to the 51-100 employee class). In a preliminary effort to contact manufacturing firms, a telephone survey was conducted with owners of 100 manufacturing firms located in Erie and Niagara counties in New York State While the survey data are restricted to two counties in New York state (leaving the analysis rather limited in terms of geographical scope), the data suggest potentially useful directions for additional empirical work at an expanded geographical scale.

The survey instrument was pre-tested with a pilot study of 25 firms during June, 2009. The results and feedback from the pilot study were used to design the final survey instrument. Telephone interviews were then conducted by professional trained interviewers utilizing the Computer Aided Telephone Interviewing (CATI) system and by computer-assisted random sampling. After three attempts, 76 usable responses were received (yielding an initial response rate of 19%). In order to achieve a higher response rate three more attempts were made to reach the remaining firms, yielding another 24 additional completed surveys (giving a final response rate of 25%). Although response rates of approximately 25% is common in survey research that focuses on business establishments, our 25% rate was disappointing in light of the potential salience of the study to the target firms. Nevertheless, t-tests comparing early (n=76) versus late respondents (n=24) failed to uncover statistically significant differences between the two groups in terms of critical variables such as export intensity, R&D intensity, levels of outsourcing, and collaboration. This said, we concede that a 25% response rate is insufficient to offer conclusive findings. Instead, our results should be treated as suggestive only.

## RESULTS

### External Collaboration

Patterns of external collaboration across the two size-classes of firms are shown in Table 1. The results indicate that the medium-sized firms utilize external partners both in the patent and product development stages to a greater extent than their smaller counterparts. The results also indicate that 63 percent of the medium-sized firms obtained their patents in collaboration with an external partner as compared to 38 percent of the smaller firms. The results were quite similar for both sized firms in terms of new product development (see Table 1). Collaboration with an external partner is similar for both new product development and patents. Tables 2 and 3 also suggest that external collaboration is not correlated with either of the two innovation measures, and this holds true for both size-classes of firms. This might explain, at least partially, while levels of R&D outsourcing have not significantly increased over time. Although there are benefits to external collaboration as discussed in previous sections, these benefits do not seem to translate to superior innovation performance.

Table 1: Size of Firm by the Incidence of External Collaboration

	Small	Medium	All
<b>Patent Collaboration</b>			
Yes	18 (38)	22 (63)	40 (48)
No	29 (62)	13 (37)	42 (52)
Total	47 (100)	35 (100)	82 (100)
Chi-square = 1.092 (p = .463)			
<b>Product Collaboration</b>			
Yes	14 (45)	15 (65)	29 (54)
No	17 (55)	8 (35)	25 (46)
Total	31 (100)	23 (100)	54 (100)
Chi-square = 1.226 (p = .372)			

*This table shows external collaboration of patent and product development by size of firm*

Table 2: Correlation of Product Innovation and External Collaboration

	Small		Medium		All	
	r	p	r	p	r	p
New product collaboration	-0.078	.667	0.85	.726	-0.033	.714

*This table shows the correlation between product innovation and external collaboration.*

Table 3: Correlation of Patent Approvals and External Collaboration

	Small		Medium		All	
	r	p	r	p	r	p
Patent collaboration	.136	.412	-.046	.753	-0.19	.787

*This table shows the correlation between patent approvals and external collaboration.*

As shown in Table 4, the collaborative strategies result from different purposes and are initiated by different entities. Both small and medium-sized firms indicate that the three most important reasons why their firm utilizes external partners for product innovation are to ... 1) access distribution network, 2) access manufacturing and facility, and 3) lower their manufacturing and production costs. The medium-sized firms consider lowering manufacturing and production cost to be more important than the smaller firms. Medium-sized firms are also more likely than their smaller counterparts to collaborate with external partners for new product development and processes and to access R&D expertise and scientific know how.

