

The Role of Universities in Technology Entrepreneurship

Jonathan Wells

“Engaging in innovation and entrepreneurship is the key for universities to stay relevant and to contribute to Canada’s economy and to the quality of life of Canadians.”

Sheldon Levy
President of Ryerson University

This article discusses the role that universities play in the process of technology entrepreneurship, where entrepreneurship is restricted to the process of launching and supporting small and medium-sized technology-based businesses. The article briefly discusses a few of the issues that influence a university’s participation in the process of entrepreneurship. Although there is no “one-size-fits-all” model, the article discusses various ways that Canadian universities may help entrepreneurs, including contract research, the provision of business parks, and sensible handling of intellectual property issues. Finally, the article suggests that the return on “investment”, for both the university and the province, is a difficult thing to measure – nevertheless, participation in the entrepreneurship process may result in some tangible and intangible benefits for both parties.

Introduction

The quotation above, recently made by the President of Ryerson University at a celebration of the NSERC Engage program (tinyurl.com/2fab8q8), is typical of the types of statement that Canadian universities expound in their public relations material. But can universities actually contribute to entrepreneurship teams? This article does not propose a definitive answer to these questions, but briefly discusses a few of the issues that influence a university’s participation in the process of entrepreneurship, specifically from the viewpoint of the university management.

The question of the degree on involvement that a university has in the entrepreneurial process may be considered important to the community as a whole, since universities are publicly funded bodies and there should be some consensus concerning the role of universities in the process. This article suggests that universities can help entrepreneurs in a number of ways, including contract research, the provision of business

parks, and sensible handling of IP issues. The discussion is restricted to the Canadian domain, with a brief comment on the situation in the United States.

For the purpose of this article, we will assume that an entrepreneur is defined as a person that undertakes a commercial activity for profit, having a personal stake in the outcome of that activity; entrepreneurship is the process of being an entrepreneur (Chambers Dictionary, 2007; tinyurl.com/885xfly). We will consider the term entrepreneurship in its colloquial usage of startups and small and medium-sized businesses that are relatively recently established. In theory, entrepreneurs can own, run, and develop businesses of any size – large venture capitalist business are entrepreneurs in the sense that they have assets at risk, and even very large privately held companies are entrepreneurial. Although large industrial/commercial entities and universities frequently partner and collaborate to undertake significant research projects, universities have a limited role in supporting businesses of this size through direct channels.

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A University's Duty to its Community

Canadian universities do not exist in a vacuum. Instead, every university is at the heart of its local community and as such may be considered to have a duty to contribute to that community by supporting business activity, particularly at a small scale. Of course, many universities are major employers within their regions and contribute to the local economy directly. A few explicitly state their mission to support the public good, such as the University of Alberta (tinyurl.com/7fufpwu) and Royal Roads (tinyurl.com/3n7m5z4). Many Canadian universities do not single out the process of economic development in the community as a concern. The website maintained by the University of Toronto – Canada's largest university – mentions on its Quick Facts page (tinyurl.com/4hphrg2) that it generates a healthy \$5.4 billion of economic impact in the Greater Toronto Area and that there have been 108 spinoff companies created. But, their mission statement does not refer at all to economic development within the city, at any scale (tinyurl.com/7kh2xmm). Many other mission statements are more aligned to supporting the community through opportunities for lifelong learning (read mature students and professional development programs) than they are with direct economic development (Kreber and Mhina, 2005; tinyurl.com/6mwhg8l).

To some extent, there is a cultural mindset in Canadian universities that separates academe from the business of trade. It is important to change this mindset if university administrations are to embrace the concepts required to support local startups and small and medium-sized businesses.

What Do Canadian Universities Do to Support Entrepreneurship?

Canadian universities do not exist to act as entrepreneurship drivers in their present form. Canadian universities exist primarily to teach academic subject matter to undergraduate students, a role that they carry out with various degrees of success. However, Canadian universities do not “teach entrepreneurship”, “do entrepreneurship”, or “support entrepreneurship” as a priority. The government ministries that oversee universities do not have any aspect of entrepreneurship as a core competency. The published role of the Ontario Ministry of Training, Colleges and Universities is restricted to the development of policy directions for universities and colleges, planning and administering policies related to basic and applied research, authoriz-

ing universities to grant degrees, and managing the funding of universities (tinyurl.com/7kgt33c). Career development is not mentioned, let alone entrepreneurship as a career choice. Anything that Ontario universities do to support entrepreneurship is an add-on activity from the government's perspective.

