

THE THIN EDGE OF INNOVATION

METRO VANCOUVER'S
EVOLVING ECONOMY

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Introduction

Metro Vancouver's Post-Industrial Transformation toward an Innovation Economy

Innovation is the complete process of taking new ideas and devising new or improved products and services. It comes in all stages of the production of goods and services, from the first vision, design, development, production, sale, and usage.¹

Over the past two generations, Metro Vancouver has striven to build a new “postindustrial” economy that embraces creative and innovative activities, most obviously the so-called high-tech sector. Such a transformation is readily discerned but still evolving and vulnerable, high tech not as transparently dominant in the local economy as resource activities, especially forestry, once were. For 100 years, commodity forestry was the principal engine of economic development in Vancouver and surrounding communities, providing the region with its industrial identity, substantively expressed in terms of employment, exports, diversification, and wealth and profoundly shaping its emerging metropolitan status in British Columbia and globally. Then forestry started to decline in the 1980s, and, although still contributing to government tax coffers, jobs, and trade, that decline left a large hole in Metro Vancouver’s economy and global roles. Has this hole been replaced? In particular, what are the nature and extent to which postindustrial Metro Vancouver has based its economic development on innovation and creativity? Has it achieved that capacity already? If so, then what are the foundations

of its innovation capacities, especially in relation to the key high-tech sector? Its high-tech firms have embarked on aerospace, electronics, software engineering, fuel cells, film and game animation, carbon sequestration, and many other specializations, but how broad and/or how deep is this sector? Has innovation reached out to other sectors that contribute to Metro Vancouver's postindustrial identity? Most importantly, has Metro Vancouver developed an innovation economy that complements contemporary patterns of globalization in ways that maintain and enhance its lifestyles and creates so-called high-road jobs that generate and spread the wealth in the economy in a sustainable way? Can all this be accomplished when, although it has an enviable living environment, Metro Vancouver sits on the periphery of national, continental, and global economies? In this book, we seek to address these local development questions, and we come up with some mixed answers. Our primary theme is innovation because it is the accepted answer to maintaining a constantly evolving economy.

Yet, as the basis for development strategies touted around the world, (business) innovation is a multi-faceted, even problematic, imperative, beginning with its conventional starting point definition as new commercial uses of products qua goods or as services, processes, marketing methods, or organizational attributes.² Moreover, processes of innovation are incredibly varied in terms of motivation, organization, time horizon, and impact.³ Innovation can be supply or demand driven; organized by individual inventors, R&D teams, and/or networks of participants in both private and public sectors; time horizons can be incredibly long and replete with financial and technological uncertainties; and outcomes can range from paradigmatic changes – exerting pervasive effects throughout the economy – to small, incremental improvements in productivity. Innovation also requires investment decisions that access talent pools, and if becoming cumulative the first initiatives in particular places are hard to predict or design. In much of this book, we seek to reveal these origins and the subsequent makeup of Metro Vancouver's emerging innovation economy.

The Evolution of Metro Vancouver's Innovation Economy

This book offers an evolutionary economic geography of Metro Vancouver's innovation economy through an analysis of the signature activities redefining its global role through research, development, and/or design (RD&D) initiatives. Our starting thesis is that this evolution has been led principally by locally based entrepreneurial initiatives. That is, the region's innovation economy has been driven from the "bottom up" rather than from the "top

down” by government policies or dominant corporations. This reliance on entrepreneurialism is Metro Vancouver’s way of dealing with its peripheral location and lack of depth in new industries. From an activity perspective, the entrepreneurially inspired search for a new globally defining innovation economy in Metro Vancouver is most obviously indicated by the so-called high-tech sector, but it is further evident in other parts of the economy, not least in attempts to rejuvenate forestry and by various lifestyle initiatives. Although gathering much recent momentum, the collective nature and scope of these activities are problematic and not fully understood.