Table 4: Importance of External Partners for Product Innovation

	IMPORTANT		
	Small	Medium	All
Access distribution network	45%	42%	44%
Access manufacturing/facility	35	46	39
Lower manufacturing/production cost	25	49	33
Access R&D expertise/scientific know how	5	20	10
Develop new products or processes	2	26	10
Extend range of candidates in pipeline	5	14	8
Manage federal regulation	3	12	7
Manage risk in production	4	15	7
Manage risk in R&D	1	9	4

*This table shows the importance of various factors for using external partners for product innovation*

## OUTSOURCING

The findings also shed a light on the activities of SMFs with respect to five dimensions of outsourcing. These dimensions include R&D, product development, manufacturing, marketing, and distribution. Respondents were asked to estimate their current outsourced percentage of the total budget compared to that of ten years ago for each of the five categories. For the combined sample, outsourcing levels increased in all the five categories. In the case of manufacturing, for instance, outsourcing levels increased from an average of 8.7% in 1999 to 13.4% in 2009 (a 54% increase). Similarly, for marketing, outsourcing increased from 3.7% in 1999 to 23.2% in 2009. (see Table 5). It is no surprise, that most of the firms outsource on these dimensions as much as possible (to constrain costs) and that the outsourcing trend is systematically upward, especially for medium-sized firms. Data presented elsewhere show that cost minimization is the key driver in this respect as few companies want to internalize these activities (Sen and Haq 2010). The distribution dimension also shows an upward trend, and again this is primarily cost driven. In contrast, research or knowledge based activities have remained stable and appear to be migrating back toward the in-house domain. In the case of research, for example, outsourcing levels increased from 6.6% in 1999 to only 7.4% in 2009. With regard to outsourcing patterns by firm size, Table 4 suggests that the medium-sized firms outsource more of the non-core activities as compared to the smaller firms, while the smaller firms outsource research and product development (core competencies) more than the medium-sized firms.

Table 5: Outsourcing Trends: Current vs. Ten Years Ago

	Sample Mean	Firm Size		ANOVA
		Small	Medium	
	%	%	%	
Research: Current	7.4	9.0	6.6	.117
10 years ago	6.6	10.0	5.5	.123
Product Development: Current	4.3	7.5	3.7	.030
10 years ago	2.3	5.0	1.8	.291
Manufacturing/Production: Current	13.4	11.3	16.5	.128
10 years ago	8.7	8.9	8.4	.439
Marketing/Sales: Current	23.2	5.0	35.3	.069
10 years ago	3.7	5.0	1.0	.392
Distribution: Current	16.2	10.3	26.9	.345
10 years ago	12.0	8.7	17.3	.029

*This table shows outsourcing of R&D, product development, manufacturing/production, marketing/sales, and distribution currently and 10 years ago*

The firms were also asked to estimate their outsourcing related savings across all of the outsourcing categories. A fourth (26%) of our respondents stated that outsourcing did not result in any cost savings. Again, the results indicate that medium-sized firms are different than their smaller firm counterparts. While 40% of the medium-sized firms achieved outsourcing related cost savings in the range of 6-20% , the smaller firms achieved only 29% during the same time period. Though not statistically significant, there is at least some evidence from Table 6 that medium-sized firms are more adept at managing the outsourcing relationship than the smaller firms. It should be clear to the SMFs that outsourcing should be considered as a complement to the firms’ core and non-core competencies rather than a substitute strategy. Strategic outsourcing is not a panacea for whatever ails the company. Rather, it is a sophisticated approach to the strategic use of non-core business functions.

Table 6: Savings Realized from Outsourcing

Savings Realized	Total Sample %	Size of Firm	
		Small %	Medium %
None	25.9	26.3	25.0
1 - 5%	22.4	26.3	15.0
6 - 10%	17.2	18.4	15.0
11 - 15%	12.1	10.5	15.0
16 - 20%	3.4	-	10.0
>20%	19.0	18.5	20.0

*This table presents the monetary savings firms have realized from outsourcing*

### CONCLUDING COMMENTS

In this paper, we have attempted to understand how small and medium-sized manufacturing firms have employed outsourcing and collaboration in an effort to combat declining product pipelines and patented product portfolios. We also focus on the role of external collaboration and outsourcing in the small and medium sized firms and the relationship between innovation and collaboration. The empirical portion of this paper was based on a telephone survey of 100 small and medium manufacturing firms located in Erie and Niagara counties in New York State.