There is also confusion between “support for entrepreneurship” and “technology/innovation transfer”. There is certainly overlap between these areas; however in Canada, technology/innovation transfer tends to be considered more in terms of the intellectual property developed in university labs than as a direct business and selling opportunity.

Finally, the situation is made worse by the fact that Canadian universities are charities. While this sounds superficially a “good thing” – and for undergraduate teaching and basic research it is beneficial – the case for applied research and entrepreneurship is not so clear cut. Charities must be careful in how aggressively they can pursue for-profit business – this means that activities such as taking an equity stake in a startup business can be problematic. Licensing arrangements and spinoff organizations may be required in order for the university to keep a proper arm's length relationship. In Ontario, examples of such organizations include Parteq (parteqinnovations.com) and Communittech (communittech.ca).

Research into Entrepreneurship is Not Entrepreneurship

Knowledge of entrepreneurship in general may be advanced by academic work undertaken at universities. There is a substantial body of work in this area – Google Scholar (scholar.google.ca) reports over 59,000 articles with the word entrepreneurship in the title, with a steadily increasing number of these articles being published each year. The majority of these articles consider aspects of entrepreneurship from the perspective of organizational behaviour or in macroeconomic dimensions. This may be interesting, and even important, but papers of this type are not generally of much use to the individual entrepreneur who is trying to bring in the first paying customer for their business.

Of course, individual professors should continue to undertake academic research into entrepreneurship as they do now. But a university that publishes multiple papers on the nature of entrepreneurship is not necessarily supporting entrepreneurship in the community. These are two different paradigms.

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Subsidized Contract Research

One way that universities can contribute to entrepreneurship is through direct research. Often, university research is thought of as being conducted by professors for the benefit of professors and academics. However, many university research labs are capable of developing and conducting research on behalf of startup businesses. This can be vitally important for the startup company that simply needs that final piece of the puzzle to complete their innovative product (e.g., implementation of a new software algorithm or design and packaging of a new computer chip). In addition, universities (and colleges) have departments devoted to industrial design or prototype development. These activities can be well beyond the abilities of an entrepreneur working in their basement, but may be easily within the capabilities of the million-dollar laboratories found in university departments, which may be blessed with state-of-the-art equipment and instrumentation. Government-sponsored programs do exist to allow entrepreneurs to gain access to university labs, but these are rare and expensive. An example is the Applied Research and Commercialization Initiative program from the FedDev Ontario agency; although the program is now closed, there is information on the FedDev website: tinyurl.com/7qetygt.

Universities can undertake contract research on a purely commercial basis. However, this course is likely to be beyond the means of most startup businesses; overhead is charged by the university, and principle investigator fees may be levied, along with technician fees and instrument rental charges. These costs can make contract research at a university expensive. Thus, continued support is required for programs that allow small, low-cost projects to be undertaken in university labs at a subsidized rate, leading to improved lab utilization, additional opportunities for student projects, and real results delivered in a timely fashion to startup businesses.

University Support for Professors, Students, and Spinoffs

Canadian universities can, should, and do support entrepreneurial spinoff businesses, as Tony Bailetti (2011; timreview.ca/article/485) recently discussed in the *TIM Review*. Thousands of such businesses are reported as having been created over the years (Niosi, 2006; tinyurl.com/7j7xchs), but the exact number of startups and

spinoffs from Canadian universities can be difficult to measure, especially because the definition of spinoff is not universally agreed. The simple definition suggested by Cooper in his report for the National Research Council Canada (NRC; nrc-cnrc.gc.ca) on the impact of spinoff activity seems sensible and succinct. According to Cooper, a spinoff is: “A firm formed specifically to commercialize university owned and/or university researcher’s technology” (Cooper, 2000; tinyurl.com/7am2692).

The reported figures for the number of spinoff companies created by universities vary wildly. According to Statistics Canada, only 19 spinoff businesses were created in 2008 (2008; tinyurl.com/bpvrc97), which is down sharply compared to the 1990s. In contrast, many individual universities claim to have created more spinoffs by themselves than are reported nationally by StatsCan. Whether the statistics available actually match the true figures is difficult to ascertain, partly for reasons concerning intellectual property, as will be discussed in the next section.

