

Dear Panel:

On behalf of the members of the Canadian Construction Association's Research and Innovation Committee, I am pleased to submit for your consideration our response to your consultation document.

Research, development and innovation support is of particular interest to Canada's construction industry. As an industry dominated by small- and medium-size firms, many of our members simply do not have the resources they require to take their creations from design to commercialization. Current government support programs are of little benefit to our members, as these programs focus primarily on university or business theoretical research, and offer little in the way of support for the more practical types of research or innovation.

Greater support for college research would greatly benefit the construction sector as it would help the industry commercialize research and innovation, as well as disseminate the outcomes of research and innovation throughout the industry. Moreover, it would create within the college sector a practical research capacity that could benefit many sectors well beyond those businesses involved in construction. The funding of college research Chairs would help coordinate college research efforts and provide an important interlocutor for universities wishing to expand their research activities into the practical realm.

CCA also believes governments should consider the use of incentives (tax or otherwise) to help encourage businesses at all levels to adopt a culture of innovation. Innovation will be critical to Canada's future success and competitiveness, particularly as China, Brazil and India begin competing more directly against us internationally. Through the adoption of a culture of innovation, we can ensure Canadian business remains competitive and early adopters of advanced technologies and the latest in construction techniques. As part of this effort, CCA strongly recommends the development of a construction secretariat (perhaps within Industry Canada or the National Research Council) to help facilitate the dissemination of innovation and help coordinate research activities.

CCA would be pleased to expand upon the responses contained within our submission. At your convenience, we look forward to the opportunity to appear before the panel in connection with this important study.

SUBMISSION



# Expert Panel for the review of Federal Support to Research and Development

February 2011

The Canadian Construction Association (CCA) appreciates the opportunity to submit this document in response to the Federal Government's initiative to consult Canadians on the issue of research and development. CCA is the voice of the non-residential sector of the construction industry representing more than 17,000 firms across Canada.

## Consultation questions posed by the Expert Panel on R&D

1. *In addition to the R&D activity defined by the OECD, should government be funding other business activities related to the commercialization of R&D? If so, what and why?*

Much of the R&D carried out within Canada is done by academics and graduate students working within the Canadian university and college community. Many of these Canadian innovators lack general business experience, which can be a significant barrier to the commercialization of new R&D.

While permitting innovators to utilize government funding to help offset the costs related to business commercialization (i.e. consulting services, legal services, accounting services) might dilute the pool of available funds for pure research, it would likely increase the pace of R&D commercialization in Canada. Funding these ancillary costs would permit innovators to access the business support they require to more effectively commercialize the products of their R&D.

2. *Does Figure 2, the model of business innovation presented above, capture the key structural factors and inputs to innovation? If not, what is missing?*

One additional area worth considering is the impact professional standards organizations are having on general business operations and their influence on corporate R&D. The construction industry is increasingly being influenced by outside stakeholders through the growing use of Building Rating Systems. These rating systems, such as LEED, are driving construction firms to implement new and innovative practices to reduce the overall impact construction will have on the environment. Traditional R&D support is often not available to support these types of innovation.

CCA defines R&D not only as the introduction of new technologies and products, but also innovations, technical or otherwise, that improve upon the efficiency and quality of services rendered in any sphere of the economy.

There are several types of innovation that may meet a broader definition of the term, including:

- HR solutions: Many companies have found ways to be innovative in the way that they use their workforce to meet the challenges of today and tomorrow.
- Procurement practices: Many service and product purchasers have found ways to procure work in such a way that they benefit from a much better response than expected. The low bid approach in some sectors has not served very well the expected outcome.

- Safety and environmental measures: New performance measures, dealing with safety or the environment, are now expected. Some may not be all that innovative but purely common sense.
- Management tools: Building Information Modeling (BIM) is a perfect example of innovation in construction design and management. The BIM system is used to enhance a collaborative approach in the design, constructability, management, supervision and data collection of building projects.