Based on the results of the study, the following findings may be summarized. First, both small and medium-sized firms utilize external partners for product and patent development. However, medium-sized firms engage external partners more than their smaller counterparts. Secondly, outsourcing of all five categories has increased from ten years ago. However, outsourcing activities of non-core activities has increased at a faster pace primarily to lower production costs. The primary reason for this trend is cost minimization, and increasingly, fewer and fewer SMFs wish to perform these activities in-house. Finally, approximately 25% of the firms did not realize any cost savings from outsourcing. The data also suggests that medium-sized firms achieve a higher cost savings than smaller firms, probably because they have more control and appear to manage their outsourcing relationships more efficiently. The outsourcing of non-core activities such as distribution, manufacturing, and marketing is likely to increase over time, though the same cannot be stated for the core competency function such as research and development. We also state that R&D and product development outsourcing will continue to grow but firms will be more selective by utilizing firms that have a proven track record. Finally, this study has offered an exploratory review of a topic that has attracted significant attention in the recent academic literature on SMFs and outsourcing activities within the manufacturing sector.

Caution should be taken in generalizing the results of this study because this study is subject to several limitations. The three major limitations are: 1) sample size, 2) low response rate, 3) limited geographic scope. The first limitation concerns the small sample size used in this study. Data was collected utilizing a sub-sample instead of the total population because of our limited budget. We could not afford to survey

more than 40% of the population. A second weakness of the study is the low response rate of 25%. Usually a 20% or lower response rate in survey research with business establishments is quite common. Nevertheless, our response rate of 25% is insufficient to provide conclusive findings, and thus the results should be treated as suggestive only. Finally, the sample was selected from Western New York and thus limited in geographic scope.

A goal of this exploratory study was to point in the direction of new research opportunities. In addition to the research questions reviewed in this study, we believe considerable opportunities exist for further empirical research to extend the current analysis to determine if R&D outsourcing is a thing of the past not only with small and medium sized manufacturing firms but other high-tech industries and larger firms which should yield additional important insights. Future research on the motive of R&D outsourcing and collaboration should specifically examine the relationship between innovation and collaboration and innovation outsourcing and to what extent do they support innovation.

**APPENDIX**

Survey of Internationalization of Small and Medium-Sized Manufacturing Enterprises in The Buffalo/Niagara Region

Confidentiality Statement:

There are no anticipated risks to participation in this research. Your summary results will be held in strict confidence. No identifiable reference will be made to any person or establishment, and only combined results will be reported in this research project.

Please answer the questions below and return the survey in the stamped, addressed envelope. Most questions ask for rough estimates only, or yes/no answers. Skip any items that you feel uncomfortable with. Feel free to add written comments at any point.

**Section A: Company Characteristics**

1. How long has your establishment been manufacturing in Buffalo/Niagara region?
  - 1 – 5 years
  - 6 – 10 years
  - 11 – 20 years
  - More than 20 years
  
2. Is your establishment wholly United States owned?
  - Yes
  - No → Country of ownership? \_\_\_\_\_
  
- 2a. Your headquarter location: \_\_\_\_\_
  
3. Please describe your most important product line? \_\_\_\_\_ SIC: \_\_\_\_\_
  
4. What was your establishment’s total sale in 2008?
  - Below \$1 million
  - \$1 - \$5 million
  - \$6 - \$10 million
  - \$11 - \$20 million
  - \$21 - \$50 million
  - \$51 - \$100 million
  - Over \$100 million
  
5. The total number of employees are: **(CHECK ONE BOX ONLY)**
  - Less than 10
  - 11-25
  - 26 – 50
  - 51-100
  - 101-500
  - More than 500
  
