

## Creating Digital Opportunity in Waterloo

Despite their status as small, peripheral, late-industrializing economies, the Nordic countries have delivered competitive growth rates for over a century, progressively reinventing themselves as resource processors, capital-intensive manufacturers, high-tech producers, and knowledge-intensive service hubs. Recent scholarship attributes this dynamism to their cohesive and encompassing social networks, which accelerates the diffusion of new ideas, neutralizes opposition to change, and facilitates coordination (Ornston 2012, 2018b). This research project investigates whether Canada can learn from the Nordic experience.

### 1. What was your key research question and what is your major finding from the research?

What can Canada learn from Nordic Europe? Setting aside a broad, cross-national comparison of innovation agencies (Canada, Denmark, Finland, and five other countries) with Dan Breznitz and Steven Samford (D. Breznitz et al. 2018), the project gained leverage on this question by focusing on two similar cases, the Kitchener-Waterloo region and the country of Finland.<sup>1</sup> Both were late entrants into the mobile communications industry and high-technology markets more generally, dominated by a single large enterprise (RIM and Nokia) which represented approximately a third of high-technology employment. Neither conforms to traditional explanations for high-technology success (Dalum 1988; Florida 2017; Weiss 2014).

There are some striking differences with Finland and the Nordic region more generally. Most obviously, Kitchener-Waterloo could not rely on policy concertation, as the region lacks the fiscal resources and regulatory tools of a nation-state. The University of Waterloo was a necessary condition (Bramwell and Wolfe 2008), generating **talent** and, to a lesser extent, **knowledge**, but this does not explain why Kitchener-Waterloo succeeded where other university towns did not (S. M. Breznitz 2014). There is also little evidence of European-style inter-firm coordination. Unlike Finland, there is no systematic sharing of **research, data, or intellectual property**. Nor did it unearth long-term supplier networks. In contrast to the vast subcontracting network Nokia constructed in the 1990s and 2000s, firms in Kitchener-Waterloo have always been oriented toward **customers and markets**.

Kitchener-Waterloo, however, does share one striking feature with Finland and the other Nordic cases. Tight-knit social networks, a product of the region's small size and dense, associational landscape<sup>2</sup>, facilitated economic restructuring in three ways: (1) New successful business models, Watcom Corp, which produced a series of software tools from the early-1980s to the mid-1990s, and then RIM (now BlackBerry), diffused rapidly within the university, the city of

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<sup>1</sup> The analysis here and in the CDO publications is based on fieldwork (62 interviews) conducted in Helsinki, Kitchener-Waterloo, Ottawa, and Toronto. Because Finland (and the other Nordic cases) is covered so extensively in Ornston 2012 and 2018, fieldwork, reports, and this summary focus on the Kitchener-Waterloo region.

<sup>2</sup> The high-tech industry association Communitech, and the Atlas Group which preceded it, feature prominently here, although it is worth noting that entrepreneurs, academics, policymakers, and community builders were also connected through the University of Waterloo, the Chamber of Commerce, and a variety of other organizations.

Waterloo, and then the broader region, inspiring a progressively larger wave of entrepreneurs. (2) Tight-knit networks facilitated mentoring. While firms did not share **research, data, or intellectual property**, they did share **knowledge about how to do business** and I find that this was crucial to the region's success. (3) Finally, the region constructed a collective narrative about its position in the digital economy. This coordinated strategy made it easier to attract **talent** (mainly students) and **capital** (risk capital, foreign direct investment, as well as public funds (the University of Waterloo itself was an early product of these efforts) (Ornston 2016).

There are opportunity costs to this looser pattern of cooperation, which revolves around ideas rather than public policies or production systems. It may make it more difficult to scale companies, particularly in the absence of deep Silicon Valley-style markets for **talent** and **capital**. RIM never rivaled Nokia (or Ericsson) in the breadth of their product offerings and never penetrated complex, capital-intensive areas such as network equipment (where Nokia continues to thrive).<sup>3</sup> Nor did RIM construct a sprawling network of sub-contractors, converting toothpaste cap and sewing machine manufacturers into regionally and globally competitive high-technology manufacturing firms (Ornston 2012).

But there were also advantages to this less coordinated model. Kitchener-Waterloo was less affected by the decline of RIM precisely because RIM was less embedded in public policy and the local economy. RIM did not systematically reorient public policies around its strategic vision, it had virtually no local partners, and few firms followed its lead into mobile communications. By contrast, Finland was far more dependent on Nokia and the firm's decline was more disruptive. This was also true of Ottawa, where high-technology employment would eventually recover from Nortel's troubles, but not nearly as rapidly as in Kitchener-Waterloo (Ornston 2018a).

