

# The impact of industry associations: Evidence from Statistics Canada data

## SUMMARY

*Industry associations are nonprofit organizations with specialized knowledge and capabilities that typically perform innovation enabler roles. I present Statistics Canada data that show that industry associations have a strong impact on the ability of Canadian firms to innovate. In the interests of informing further empirical work on the contributions of organizations that work to enable innovation, I develop theory to describe how organizations that perform innovation enabler roles are expected to contribute to the ability of firms to innovate. I also describe how the measurement guidelines of the Frascati and Oslo Manuals published by the Organization for Economic Co-operation and Development make it difficult to observe the existence and impact of nonprofit organizations that perform innovation enabler roles.*

## KEY WORDS

industry associations;  
nonprofits;  
innovation policy

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In the innovation literature the linear model of innovation was laid to rest some time ago (Rothwell et al., 1974). It has been superseded by the understanding that innovation is a nonlinear, multidimensional process that involves many players and perspectives (Dougherty, 1990, 1992), multidirectional knowledge flows (Lane & Maxfield, 1996), and continuous iteration between new product development and use (Iansiti, 1998). But in public policy circles the linear model of innovation appears to be in robust health. Governments are outdoing each other in investments in the upstream elements of innova-

tion, in the hopes of engendering eventual desirable behaviors on the part of downstream players. The thinking seems to be that if we just invest enough in research, technology commercialization, and knowledge dissemination activities, then eventually we will be rewarded with firms that are innovative and productivity numbers that will make us proud. The problem is: are the firms listening? Or is this a collective effort in technology push?

The vast majority of firms are small and do not perform R&D, but this doesn't mean there wouldn't be huge returns, both private and public, to their being more innovative. But small firms are highly resource constrained, especially in terms of the time of managers. Just as consumers have little interest in examining every new product that is brought to market, small firm managers have little interest in examining the many new technologies, opportunities, and incentives that governments put in front of them. And just as many new products don't fit the needs of the user, many new innovation enhanc-

ing offerings of government may be inappropriate. On average, the small firm manager may be better off attending to pressing concerns and engaging with people who understand his/her business and its needs, than by getting distracted by government interventions.

When managers see a need for engaging with others from whom they can learn and with whom they can engage in collective action to better their situation, they often set up industry associations (Aldrich, Bolton, Baker & Sasaki, 1998). Industry associations are autonomous, nonprofit organizations that generally do not receive funding from governments, except in circumstances where they are seen to contribute to national priorities. They would not exist without the support of the firms that are their clients, and as a consequence they must ensure that they understand and are attentive to their clients' needs. Their ability to do so is facilitated by the fact that they generally focus on a specific industry, and sometimes on a specific geographic region, and their specialization allows them to develop specialized knowledge and capabilities.

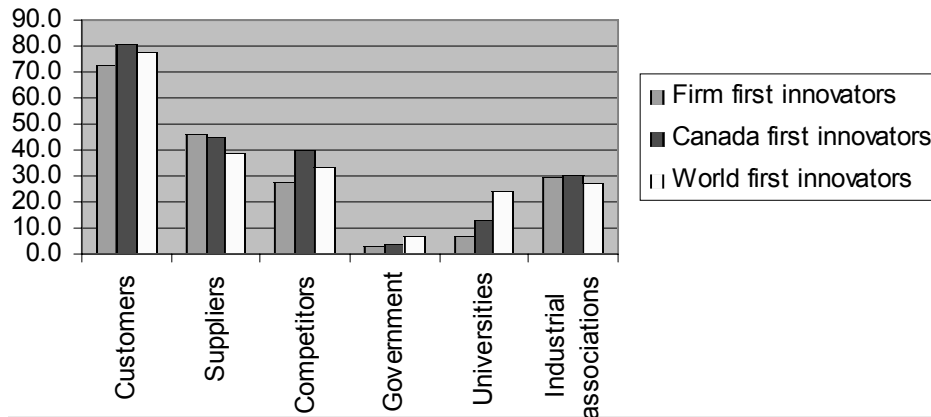
In the next section I present evidence that shows that industry associations are valuable contributors to the ability of firms to innovate. Based on Statistics Canada data from over 2000 firms across a wide range of industries, I show that industry associations appear to outperform governments and universities as innovation enablers. I then present a theoretical perspective on the innovation enabler role, a role often performed by nonprofit organizations, with a view to facilitating further empirical work. In the subsequent section I describe how the conceptual models and measurement systems typically used to measure innovation and R&D in all OECD (Organization for Economic Co-operation and Development) countries make it difficult to observe the number of innovation enabling nonprofit organizations in existence, let alone measure the impact of their activities. In the conclusion I describe how industry associations can be leveraged to promote the innovativeness of firms.