Broadening the Government's approach to include other spheres of activities where investment or incentives could go a long way to increase the level of innovation in Canada.

3. *Regarding capital, is there an adequate supply of risk capital for Canadian firms at each stage of their growth (start-up, small, medium, large)? If not, why not? Where returns on investments are low, what are the reasons and potential solutions?*

Capital, regardless of the stage of development, is always in short supply. Most firms can access the capital required to carry out preliminary R&D activities. Where firms often struggle is in finding the financial support required to build prototypes or test R&D products, prior to commercialization. Private sector financing following the successful completion of this middle stage of R&D is generally readily available.

4. *Regarding ideas and knowledge, do you believe it is important for Canadian firms to perform their own R&D and, if so, what do you believe are the key factors that have been limiting business R&D activity in Canada?*

Research and innovation investment/funding in the Canadian construction industry is limited compared to the GDP contribution. R&D for the industry is only 0.2% of GDP, which represents a 30% decline over the last 20 years. In comparison, research spending in all other sectors has increased an average of 19% (CCIC, 2005). In the last few decades in the Canadian construction industry, both R&D investment and construction productivity have declined (Statistics Canada, 2009).

The construction sector is different from other industries, especially with respect to the research and innovation process. While it is common in other sectors for companies to conduct research to improve products and make them more appealing to customers, in construction, the characteristics of the final product to be delivered to the customer is provided at the outset in the form of specifications. Research and corresponding innovation comes about as a result of improvements to processes or the ability to incorporate new materials or systems, or the capability to deliver faster construction timeframes with reduced risk. Unfortunately, little detailed information has been available on innovation in the Canadian construction industry, although historical data suggests that only a small proportion of companies undertake formal R&D activities.

Construction companies can be grouped into three types with respect to how they approached research and innovation. The first type includes companies that resist undertaking research activities, often because of the perceived lack of time, funds, and experience, and a fear of risk.

The second type of company includes those that wish to conduct research, and who believe that research and innovation could bring benefits, but still do not engage in formal research. Companies in this category say that they cannot find resources or do not have enough time to undertake research or implement new solutions.

The third type includes companies which are actively engaged in the R&D process. They can be characterized as those investing funds towards research on an ongoing basis and expecting to see ongoing benefits of that investment.

The 2009 Statistics Canada (SC) publication *Industrial Research and Development: Intentions* (Catalogue no. 88-202-X, published January 2010) provides a good overview of the levels of research and development conducted within various business enterprise sectors in Canada, as defined by the North American Industry Classification System.

Table 1 shows a subset of data available from CANSIM Table 358-0024 showing R&D performed within several sectors, Construction, Manufacturing, and Agriculture as well as totals for all industries. In this table, it can be seen that construction accounts for less than 1% of all R&D in Canada. Table 2 takes the data from Table 1 and compares it to Industry Canada data for contribution to 2009 GDP.

**Table 1 Research and Development performed by business enterprise sector in 2008, all figures in millions of dollars. From CANSIM Table 358-0024**

Sector	Wages	Capital	Other	Total
Construction	64	20	36	120
Manufacturing	4,158	421	2,721	7,300
Agriculture, forestry, hunting, and fishing	59	x	x	106
All Industries	8,928	998	5,866	15,794

**Table 2 Research and Development performed by business enterprise sector in 2008 compared to 2009 contribution to GDP**

Sector	2009 GDP	% of contribution to GDP	2009 GDP/ 2008 R&D
Construction	69,051	5.8%	0.17%
Manufacturing	151,035	12.6%	4.83%
Agriculture, forestry, hunting, and fishing	25,294	2.1%	0.42%
All Industries	1,195,602	100%	1.32%

That report also shows that 617 construction companies in Canada report that they engaged in formal R&D activities. These 617 companies engage in a total of \$83 million in intramural (within the company) and \$12 million in extramural research. These companies also report that the R&D levels are 1.1% of revenue (this suggests that these 617 companies represent a total revenue of \$8.6 billion). These companies also report that they receive no R&D funds from outside Canada and that no extramural R&D is conducted outside Canada.