6. In a typical operating year, roughly what percentage (%) of your establishment’s total sales go toward research and development (R&D) activity? \_\_\_\_\_ %

**Section B: Export Markets**

7. Do you export?  Yes  No  Plan to export in the future
  
8. How familiar are you with Government Export Assistance program?
  - Extremely familiar
  - Very familiar
  - Some what familiar
  - Not very familiar
  - Not at all familiar
  
9. Have you ever used any type of Government Export Assistance?
  - Yes
  - No

10. If “Yes” to Government Export Assistance...How effective was the Government Export Assistance to your business?  
 Extremely effective       Not very effective  
 Very effective                       Not at all effective  
 Some what effective

11. Over the last 5 years, how would you rank your establishment’s annual growth performance over the categories listed below? **(CHECK ONE BOX PER CATEGORY)**

Category	Average annual growth rate (percentage)				
	Below 1%	1 – 5%	5.1 – 10%	10.1 – 15%	15%+
Total sales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Export sales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R&D spending	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. In a typical operating year, roughly what percentage (%) of your establishment’s total sales come from export markets? \_\_\_\_\_ %
13. If you currently have export markets, please specify and rank the top 3 destinations. Also indicate where you expect to see the best export prospects over the next 5 years. *(If you do NOT currently export, but wish to do so soon, please indicate where you want to export to).*

	Current Export Markets	Export Earnings (% of total sales)	Best Export Prospects
1.	_____	_____ %	_____
2.	_____	_____ %	_____
3.	_____	_____ %	_____

14. What are the barriers in exporting to the foreign market? If you have actually exported, please answer in regard to the actual obstacles faced. If you are currently attempting to export or are not interested in exporting, please answer in regard to the perceived obstacles faced. **(PLEASE RATE YOUR RESPONSES AS PER THE FOLLOWNG SCALE, CHECK ONE BOX PER LINE).**

1=No barrier 2= Minor barrier 3= Moderate barrier 4= Above moderate barrier 5= Major barrier

		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Size of your firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Willingness to take risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of in-house expertise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Management time requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cultural differences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Licensing requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Immigration issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strong domestic competition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Out-dated plant and equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Employee recruitment difficulties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rising costs of production inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government controls/regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Declining demand for product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of operating capital	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shortage of production materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strong competition from foreign producers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other → Please specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION C: Innovation**

- 15a. Please indicate a rough estimate of patents and products your company has achieved over the past 7 years (or the period from company inception to present, if less than 7 years).  
 US patent approvals: \_\_\_\_\_ New Products: \_\_\_\_\_
- 15b. What portion of these patents were developed in collaboration with an external partner? \_\_\_\_\_ %  
 What portion of these products were developed in collaboration with an external partner? \_\_\_\_\_ %



16. Please indicate the importance of the following reasons for outsourcing your product innovation.  
(Using a number from the scale in the box below, check  $\surd$  one box per factor)

1=not important 2=minor importance 3=moderate importance 4=very important 5=critically important
--

<b>FACTORS</b>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
a. Access R&D expertise/scientific know how	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Develop new products or processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Extend range of candidates in pipeline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Access manufacturing /facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lower manufacturing/production cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Manage Federal regulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Access distribution network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Manage risk in R&D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Manage risk in production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION D: Outsourcing**

17. What percentage of the total budget for each of the following areas is used for outsourcing? (The term “outsourcing” refers to payments to another firm for services that your company may otherwise perform in-house)
18. What percentage of the total budget was used for outsourcing 10 years ago (or the period from company inception to present, if less than 10 years)?