## IMPACT OF INDUSTRY ASSOCIATIONS

In 2003 Statistics Canada conducted a survey of 2123 establishments in 35 knowledge-based service industries in Canada. The target population included all establishments in selected service industries including all information and communications technology industries, selected knowledge-based professional, scientific and technical services industries, and selected natural resource and transport industries. Only establishments with a gross business income of at least \$200,000 and at least 15 employees were considered in sample selection. Responses were divided into two groups based on whether or not the firm had introduced a new product, service, or process within the last three years and the results presented below are based on the subset of firms that had done so, i.e. the innovators (Statistics Canada, 2003a).

Statistics Canada identified two innovation-enabling mechanisms that might be expected to contribute to the ability of a firm to innovate. Based on the premise that a firm's ability to innovate is enhanced by its exposure to ideas, firms were asked to indicate their sources for ideas and to rate their importance. Similarly, based on the premise that the innovative capacity of a firm is enhanced through collaboration, firms were asked to indicate the types of organizations with which they collaborated. The responses, shown in Figures 1 and 2, are segregated according to the extent to which the responding firm's 'new' products, processes, and services have not appeared earlier. The innovations of 'world first' innovators are new to the world, those of 'Canada first' innovators are new only within Canada, and those of 'firm first' innovators are new only to the firm.

As shown in Figure 1, customers were the most important source of ideas, followed by suppliers and competitors, and consistent with the literature on the sources of ideas for new products (von Hippel, 1986). In terms of non-firm organizations, nonprofit industry associations were more frequently cited as important sources of



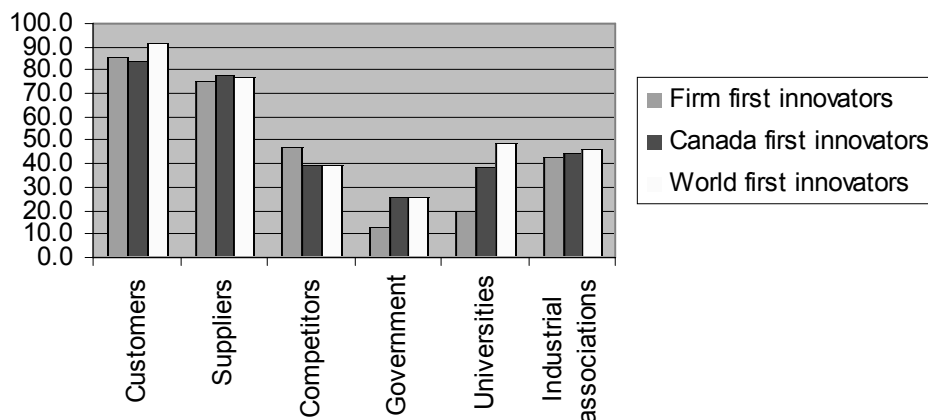
**FIGURE 1: IMPORTANT SOURCES OF IDEAS FOR CANADIAN INNOVATORS**  
(Statistics Canada, 2003b)

ideas than either federal government research institutes or universities. Similarly, as shown in Figure 2, industry associations were more frequently cited as collaborators of innovative firms than either federal government research institutes or universities with the exception of ‘world first’ innovators that cited universities slightly more frequently as collaborators.