However, changing markets, new technology, global competitiveness, and the need for sustainable economic and social development now provide new incentives for innovation in the construction industry. If the Federal Government can provide a business environment that will entice companies to be more engaged in research and innovation, the construction industry will become more proactive in the pursuit of R&D.

5. *Regarding networks, collaborations and linkages, what are the main impediments to successful business-university or business-college partnerships? Does the postsecondary education system have the right capacity, approaches, and policies for effective partnerships with business?*

From a construction industry perspective, one glaring shortfall in the current R&D network is the lack of college research Chairs to help guide and shape research activities.

Due to their focus on local community needs, college research is often carried out in isolation. Providing support for a college research Chair program would improve communications between colleges and polytechnics and make the development, refinement and sharing of new R&D more structured. This would likely improve not only the likelihood of commercialization, but provide a feeder network into the university community, where the practical could be married with ongoing theoretic research. In short, a college research Chair program would help improve college research outcomes and provide the community with the interlocutor required to effectively bridge the current divide between traditional university and college research programs.

6. *Regarding the creation of demand for business innovation, what role, if any, do you believe that government should play in being a "first customer" for R&D investments in Canada?*

The success of the introduction of new products and processes in the industry requires a close partnership between the private and public sectors. The various levels of government in Canada can, and should, have a major influence on the industry. They can do so as regulators, educators and as technology brokers. Furthermore, governments have a legitimate role to play, as clients, given the fact that collectively, they are one of our largest clients.

By coordinating their efforts, exercising their influence, providing a business climate that encourages private sector investment, government can become a major positive influence on the sector. Specific actions that governments can take are as follows:

- Act as a partner and facilitator in bringing industry together.
- Use its purchasing power and act as a model and demanding client, purchasing on best value rather than cheapest bid.
- Provide stable funding for procurement to reduce the economic cycles of activities.
- Provide for an innovation-friendly regulatory regime, including increased emphasis on performance-based regulation
- Consider the establishment of an equalized industry funding arrangement to maintain an industry R&D culture
- Play a leading role in information and technology transfer
- Establish a regulatory framework that provides proper business climate for encouraging investment in research, innovation and commercialization initiatives.

7. *Regarding talent, is Canada producing sufficient numbers of graduates with the right skills to drive business innovation and productivity growth? If not, what changes are needed? Where demand for advanced skills is low, what are the reasons and what changes, if any, are needed?*

8. *Can you describe whether and how your firm employs students currently enrolled in community colleges, polytechnics and universities, and what government measures could make it easier to work with students during their academic programs and to recruit them after their graduation?*

In response to these questions, CCA would simply state recommendations made by the Employers' Coalition to Advance Skills, of which CCA is a member, that pertain to this area:

- A national dialogue shall commence with the federal and provincial/territorial governments, educational institutions, the private sector and civil society to develop an action plan to increase the access of traditional marginalized groups to post-secondary education.
- To overcome enrolment challenges, college infrastructure capacity must be expanded to eliminate enrolment backlogs. The federal government should extend the Knowledge Infrastructure Program at a funding level of \$1 billion annually over the life of the Building Canada Plan.

- To better support research and innovation in colleges, institutes and polytechnics, funding for the College and Community Innovation Program should be increased to \$50 million annually. As part of this effort, the Applied Research and Commercialization Initiative Program introduced under the Federal Economic Development Agency for Southern Ontario should also be extended to other federal regional development agencies.
- The federal government should launch a program to support the appointment of Research Leaders in colleges, institutes and polytechnics to steer the research, innovation and commercialization activities of these institutions.
- Establish a regulatory framework that provides a proper business climate for encouraging investment in research, innovation and commercialization initiatives.