The impacts of university spinoffs have been widely studied over the years, even though university spinoffs represent only a fraction of all new businesses created in the community. As mentioned earlier, intellectual studies of entrepreneurship and statistics tabulating spinoff activity are not of any general help to a new enterprise however important these data are for statistical purposes. What is clear is that there is a steady flow-through of businesses being launched from universities and it can be assumed that there is a commensurate requirement for support for these startups. It is not known how many spinoffs are created by students versus the numbers created by professors. We can see that universities are certainly involved in the creation of new businesses, and universities are an integral part of the entrepreneurship team in these cases. What is not so clear is the actual level of commitment by universities to this process.

Intellectual Property

About half of Canadian universities and hospitals reserve an interest in the intellectual property developed by their research staff; in the other institutions, the intellectual property is owned by its inventor (e.g. Statistics Canada, 2008; tinyurl.com/bpvrc97). Ownership of intellectual property is a significant issue when considering the university’s role in the entrepreneurship team, with consequences that vary across the spectrum.

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In the case where the inventor of a new technology owns the entire intellectual property associated with the product and wishes to commercialize it in a spinoff business, the university has no real incentive to assist in the process. The university will not receive any return on its investment of lab facilities, students, or other assistance provided to the entrepreneur. This scenario also is the case for a community-based startup – there is no obvious payback to the university from help rendered to a locally launched business.

At the other end of the spectrum (in Canada) the issue is the other way round; if the university owns all the intellectual property, as would normally be the case for product developed by an employee of a private company, then the incentive for the entrepreneur is sharply curtailed. Why would a hardworking entrepreneur work 100-hour weeks to see all the benefit accrue to the institution? For those Canadian universities that do follow this policy, the payback in royalties or licence fees appears to be modest.

The lack of sensible, fair, and consistent intellectual-property policies for spinoff and local businesses is a serious hindrance when adding the university to the entrepreneurship team.

Business Parks and Space

The university does have a role in helping startups with space and by providing a collaborative and conducive atmosphere for technology development and business creation. Several universities now have a “business park” or “incubator”. Examples include the Digital Media Zone at Ryerson University (digitalmediazone.ryerson.ca) and the Research Transition Facility at the University of Calgary (tinyurl.com/73gsgwk). Some of these environments are better supported than others and they have been established with varying amounts of seed capital; others operate on a small scale. Although it is now officially and strongly supported by the University of Waterloo, the VeloCity mobile-media incubator (velocity.uwaterloo.ca) was started by students and is still partially located in a student residence.

A University’s Role in an Entrepreneurship Team

So, what is a university’s role in an entrepreneurship team, given the various constraints on the university, such as intellectual property policy, funding, and space availability? Anecdotal evidence, taken in context with

some of the points raised above, suggests that a university’s ideal role is not to take ownership of businesses, nor is it to run businesses outside the university’s core competencies. Neither should the university replace the angel investors, and later the venture capitalists, who are key to the entrepreneurship process. Entrepreneurs, whether coming from the community or from within the university, do not require this. It is not the ideal role of a Canadian university to become a portfolio manager.

However, there are a number of practical measures that Canadian universities can take to help businesses launch successfully that will contribute to the local economy and that will fulfill the universities’ social obligations in this sphere. The same principles hold true whether the business is community based or a university spinoff.

1. Make the relevant intellectual property as easily available as possible. Open source concepts and public licences may have a role here.
2. Provide lab space and resources, including graduate students, for product research, development, and design. These measures are related to the issue of universities supporting their communities by making university resources available at favourable rates for startup research requirements.
3. Assist with traditional technology transfer activities such as the acquisition of patents.
4. Act as a “dating service” within the academic and business communities by introducing entrepreneurs to professors, students, and relevant community resources that may be able to help them.
5. Provide seed funding at the early stage to cover the development of prototypes, business plans, and market research projects.
6. Help to attract third-party funding. For example, a university may be able to help a new business acquire government grants, such as the Industrial Research Assistance Program (IRAP; tinyurl.com/7z5jhvv).
7. Provide subsidized collaborative space for new startups to develop their businesses in an atmosphere designed to promote business success in an incubator or business park.

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In summary, a Canadian university's ideal role in the entrepreneurship process is to support the creation of business on what might be considered as a provision-of-service basis.