One explanation for these surprising numbers says that since something like 99% of Canadian firms don’t conduct research they can hardly be expected to turn to universities and federal government research institutes for ideas. But it turns out that the pattern is the same, even for firms

that do conduct research. Firms with R&D personnel cite industry associations as important sources of ideas an average of 6.0 times more frequently than they cite federal government research institutes, and an average of 2.4 times more frequently than they cite universities.

It must be noted that there was no attempt to control for the relative sizes of the populations of organizational actors considered in the data presented in Figures 1 and 2. The population of organizations that could be customers, suppliers, or competitors is virtually infinite as these roles could be played by any organization ranging from a Canadian firm to a foreign government.



**FIGURE 2: COLLABORATORS OF CANADIAN INNOVATORS**  
(Statistics Canada, 2003b)

In comparison there are likely about 2500–3000 industry associations in Canada that may collectively employ about 40,000–50,000 people, assuming that respondents restricted themselves to Canadian industry associations.<sup>1</sup> There are about 502 universities, colleges, and other non-profit post-secondary educational institutions in Canada that collectively employ some 212,596 people (Statistics Canada, 2005a) although there are only 92 universities (AUCC, 2005) that collectively employ some 47,340 personnel engaged in R&D (Statistics Canada, 2005b). The largest federal government research institute in Canada is the National Research Council that employs approximately 4,000 people (NRC, 2005) and collectively the federal government employs 13,960 personnel engaged in R&D (Statistics Canada, 2005b). And finally the numbers of provincial research institutes and private non-profit research institutes are very low. In addition, it must be noted that the sample focused on firms in knowledge-based industries. The survey results may have been different had the sample been broader in terms of industry coverage.

Notwithstanding the caveat, there are two conclusions to be drawn from the data. First, that industry associations are important contributors to the ability of Canadian firms to innovate and second, that the agents that make innovation enabling contributions can be identified with the appropriate methodology. The contributions to innovation of industry associations are strong because their activities are driven by the needs of their clients and because they have specialized knowledge of the context in which technology is applied and new products developed. Their heterogeneity mirrors the heterogeneity in the population of firms that are their clients. Industry associations are a self-organizing population of organizations where organization creation, growth and survival is tightly linked to the ability to add value.

If Statistics Canada had not asked about specific innovation-enabling mechanisms (i.e. sources of ideas and collaborators) it unlikely that

it would have elicited the data presented above on the impact of industry associations. For instance, if Statistics Canada had instead asked respondents about external organizations that had a significant impact on their firm's ability to innovate, is likely that the social and public contributions of industry associations would have been overlooked in favor of the private and economic contributions of customers and suppliers. In the next section I develop theory on the nature of contributions made by organizations that perform the role of innovation enabler with a view to facilitating future empirical work on the impact of organizations that typically perform the role.

### CONTRIBUTIONS OF INNOVATION ENABLERS

While the activities of industry associations may vary by country, in Canada the activities of industry associations typically centre on hosting meetings where members share knowledge on the business environment, particularly as it impacts their industry. Topics of interest may include changes in the behaviour of customers, suppliers, and competitors, changes in industry standards and government regulations, and new technologies. The knowledge is particularly valuable because it is subjective and reflects the state of affairs as perceived by peers. Other activities may include lobbying, training, and joint promotional activities; few industry associations perform R&D.

In the following I present a theoretical perspective on the innovation enabling roles that are often, but not exclusively, performed by non-profit organizations such as industry associations. Organizations that perform innovation enabler roles (enablers hereafter) impact a focal firm's ability to innovate by shaping the networks and markets in which the firm engages in four ways: (1) they identify and legitimize agents; (2) they facilitate the creation of ties between agents; (3) they increase access to resources through network brokerage; and (4) they facilitate joint action through network closure. In the following I elab-

orate on the four classes of innovation-enabling mechanisms.