	<u>% Budget Used in Outsourcing</u>	<u>10 years ago</u>
Research & Development	___%	___%
Product development	___%	___%
Manufacturing/production	___%	___%
Marketing/sales	___%	___%
Distribution	___%	___%
Other-> SPECIFY: _____	___%	___%

**(IF YOU OUTSOURCE R&D: PLEASE ANSWER Q.19A – Q.19D)**

- 19a. Do you outsource to domestic or foreign firms?  Domestic  Foreign  Both
- 19b. If “Foreign”, please specify the top 2 countries: 1) \_\_\_\_\_ 2) \_\_\_\_\_
- If “Domestic”, is the firm located within your state or elsewhere in the United States:  
1) \_\_\_ Within State 2) \_\_\_ Elsewhere in the US
- If “Elsewhere in US”, please give the most important reason for choosing a firm in another state:  
\_\_\_\_\_
- 19c. Please indicate the two primary reasons involved in outsourcing your R&D activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_
- 19d. Please indicate the two primary risk factors involved in outsourcing your R&D activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

**(IF YOU OUTSOURCE YOUR PRODUCT DEVELOPMENT: PLEASE ANSWER Q20A – Q20D)**

- 20a. Do you outsource to domestic or foreign firms?  Domestic  Foreign  Both
- 20b. If “Foreign”, please specify the top 2 countries: 1) \_\_\_\_\_ 2) \_\_\_\_\_
- If “Domestic”, is the firm located within your state or elsewhere in United States:  
1) \_\_\_ Within State 2) \_\_\_ Elsewhere in the US
- If “Elsewhere in US”, please give the most important reason for choosing a firm in another state:  
\_\_\_\_\_
- 20c. Please indicate the two primary reasons involved in outsourcing your manufacturing activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

20d. Please indicate the two primary risk factors involved in outsourcing your manufacturing activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

**(IF YOU OUTSOURCE YOUR MANUFACTURING ACTIVITIES: PLEASE ANSWER Q21A – Q21D)**

21a. Do you outsource to domestic or foreign firms?  Domestic  Foreign  Both

21b. If “Foreign”, please specify the top 2 countries: 1) \_\_\_\_\_ 2) \_\_\_\_\_  
If “Domestic”, is the firm located within your state or elsewhere in United States:  
1) \_\_\_ Within State 2) \_\_\_ Elsewhere in the US

If “Elsewhere in US”, please give the most important reason for choosing a firm in another state:  
\_\_\_\_\_

21c. Please indicate the two primary reasons involved in outsourcing your manufacturing activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

21d. Please indicate the two primary risk factors involved in outsourcing your manufacturing activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

**(IF YOU OUTSOURCE YOUR MARKETING/SALES ACTIVITIES: PLEASE ANSWER Q22A – Q22D)**

22a. Do you outsource to domestic or foreign firms?  Domestic  Foreign  Both

22b. If “Foreign”, please specify the top 2 countries: 1) \_\_\_\_\_ 2) \_\_\_\_\_  
If “Domestic”, is the firm located within your state or elsewhere in the United States:  
1) \_\_\_ Within State 2) \_\_\_ Elsewhere in the US

If “Elsewhere in US”, please give the most important reason for choosing a firm in another state:  
\_\_\_\_\_

22c. Please indicate the two primary reasons involved in outsourcing your marketing/sales activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

22d. Please indicate the two primary risk factors involved in outsourcing your marketing/sales activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

**(IF YOU OUTSOURCE YOUR DISTRIBUTION ACTIVITIES: PLEASE ANSWER Q23A – Q23D)**

23a. Do you outsource to domestic or foreign firms?  Domestic  Foreign  Both

23b. If “Foreign”, please specify the top 2 countries: 1) \_\_\_\_\_ 2) \_\_\_\_\_  
If “Domestic”, is the firm located within your state or elsewhere in the United States:  
1) \_\_\_ Within State 2) \_\_\_ Elsewhere in the US

If “Elsewhere in US”, please give the most important reason for choosing a firm in another state:  
\_\_\_\_\_

23c. Please indicate the two primary reasons involved in outsourcing your distribution activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

23d. Please indicate the two primary risk factors involved in outsourcing your distribution activities in order of importance?  
1. \_\_\_\_\_ 2. \_\_\_\_\_