Conclusion

In the end, we must ask: what does a Canadian university receive in return for this philanthropy, which may be heavily subsidized by the taxpayer? This is a difficult question to answer given that the payback may be tangible or intangible, may accrue to the university or to the province, and may be short term or long term.

Most obviously, the university may receive royalties (or even a capital gain, if an equity stake is sold) from the technology business or spinoff that it has helped to create. This tends to be the model used in the United States (see Box 1), but in Canada this process varies widely, and of course the new business has to be successful enough to generate sufficient cash flow to pay royalties or dividends. The exact level of return is not precisely clear, and according to Statistics Canada it is relatively low. According to their figures, only \$53 million in total was received by Canadian universities as income "generated from IP" in 2008 (tinyurl.com/bqf9bsm). The National Sciences and Engineering Research Council of Canada (NSERC; nserc-crsng.gc.ca) is the federal government's primary funder of technology and science research in universities; in the same year as universities received \$53 million through intellectual property, NSERC spent almost exactly the same amount on the Centres of Excellence for Commercialization & Research program alone, out of a total expenditure of around \$1 billion (tinyurl.com/89u2uml). Thus, royalty revenue is not a big contributor to university revenue streams in percentage terms.

In some cases, the university may generate goodwill with its local community, which is particularly likely if the university is providing assistance that would otherwise be simply too expensive for the entrepreneur to acquire; incubator space and access to labs and students are standout examples. This is undoubtedly a "good thing", but it is very hard to measure in objective terms.

Finally, one aspect that is often overlooked is that the university will hopefully generate a substantial level of goodwill with the individual entrepreneurs that it supports. A few of these entrepreneurs will become very

Box 1. The entrepreneurial culture of universities in the United States

It should be noted that this article applies primarily to Canadian universities, where the entrepreneurship culture is very restrained. The situation in the United States is somewhat different, with much more emphasis being placed on the entrepreneurial culture than in Canada. The largest entrepreneurial universities (e.g., MIT, Stanford) do generate large numbers of spinoffs and very large royalties. For instance, MIT estimates that well over 10,000 spinoffs have been founded by MIT alumni, with revenues in excess of \$300 billion USD. MIT takes royalties for all intellectual property developed at the university, and this policy is applied consistently. Overall, it is the culture that is different – institutions in the United States expect their faculty to produce commercializable output and this is strongly supported. For more information about MIT's Technology Licensing Office, see web.mit.edu/tlo/www/.

successful and may show their appreciation for the help they received in the early stages by providing philanthropic donations back to the programs that launched them.

For the province, the payback is less difficult to define as a public good, but it is still difficult to measure in purely fiscal terms. The primary payout for a province is of course increased employment, which translates not only into votes for the party that is in charge, but also into decreased benefit payments and increased tax revenues downstream. Increased foreign-exchange earnings are an additional benefit when Canadian startups make sales of products or services denominated in foreign currency. In addition, a growing business sold to a foreign buyer under an early-exit strategy generates a positive contribution to the balance of payments in the short term.

The final problem is attribution. In the case of a high-tech solution developed in a university lab and taken directly to market, it is easy to attribute the success of the overall business to the involvement of the university: no lab means no product, which means no business. However, when the university has provided

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something less direct – help with a grant application or some contribution of space, for instance – attribution is not so straightforward. There is really no practical way that we can tell whether the newly launched business would have succeeded anyway. We can guess that this type of assistance will shorten the time to market, but quantifying that is difficult.

Overall, the conclusion is that university involvement in the entrepreneurial process appears to be beneficial, but is not accurately quantifiable in terms of the resources committed to it.

About the Author

Jonathan Wells is Executive Director, Research Centre in Technology Innovation, at Carleton University in Ottawa, Canada. Jonathan comes from a background of software engineering, with experience in all sizes of high-tech business, from very small startups upwards to large multinationals. He founded and ran a small software development and consultancy business for several years and subsequently worked as a project manager for HP software development teams in New Zealand, later holding the position of CIO for the Meat Inspection Branch of the NZ Canadian Food Inspection Agency. Jonathan has an undergraduate degree in Physics and Computer Science and holds an MBA from the University of Canterbury, Christchurch, NZ.

Citation: Wells, J. 2012. The Role of Universities in Technology Entrepreneurship. *Technology Innovation Management Review*. April 2012: 35-40.