### **Identifying and legitimating agents**

Enablers contribute to a firm's ability to innovate by identifying and legitimating agents. There are several ways in which enablers grant legitimacy to a focal firm, for example, a government may allow it to incorporate, a stock market may allow it to trade its shares on the market, the International Standards Office may grant it ISO certification for its activities, or, in the case of a retailer, a manufacturing firm may certify it as an 'authorized dealer'. In other cases the firm's ability to innovate is facilitated by the work of enablers that identify and certify input resources, for example by universities, other educational institutes, and professional associations that accredit individuals and institutions making it easier for the firm to identify suitable employees. Industry associations that identify firms that participate in a given industry or region are also acting as enablers. Such activities have been shown to have a positive impact on the survival of organizations (Singh, Tucker & House, 1986).

### **Facilitating the creation of inter-agent ties**

A firm's ability to innovate will be further facilitated through the creation and strengthening of inter-agent ties (Ahuja, 2000). In some cases networking activities are central to the mandates of the enablers (e.g. industry associations, economic development organizations, and professional societies) whereas in other cases inter-agent ties are a by-product of transactional (buy-sell) relations. For example, transactional relations with prestigious partners such as leading venture capitalists have been shown to result in reputational benefits for firms (Stuart, Hoang & Hybels, 1999).

### **Increasing access to resources through network brokerage**

Open networks in which there are structural holes create brokerage opportunities for agents

that bridge otherwise weakly connected network elements (Burt, 2000). Brokerage provides benefits in terms of access to non-redundant information and opportunities for control. There is conflicting evidence on whether the brokerage role enhances or disrupts a firm's ability to innovate. Where the brokerage role is central to the firm's competitive advantage it has been shown to be beneficial (Hargadon & Sutton, 1997) but where a firm's network is comprised of competitors, a high ratio of disconnected partners has been shown to have a negative impact on the firm's innovation output (Ahuja, 2000). Some innovation-related nonprofits are created expressly to serve as brokers between networks of firms and networks of university researchers. In other cases economic development organizations and national trade offices try to broker between domestic firms and potential customers in other countries.

### **Facilitating joint action through network closure**

Networks in which all or most agents are connected to one another exhibit high degrees of network closure. Agents that participate in such networks benefit insofar as closed networks mitigate risk by enhancing communications and enforcing sanctions for inappropriate behavior (Coleman, 1988). Enablers such as industry associations, economic development organizations, and professional societies work to facilitate communications and create trust among participants by working to promote a high level of participation amongst the target population, and a high frequency and intensity of engagement amongst participants. A high degree of network closure is especially important for collaborative activities in which firms work together and share proprietary technologies and know-how. The Toyota Production System enables collaboration amongst suppliers through a variety of bilateral and multilateral activities that promote network closure making Toyota an enabler as well as a customer (Dyer & Nobeoka, 2000).

Future empirical work designed to elicit information in the impact of innovation enablers can design queries based on the innovation enabling mechanisms just described. For example, firms might be asked about the type of organizational actor (i.e. firm, government, university, nonprofit) that increased their legitimacy in the eyes of customers (an example of identifying and legitimizing agents), connected them to other firms with similar problems (an example of creating inter-agent ties), connected them to knowledge sources of which they were unaware (an example of network brokerage), or that facilitated collective approaches to investing in expensive equipment (an example of network closure).

### MEASURING THE CONTRIBUTIONS OF NONPROFITS

In their efforts to measure R&D and innovation, Statistics Canada and its counterparts in other countries are guided by the Frascati Manual (OECD, 2002) and the Oslo Manual (OECD, 2005), respectively. The OECD Manuals are intended to serve a variety of purposes and must contend with tremendous heterogeneity in national activities, cultures, and understandings. Understandably, innovation enabling nonprofit

organizations have received little attention. But it is important to understand how the OECD approaches may have influenced our perceptions of the importance and impact of nonprofit organizations. With this in mind, I present five ways in which the OECD guidelines make it difficult for statisticians and those that use their data to recognize the contributions of nonprofit organizations that typically perform innovation enabler roles.