## 2. What do your research findings mean for our understanding of Canada's digital opportunity?

The Kitchener-Waterloo region demonstrates that Canada can successfully compete as a *producer* of digital technologies, even without the exceptionally deep markets for **capital** and **talent** that characterize Silicon Valley and the US more generally. Nor, unlike Finland, did the Kitchener-Waterloo region require a flagship firm to direct this process. While RIM played a critical role in "putting Waterloo on the map" and contributed to the local community, there are few direct links to the current startup boom. The latest generation of enterprises is more often led by students rather than former RIM employees and these firms have drawn on a diverse range of enterprises, not just RIM, for mentoring and advice.<sup>4</sup> They did not depend on RIM as a customer. They have hired many RIM employees, but they are competing in a wide variety of markets rather than drawing on a specialized set of competencies (Ornston 2016, 2018a). This represents a stark contrast from Finland where, because so many firms operated within Nokia's orbit, entrepreneurs are effectively constructing a startup scene from scratch.

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<sup>3</sup> Ottawa, which did, more closely resembles the Nordic region in its reliance on supportive, large-scale science and technology policies and much deeper patterns of inter-firm collaboration.

<sup>4</sup> While RIM contributed actively to Communitech and its employees mentored enterprises such as Igloo, it did not feature prominently in interviews, perhaps because the enterprise operated in a different league from the startups that represent the majority of the high-technology ecosystem.

There are limits to Waterloo's success. After RIM and five contemporaries went public between 1996 and 1998, the region has witnessed only one unicorn, two IPOs, and a handful of \$100+ million acquisitions. Kitchener-Waterloo trails even second and third tier US tech hubs in venture **capital**, while many industry representatives bemoan a dearth of senior-level **talent** in non-technological fields such as finance and marketing. Local firms have adapted to these constraints, partly as a result of the mentoring networks above, by targeting business-to-business niches rather than high-profile consumer markets. But they are smaller than their US counterparts, with lower revenue per employee. This makes it difficult to compete with local subsidiaries of US conglomerates such as Google, which could dominate the market for local **talent**. This has policy implications, below.

Not all Canadian communities can aim to produce new digital technologies. As noted above, the University of Waterloo was a necessary condition for the growth of the Kitchener-Waterloo high-tech cluster, generating **talent** and, to a lesser extent, **knowledge**. As the Creating Digital Opportunity project demonstrates, other regions are *applying* digital technologies to traditional industries. As noted by Breznitz, Ornston, and Samford, this may require a different set of policies and institutions (D. Breznitz et al. 2018). We should not generalize from Kitchener-Waterloo to Canada as a whole.

### **3. What are the key policy implications that flow from your findings?**

Federal and provincial governments play an important role in fostering innovation, with interviewees praising the University of Waterloo, NSERC, and SRED. Industry representatives also suggest that federal and provincial policymakers could do more. Virtually *every* interviewee mentioned better transit connections to Toronto, which would ease access to **talent** and, to a lesser extent, **markets, customers, knowledge, and capital**.

But this research project illustrates how municipal and regional policymakers can also play a constructive role, even with few fiscal resources and little regulatory authority. More specifically, regions can use collective narratives to (1) diffuse new business models, (2) exchange **knowledge**, and (3) attract **capital** and **talent**. In Kitchener-Waterloo, it is important to emphasize that this was a bottom-up process, spearheaded by the private sector and not cooked up by far-sighted policymakers. But policymakers can play a supporting role by supporting network-based associations such as the Atlas Group and Communitech and championing their efforts (Ornston 2016). This is also the case in a post-Nokia Finland where a startup scene, to the extent that it exists, is based on emulation, knowledge exchange, and rebranding rather than large infusions of public capital, a flagship company, or inter-firm collaboration in production (Ornston 2018b).

There are also things that local, provincial, and federal policymakers should *not* do. The Finnish experience (and Ottawa) suggests that, while scale-ups can contribute to a local ecosystem, policymakers should be careful not to mobilize resources around a single enterprise. There is little evidence of this in Kitchener-Waterloo today, but the foreign technology sector is a source of concern. For example, a larger Google could stifle entrepreneurship by outbidding local startups for **talent**, much as RIM did in the early 2000s. There is no need for alarm or

protectionism, but policymakers should refrain from using scarce resources to attract and retain foreign subsidiaries and instead focus on domestic enterprises and their needs (Ornston 2018a).

The **social impact** of promoting high-technology industry has been broadly positive for Kitchener-Waterloo. Regional representatives note that the rise of a relatively high-paying technology sector has increased inequality and placed upward pressure on housing prices, but the rapid deindustrialization of Kitchener in the 1990s and early 2000s could have led to far worse outcomes. Smaller and more peripheral regions, especially those with a fragmented associational and civic landscape, face greater challenges in adapting to the digital economy. Federal and provincial governments will play an important role in reconciling the tension between regions which have the capabilities to adapt to these changes and those which do not.

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