9. *With which federal programs supporting business or commercially oriented R&D in Canada do you have direct experience and knowledge? In your view:*

- (a) *Which of these programs are working, and why?*  
 (b) *Which programs are not working, and why?*

CCA is most familiar with the Industrial Research Assistance Program. CCA believes a disconnect exists between the industry and the kind of activities being funded by this program, particularly as it relates to *Funding for Organizations*. There is no consultation on their part, no transparency and the amount available for the construction sector is minimal considering the very important role that the industry plays in the Canadian economy. Therefore, extra funding and transparency is desirable to maximize the value of this important program in Canada.

10. *If you have direct experience and knowledge of the SR&ED tax credit, what are your views on this program?*

11. *How could the Government of Canada lighten the administration requirements of its programs on recipients and improve outreach to business?*

In the longer view, most organizations invest in R&D because they believe that there will be a worthwhile return on investment. In theory, a company would realize sufficient benefits from research activities to be able to re-invest the savings or profits into conducting additional research. In fact, many large companies work according to this model. These large companies often also have more experience and knowledge for R&D, and wider networks with universities and research institutions. Unfortunately, the reality is that for many smaller companies, the return on investment cycle is long enough that they are not sufficiently liquid to carry the research costs until they reach this steady state. While there are a variety of funding sources available for smaller companies wishing to engage in research, a common perception is that many of these sources are not easily accessed. For a small- to medium-sized company with little history of conducting research, the application process may be onerous, and the odds of an application being granted may be low.

12. *How could the Government of Canada be more innovative and responsive to meet new needs or opportunities, and try alternative service delivery approaches in its programs?*

Government programs are always onerous to manage for companies wanting to benefit from them. Tax measures and other incentives are more efficient. For example, the introduction of new equipment and technologies are key to companies wanting to innovate. Accelerating the depreciation rates (Capital Cost Allowance) on moveable equipment and related technologies would provide additional valuable stimulus for innovation practices in Canada.

13. *Are there any gaps in the Government of Canada's support to business and commercially-oriented R&D? Do firms performing R&D in other countries have an advantage over Canadian firms because of access to programs that are not available in Canada? What would be the principal features of new programming to fill these gaps?*

Studies indicate that the investment rate of the Canadian construction sector in R&D is not only one of the lowest among Canadian industrial sectors, but also it is one of the lowest in OECD countries (CCRB, 2000). While the research rate is similar in Canada and the United States (U.S.), it is worth noting that Sweden, Denmark, Japan and the United Kingdom devote a significantly higher percentage of construction activity towards research.

Practices in the construction industry are different in different countries, even among some European countries, based on the difference in government systems, construction firm ownerships and financial features, and social and environmental characters. Simply adopting practices as set out by other countries is likely not the best solution for the Canadian construction industry; however, Canada can look at common practices and special strategies to set its own targets for research and innovation.

14. *What lessons and best practices can be taken from provincial business and commercially oriented R&D programs, and how should the two orders of government align their programming?*
15. *Is there a difference between R&D and innovation? If yes, how are they different? Should government focus on R&D or Innovation? What should the balance be?*

The difference between R&D and innovation is that innovation in the construction industry is often the result of companies finding solutions as they execute or intend to execute the work in relation to specific projects. R&D is mostly associated to pure science or research in the development of tools or products associated to industry. For example, there is a significant amount of R&D in the manufacturing of products integrated in construction projects, but these are not captured or accounted for in the statistics when one measures the level of innovation in the construction industry.

It is clear that the Canadian construction sector has the capacity to become more innovative. To achieve this goal, the following needs to materialize:

- The research funding system and the current approach to R&D in construction must be better aligned to meet the needs of the sector.
- The sector needs to find mechanisms to increase the level of collaboration.
- Technologies that are well-suited for R&D in Canada should be identified and encouraged.
- The industry is deeply fragmented and geographically dispersed. The governance arrangements in the sector are poorly integrated. There is no effective platform through which the stakeholders can meet and resolve systemic industry-wide issues. A construction knowledge secretariat should be formed with the assistance of the Federal Government to act as a research coordinator, knowledge repository, and serve as a neutral third party clearing house of new knowledge.