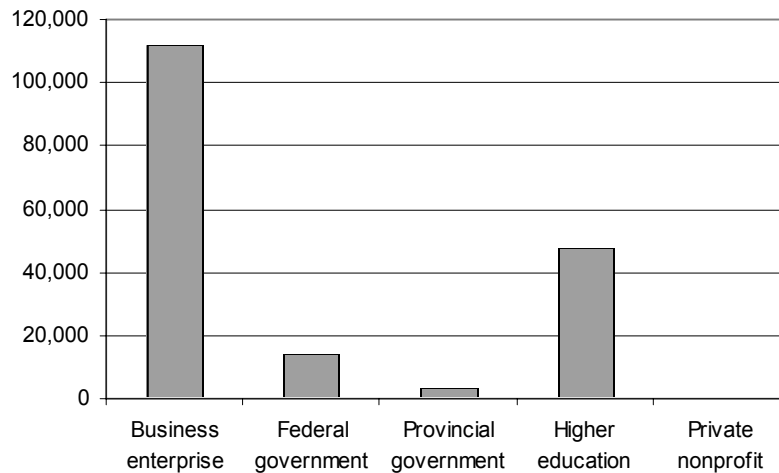
#### 1. Nonprofits not included as information sources

The Oslo Manual offers guidance on possible sources of information, ideas, and the like (OECD, 2005: 81). As shown in Table 1, the Oslo Manual's list of information sources includes a range of sources that are internal to the firm, external to it, public sector sources, or that are generally available. Industry associations and research consortia do not appear on the list. Statistics agencies that use this list of sources as given will not capture the contributions of important types of nonprofit organizations. Interestingly, Statistics Canada departed from convention and modified the list on the advice of its industry advisors and was thereby able to uncover the contributions of industry associations.<sup>2</sup>

TABLE 1: OSLO MANUAL, SOURCES OF INFORMATION

Sources of information	Sources of information, <i>continued</i>
Internal sources within the enterprise: R&D Production Marketing Distribution	Public sector sources: Universities and other higher education institutions Government/public research institutes Private non profit research institutes Specialized public/semi-public innovation support services
<i>Other enterprises within the enterprise group</i>	General information sources: Patent disclosures Professional conferences, meetings, branch literature and journals Fairs and exhibitions Professional associations, trade unions Other local associations Informal contacts or networks Standards or standardization agencies Public regulations (i.e. environment, security)
External market and commercial sources: Competitors Other enterprises in the industry Clients or customers Consultants/consultancy firms Suppliers of equipment, material, components, software, or services Commercial laboratories	

Source: OECD, 2005: 81.



**FIGURE 3: 2002 R&D PERSONNEL IN CANADA**  
(Statistics Canada, 2005b)

## 2. List of innovation sources combines actors and roles

To be clear about the impact of organizational actors and organizational roles it is necessary to distinguish between actors and roles. There are four major types of organizational actors in an economy: firms, governments, universities, and nonprofit organizations.<sup>3</sup> Each of these organizational actors can play one or more roles, where roles are defined relative to another organization or individual. Common transactional roles are customer, supplier, competitor, and complemen- tor (Brandenburger & Nalebuff, 1996). In the preceding section I introduced a non-transactional role, that of innovation enabler. The list of information sources proposed by the Oslo Manual combines actors and roles making it impossible to measure the contributions of specific types of actors such as nonprofits. For example, as noted above, when customers are identified as sources of ideas it is not clear whether the customer is a for-profit Canadian firm or a foreign government organization.

## 3. Focus on economic transactions rather than social relations

Unlike social relations, economic exchanges leave clear paper trails that make them relatively easy to

measure. But people engage with one another and learn through both economic and social relations, and it can be argued that social relations are at least as important to innovation and the exchange of knowledge as their economic counterparts. With their focus on producing reliable data, statistical agencies, not surprisingly, focus on economic relations.