24. Approximately, what monetary savings on average have you realized from outsourcing:  
 None     1 – 5 %     6 – 10%     11 – 15%     16 – 20%     >20%
25. Please rate the importance of the **sources of outside advice** to your company (some agreement being formal, requiring a fee payment and others may be informal, not requiring any financial payment) to your firm’s business. (Using a number from the scale in the box below, check  one box per factor)

1=not important   2=minor importance   3=moderate importance   4=very important   5=critically important
--

<u>SERVICES</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
a. Marketing consulting/research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Advertising/Public relations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Teaching and research hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. University research departments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Local government agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Federal agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Non government agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Local networks of business associates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Customers/users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Suppliers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. How would you describe the competitive problems facing your establishment? (**RANK THE FOLLOWING CATEGORIES FROM A LOW OF “1” (NOT A PROBLEM) TO “5” (A SEVERE PROBLEM). CHECK THE BOX THAT BEST DESCRIBES YOUR POSITION FOR EACH STATEMENT.**)

1=Not a problem   2=Minor problem   3=Moderate problem   4=Important problem   5=Severe problem
---

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Foreign imports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local taxes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State taxes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Federal taxes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finding good labor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
U.S. competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to capital	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Foreign trade barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Federal regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local business services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other → Specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Thank you very much for your help in this survey. We appreciate your time and effort. If you would like a copy of our summary report, please provide your mailing address.*

*I would like to receive a summary report:*   

Company name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Fax number: \_\_\_\_\_

Name of respondent: \_\_\_\_\_

Title: \_\_\_\_\_

If you have any further questions about this survey, please contact:

Dr. Kushnood Haq  
 320 Porter Avenue  
 Buffalo, NY 14201  
 716-829-8123  
 E-mail: [haqk@dyc.edu](mailto:haqk@dyc.edu)

Dr. Arup Sen  
 320 Porter Avenue  
 Buffalo, NY 14201  
 716-829-7658  
 E-mail: [sena@dyc.edu](mailto:sena@dyc.edu)

The research study has been reviewed and approved by the Institutional Review Board of D’Youville College.

## REFERENCES

- Alvarez, S.A. and Barney, J.B. (2001) How entrepreneurial firms can benefit from alliances with large partners, *Academy of Management Executive*, 15 (1): 139-148.
- Baum, J.A.C., Calabrese, T. and Silverman, B.S. (2000) 'Don't go it alone: alliance network composition and startups' performance in Canadian biotechnology, *Strategic Management Journal*, Vol. 21, No. 3, pp. 267-294.
- Britton, J.N. H., (2003) Network structure of an industrial cluster: electronics in Toronto. *Environment and Planning (A)*, 35; 983-1006.
- DeJong, J.P.L., and O. Marsili, (2006) The fruit flies of innovation: A taxonomy of innovative small firms, *Research Policy*, 35: 213-229.
- Duysters, G., Kok, G., Vaandrager, M., 1999 Crafting successful strategic partnerships, *R&D Management* 29, 343-351.
- Freel, M. (2006) Patterns of technological innovation in knowledge intensive business services. *Industry and Innovation*, 13: 335-358.
- Gilley, K.M. and Rasheed, A. (2000) Marketing more by doing less: Analysis of outsourcing and its effects on firm performance, *Journal of Management*, 26: 763-790.
- Hagedoorn, J., 2002 Inter-firm R&D partnerships-an overview of patterns and trends since 1960, *Research Policy* 31, 477-492.
- Hagedoorn, J. 2002 Inter-firm R&D partnerships: an overview of major trends and patterns since 1960. *Research Policy*, V. 31, pp. 477-492.
- Hitt, M.A., Ireland, R.D., and Hoskisson, R.E. (2000) *Strategic Management: Competitiveness and Globalization* (4<sup>th</sup> Ed.) St. Paul, MN West Publishing.
- Howells, J., (2006) Intermediation and the role of intermediaries in innovation. *Research Policy*, 35: 715-728.
- Howells, J., Gagliardi, D. and Malik, K. (2008) The growth and management of R&D outsourcing: evidence from UK pharmaceuticals. *R&D Management*, 38: 205-219.
- Lane, C., and Probert, J., 2007 The external sourcing of technological knowledge by U.S. pharmaceutical companies: Strategic goals and inter-organizational relationships, *Industry and Innovation*. V. 14, No. 1, pp. 5-25.
- Lei, D., Hitt, M.A. and Bettis, R. (1996) Dynamic core competencies through meta-learning and strategic context, *Journal of Management*, 22 (4): 549-569.
- MacPherson, A. (1997) The contribution of producer service outsourcing to the innovation performance of New York State manufacturing firms. *Annals of the Association of American Geographers*, 87: 52-71.
- Murray, J.Y. and Kotabe, M. (1999) Sourcing strategies of U.S. service companies: A modified transaction-cost analysis, *Strategic Management Journal*, 20: 791-809.

