Luck, Legacy and Local Leadership: Transitioning to New Digital Opportunities in Ottawa

Summary of Main Findings, February 18, 2019

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Context and Research Questions

This research develops an understanding of how Ottawa's digital economy has remained globally relevant amidst a period of significant change both in communications network technology in which the region had long maintained a specialization, and with the demise of Nortel, its preeminent firm and global symbol of Canadian technological prowess. Today, after significant churn and employment loss following Nortel's bankruptcy in 2009, Ottawa has regained its stature as an important city region in digital innovation and in 2018 ranked top among North American technology hubs for employment growth.

Specifically, this research asked the following: *What are the main external and internal factors that have allowed Ottawa's digital industry to adapt amidst major market shifts, and how do they shape the region's potential to take advantage of global economic development opportunities associated with digital trends?*

We sought answers to these questions through 55 semi-structured interviews with executive managers of large and small Ottawa based digital firms, government and industry association representatives, mentors, venture capital and angel investors. Interviews were conducted between the spring 2015 and summer of 2016 and all participants were offered anonymity. The interviews were transcribed and analyzed for themes using qualitative software. These interviews were supplemented with reviews of websites, policy documents, and secondary literature. Our initial explorations highlighted the development of two initiatives that shed particular light on strategic coupling dynamics. These initiatives were explored further through follow-up interviews and questions.

Main Findings

Ottawa's current success is linked to a global technological paradigm shift underway in digital networking architecture

In response to demands of very large data centers, cloud computing applications, and increasingly 5th generation wireless technology, a new communication network technology (Software Defined Networking) is being developed and adopted globally. The development of SDN is consistent with a pattern of development whereby new telecommunications network architectures emerge approximately once a decade, driven by a need to accommodate network traffic growth, new services, and advances in technology. The new architecture allows for scalable and resilient networks that provide high degree of control over data flows for custom networks to

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be built by software alone (i.e. network virtualization), and for the virtualization of functions that formerly were delivered through hardware components (i.e. Network Function Virtualization (NFV)). From an economic standpoint, SDN is also considered to be disruptive to large vendors that provide what was only recently proprietary hardware – the server infrastructure that underpins networks. With SDN, the hardware layer is commodified, as the intelligence and control shifts from being embedded in hardware to being in control of the SDN controller (Darbha & Shevenell, 2013). It is also driving innovation in interface software, network control and traffic management, and enabling new services and cloud based applications. With SDN now linked closely with 5G growth development, there is a convergence of opportunity between SDN, 5G wireless, cloud based software as a service (SAS) technologies and end-use applications such as automated vehicles, which require all of these technologies.

For its part, Ottawa's digital sector, which has developed capabilities in each of these areas, has become recognized node in a global innovation network that is driving this digital network transformation. Within the last decade, all the major global players have established a research presence in Ottawa including Nokia, Ericsson, Juniper Networks, Cisco Systems Canada, Huawei Technologies Canada, and CIENA Corporation, adding to established local firms including Mitel and Blackberry-QNX.

The success of Ottawa's transition can be traced to technological path dependency and the reconfiguration and reconnection of Nortel talent through MNC investment into the global innovation network.

Understanding the region's success in transitioning to new network architecture begins with understanding Nortel's legacy. Nortel, whose roots stems from federal labs operated by the National Research Council that were active in communications research during the Second World War was on the cutting edge of technology development in areas such as 4G/LTE wireless, long-haul optical, and fibre-optic transmission prior to filing for bankruptcy protection in 2009 and selling its business units. Patent holdings also included many in SDN relevant patent classes. Global companies were quick to recognize the value of Nortel's business units and R&D talent and, in the wake of Nortel's closure in 2009, a number of leading multinational companies established operations in Ottawa and/or significantly expanded their R&D operations. Several companies such as Nokia, Ciena, and Ericsson took over former Nortel R&D and business units. Others, such as Huawei, hired Nortel's star staff.

In effect, the collapse of Nortel made available capabilities and experience at the nexus of network hardware and software, which proved important in the shifts that were occurring in networking and which were accelerating at the time. Indeed, MNC investments in Ottawa came at a pivotal time in transition to 5G SDN, making the region highly valued for its skills. Interviews underscored the region's talent pool as the single most important factor in its success, having unique mix of hardware and software skills, a positive collaborative culture and high retention rates compared to US hubs.

Government programs and local strategic initiatives have bolstered Ottawa's position as an R&D hub in the global innovation network that is developing SDN 5G

For several MNC's the decision to invest in research operations in Ottawa was aided by government programs which served to embed MNCs in local research activity and competence building. Provincial subsidies to Huawei, Ericsson, CISCO committed companies to initial employment targets which often surpassed by firm expansions. At the federal level, interviews suggest programs such as SR&ED may be contributing to the heavy R&D focus at, however, the expense of growth and commercialization.

Several initiatives instigated through local leadership and facilitated by the local associative governance system, have also helped position Ottawa strategically within global innovation networks. These initiatives – Centre of Excellence for Next Generation Networks and Wesley Clover, L-Spark and Alacrity – have helped combine, with support from public funding, knowledge of technical opportunities and market dynamics with regional assets, creating economic opportunities for area firms and platforms for local collaboration among global competitors. These efforts showcase how local state and non-state actors can leverage government programs and transform them into sector and region-specific initiatives that strengthen the local innovation system, and embed MNCs.

Ottawa's transition has come with an increased dependence on MNCs, giving rise to concerns about vulnerability and value capture

The dependence on multinational companies has not gone unnoticed by local leaders who have expressed concern over the heavy focused on R&D. From interviews, it is clear that Ottawa's technical talent is highly valued by companies following innovation-based, rather than cost reduction based, strategies. However regional value capture is limited to the direct economic impacts associated with relatively large salaries of high-tech workers rather than the development of capabilities in management and market knowledge that are created with the build-up of indigenous firms. Growing a company within Canada, or "scale up", was frequently mentioned as a primary challenge for domestic companies. Policy reports note a pattern of premature buy-outs and acquisitions of Canadian companies before they can reach sufficient scale. Both a lack of managerial talent, large domestic markets, and domestic capital are noted as scale up barriers. Companies that are seen to be undervalued with significant technical assets make enticing targets for acquisition.

Transferability of Ottawa's success likely limited

The extent to which Ottawa's success can be replicated is limited in part because the region continues to benefit from a specialization in telecommunications networks that has long historical roots. Also, the inward investment by MNCs that followed from Nortel's asset sell off, and which deepened the region's specialization and links to global innovation networks, occurred at a pivotal time in the evolution of the technology with the shift in network architecture. What is transferable however, are Ottawa's lessons for how regions can respond to rapidly shifting digital opportunities, with government support.

The two locally led strategic initiatives (CENGN and Wesley Clover) accessed public resources, revealing the way in which governments have indirectly supported this strategic approach to economic development. CENGN was enabled by the federal government Network of Centres of Excellence program, and Wesley Clover partnered with Invest Ottawa to create L-Spark through the Canada Accelerator and Incubator Program. That they were used in this manner is because of leadership from regional non-state actors who understood the technological and market dynamics in the digital sector, and the opportunities that come with building relationships with global lead firms and local capabilities. The importance of local actors shaping how federal policies are implemented highlights the methodological importance of examining local actor perspectives rather than the perspectives of the national state in studies of the political economy of regional development.