Figure 3, below, presents GERD (Gross Domestic Expenditures on Research and Development) data on R&D personnel in Canada in 2002, the most recent available data. According to this data, nonprofits appear to be truly insignificant. There are three explanations for this. First, most nonprofits are not involved in R&D. Second, there are nonprofits such as research networks and research consortia that are involved in R&D, but that often act innovation enablers, facilitating rather than performing R&D. As their contributions are both social and technological, the proportion of R&D personnel among their employees may be low. And finally, as is discussed below, the OECD Manuals do not classify all nonprofits as nonprofits.

It is nonetheless remarkable to compare the GERD data on federal government R&D personnel and nonprofit R&D personnel with the data presented in Figures 1 and 2, above, on

important sources of ideas and collaborators for innovative firms. The federal government employs 13,960 research personnel while nonprofits are said to employ only 730 research personnel, a ratio of 19 to one (Statistics Canada, 2005b). But industry associations (only one type of nonprofit organization) are cited as important sources of ideas between four and nine times more frequently than federal government research institutes (which do not employ all federal government R&D personnel), and are similarly cited as collaborators up to three times more frequently. The number of R&D personnel and the likelihood of being cited as an important source of ideas or as a collaborator seem to be inversely related when one compares the federal government and nonprofits.

#### 4. Only a subset of nonprofits are classified as nonprofits

The Frascati Manual, and the Oslo Manual by reference to it, identifies four sectors of the economy: the business enterprise sector, the government sector, the private nonprofit sector, and the higher education sector (OECD, 2002: 66). Innovation-related nonprofit organizations are not necessarily classified in the nonprofit sector as might be expected, because nonprofit organizations are excluded from the nonprofit sector if:

1. They mainly render services to enterprises, in which case they are classified under the business enterprise sector. This includes industry and trade associations, and economic development organizations (OECD, 2002: 56).
2. They primarily serve government, or if they are entirely or mainly financed and controlled by government, in which case they are classified under the government sector. This includes the many research institutes, science parks, centers, networks, and consortia that are led by industry but that receive substantial government funding (OECD, 2002: 63).
3. They offer higher education services or are controlled by institutes of higher education which includes all research institutes, experi-

mental stations, and clinics operating under the direct control of, administered by, or associated with higher education establishments (OECD, 2002: 55).

As a consequence the number of nonprofit organizations that are classified as nonprofits is a subset of the total population of nonprofit organizations.

#### 5. OCED definition of a national system of innovation does not mention nonprofits

Innovation researchers have focused on three levels of analysis: the level of the firm and interfirm relations, the level of the region and regional systems of innovation, and the level of the nation and national systems of innovation (NSI). As the broadest level of analysis, the NSI school is the most likely to have considered the role of nonprofit organizations and indeed most definitions of a national system of innovation focus on the interconnected nature of science, technology, and business activities and leave open the possibility of a diverse range of actors performing the constituent roles (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Niosi, 2000). The OECD however, defines a national system of innovation in such a way as to exclude nonprofit organizations from consideration:

A system of interacting private and public firms (either large or small), universities and government agencies aiming at the production of science and technology within national borders. Interaction among these units may be technical, commercial, legal, social and financial, inasmuch as the goal of the interaction is the development, protection, financing or regulation of new science and technology.

(OECD, 1994: 3)

In summary, there are five reasons for which data collected according to OECD guidelines are unlikely to capture the innovation enabling contributions of nonprofit organizations. First, the

Oslo Manual does not include nonprofits as innovation sources and second, its list of innovation sources combines actors and roles. Third, GERD data focuses on economic transactions rather than social relations. Fourth, the Frascati Manual, and the Oslo Manual by reference to it, does not classify all nonprofits as nonprofits and fifth, the OCED definition of a national system of innovation does not mention nonprofits.