Narula, R., 2002 R&D collaboration by SMEs: some analytical issues and evidence in: Contractor, F., Lorange, P. (Eds.), *Cooperative Strategies and Alliances*, Pergamon Press.

Powell, W.W., Koput, K.W. and Smith-Doerr, L. (1996) 'Interorganisational collaboration and the locus of innovation: networks of learning in biotechnology', *Administrative Science Quarterly*, Vol. 41, No. 1, pp. 116-146.

Sen, A.K. (2009) Outsourcing of research and development activities: Evidence from U.S. biopharmaceutical firms, *Global Journal of Business Research*, Vol. 3 No. 73-82.

Sen, A.K. and Haq, K. (2010) Internationalization of SMEs: opportunities and limitations in the age of globalization, *International Business & Economics Research Journal*

Sen, A.K. and MacPherson, A., (2009) Outsourcing, external collaboration, and innovation among U.S. firms in the biopharmaceutical industry, *The Industrial Geographer*, Vol. 6 Issue 1: 20-36.

Staropoli, C. (1998) 'Cooperation in R&D in the pharmaceutical industry – the network as an organizational innovation governing technological innovation', *Technovation*, Vol. 18, No. 1, pp. 13-23.

Tidd, J., Trehwella, M., 1997 Organizational and technological antecedents for knowledge creation and learning, *R&D Management* 27, 359-375.

Vanchan, V. and MacPherson, A., (2007) The growth performance of U.S. firms in the industrial design sector; and exploratory study. *Industry and Innovation*, 37: 219-231.

Yasuda, H. (2005) Formation of strategic alliances in high technology industries: Comparative study of the resourced based theory and the transaction-cost theory. *Technovation*, 25: 763-770.

## AUTHOR BIOGRAPHY

Dr. Arup K. Sen, is the Chair of the Business Department at D'Youville College, Buffalo, N.Y. with responsibility for program development, enrollment and retention, and managing the daily operations of the Business Department. He also serves as the Director of the Graduate Business and Advance Programs. Prior to joining D'Youville, College in 2002, Dr. Sen served as a faculty in the School of Management at The University at Buffalo for 18 years. He received his Bachelors degree in Accounting from Hampton University, Masters in Marketing from Virginia Commonwealth University and Ph.D. in International Trade from The University at Buffalo. Dr. Sen's research interests involve internationalization, outsourcing, and collaboration of core and non-core activities of small and medium sized firms. Dr. Arup Sen can be contacted at D'Youville, College 320 Porter Avenue, Buffalo, NY 14201, Email: [sena@dyc.edu](mailto:sena@dyc.edu)

Dr. Kushnood Haq is the Vice President of Academic Affairs at D'Youville College, Bachelors in Management from Canisius College, his MBA from St. Bonaventure University and his Ph.D. in International Trade from The University at Buffalo. Dr. Haq's research interests involve internationalization of higher education, foreign direct investment, and export activities of small and medium sized firms. Dr. Kushnood Haq can be contacted at D'Youville, College 320 Porter Avenue, Buffalo, NY 14201, Email: [haqk@dyc.edu](mailto:haqk@dyc.edu)