## CONCLUSION

There is limited empirical evidence demonstrating the innovation-enabling contributions of nonprofit organizations, such as industry associations, primarily because past data collection efforts have not been informed by theory on the nature of the contributions that such organizations might make. In this paper, I have briefly outlined the form such theory might take and have described the four ways in which innovation enablers contribute to innovation by shaping networks and markets.

As the theory applies to industry associations, industry associations are expected to enable innovation: (1) by identifying and legitimizing firms, for example by creating industry directories, and (2) by facilitating the creation of interfirm relations, for instance through networking activities. An additional means by which industry associations are expected to enable innovation is (3) by providing increased access to resources through network brokerage activities, for example access to knowledge in universities and opportunities in foreign markets. In this paper I have presented data that show that industry associations are frequently cited by innovative firms as important sources of ideas, likely a result of their ability to make interfirm connections between firms that wouldn't otherwise be connected. And finally, industry associations are expected to enable innovation (4) by facilitating joint action through network closure. This is similarly evidenced by data I have presented that show that industry associations are frequently cited by innovative firms as

collaborators, likely a result of their ability to increase the density of interfirm connections.

Future efforts to measure the impact of various organizational actors on the ability of firms to innovate should be guided theory on the likely nature of innovation-enabling contributions that such organizational actors might make. Contributions that are economic and private, for example receiving \$20 million from a venture capitalist, are likely to take precedence over contributions that are social and public, for example increasing legitimacy through the publication of an industry directory. Efforts to capture the impact of organizational actors that tend to make social contributions must make appropriately designed queries. Statistics Canada was able to collect data that revealed the importance of industry associations by making such queries and in so doing departed from certain OECD conventions.

If future empirical evidence confirms the strong impact of industry associations on the ability of firms to innovate then this presents an opportunity for governments. Instead of creating new programs and working to attract the participation of firms, governments can leverage the existing capabilities of industry associations. In many cases an industry association may be the only non-transactional organization with which a given small firm engages, and so such organizations represent the best opportunity for governments to reach small firms. But like their small firm constituents, many industry associations face resource shortages, and the more transformative the activities in which they engage, the more acutely the resource shortages are felt. Activities that are non-customized, near term, local, and not knowledge intensive can be undertaken with relatively modest resources. But activities that are one-on-one, intended to make a difference over the long term, international, or science or technology-based require government support. In advanced economies, industry associations can sustain their existence with the former type of activity but their ability to contribute fully to the

innovativeness of firms is linked to their ability to provide high value added assistance of the type that relies upon the support of government. In developing economies it may be appropriate to subsidize industry associations catering to basic, shared needs.

The ability of industry associations to draw upon their diversity and their understanding of client needs is reflective of two broader trends in innovation. First, the trend toward increasing customization (Pine, 1993) and second, the trend toward user designed innovation, a result of more sophisticated design technologies and of users' superior knowledge of the context in which new products will be used (von Hippel, 2005). Governments will be unable to match the diversity, knowledge, and capabilities of industry associations without an unreasonable increase in their size and complexity. Industry associations are not the only type of nonprofit organization that could be leveraged by government to contribute more strongly to innovation. With appropriate incentives, economic development organizations, professional societies, and labour unions could all be playing stronger roles.

### Acknowledgements

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### Endnotes

- 1 There are 8,483 nonprofits are classified under Group 11 – Business and professional associations and unions in Canada, and they collectively employ 150,226 people (Statistics Canada, 2005). The organizations classified under Group 11 include industry associations, professional societies and unions, and economic development organizations, likely in approximately equal proportions, and so I estimate that they are approximately 2500–3000 industry associations in Canada that collectively employ some 40,000–50,000 people.

- 2 Interview with Dr. Frances Anderson, Science, Innovation and Electronic Information Division, Statistics Canada, February 21st, 2005.
- 3 In fact, the System of National Accounts identifies only three main classes of organizational actors, namely firms (non-financial and financial), governments, and nonprofits (it also identifies households as a sector (OECD, 2002: 53). The Frascati Manual distinguishes universities because of the important and differentiated role they play in research (OECD, 2002: 68).

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