High tech’s entrepreneurial stimulus can be traced to the 1960s and the formation of several local companies, led by Glenayre and MacDonald Dettwiler and Associates (MDA). As the most notable and enduring business marker of Metro Vancouver’s innovation economy, MDA started in 1969 as a spinoff by two University of British Columbia (UBC) professors who expressed a need for Metro Vancouver to diversify its economy to supply jobs for their graduate engineers.⁴ MDA subsequently became a Canadian high-tech symbol with its world-leading development of the Canadarm for NASA and is still a vibrant company in Metro Vancouver’s innovation economy. Yet a broader high-tech economy remains a work in progress. The sector remained limited in scope until the 1990s, when it became officially recognized, its growth started to be recorded,⁵ and studies of specific high-tech clusters were conducted, especially in relation to telecommunications, life sciences or biotechnology, and new media.⁶ Similarly, the rejuvenation of the forestry sector around value-added initiatives, such as engineered wood, and the formation of innovative lifestyle businesses (especially in apparel and restaurant chains) has occurred mainly since the 1990s and been driven by local entrepreneurial companies. This growth of high-tech, lifestyle, and even rejuvenated forestry companies has also been strongly service sector oriented, supported by some prototype and custom-made manufacturing but with large-scale manufacturing located elsewhere.

Admittedly, if innovation is becoming an increasingly important force driving Metro Vancouver’s economy, according to conventional metrics, such as per capita R&D employment or patent counts, then the region’s innovativeness is not particularly distinguished, within Canada or globally. Most saliently, the region lacks the corporate depth for long-term R&D. Metro Vancouver’s entrepreneurial innovation has arisen from basic research, intuition, experience, insight, and some response to local demand. Yet that innovation is often incremental, and many firms seek to apply and design technologies and ideas – large and small – developed elsewhere in novel

ways. Moreover, most are not committed to controlling an entire production system, and if, as the epigraph to this introduction notes, innovation “comes in all stages of the production of goods and services” then Metro Vancouver firms tend to specialize in one or a few of these stages. The flip-side of the remarkable number of innovative firms generated in recent decades is that most of them have remained small and are distributed across many different activities. Only a few have become relatively high-profile (“big firms locally”), and rarely if ever have they grown to the status of giants or even (larger) mid-sized “core” firms. Along the way, many notable companies have failed, such as Glenayre, or been acquired, such as MDA. Although Metro Vancouver is a successful entrepreneurial story, it seems to confront a conundrum of arrested development; development has occurred but without achieving large-scale dominant industries and firms.

Explaining this conundrum is complicated because the spawning and growth of local firms have stimulated greater participation by universities and government policies. In addition, industry organizations and financial services have co-evolved into an increasingly sophisticated array of institutional supports or “architectures” for innovation. Moreover, entrepreneurial firms have sent signals to multinational corporations (MNCs) not only of the availability of acquisition targets but also of Metro Vancouver’s expanding talent pool. Together these factors are shaping the nature and extent of Metro Vancouver’s innovative milieu and the potential for stronger industry clusters. However, whether the region is solving its seemingly arrested development by using innovation and entrepreneurial diversity as a foundation for long-term cumulative causation remains in question.

In this book, we wish to flesh out the conundrum confronting Metro Vancouver – the strengths and weaknesses of its innovation and its local elaboration. The successes depend on a diversity of high-tech, lifestyle, and rejuvenated forestry activities that draw their innovativeness from the vitality of entrepreneurial firms. The constant generation of these firms is required not only for innovation and diversity per se but also because their capacity to scale up (thus far) has been limited. To make this argument, we emphasize the actual behaviour of entrepreneurial firms, their origins and growth, especially that of relatively high-profile companies, their connections to MNCs, and their implications for a wider institutional architecture, especially within Metro Vancouver. In terms of style, the study seeks to elucidate Metro Vancouver’s search for an innovation economy in a readily accessible way that hopefully informs interests beyond those of specialists.

An Integrated Approach

Metro Vancouver's innovation economy might be relatively small, but it is remarkably diverse and complex; this "place-based" study addresses this complexity with an integrative, synthetic analysis. This approach complements previous individual case study clusters, for example of life sciences, by focusing on business behaviour across high-tech, forestry, and lifestyle activities, to provide a broader picture of the region's innovation economy. Analytically, the study is informed by multiple, established, and related concepts drawn from evolutionary and institutional literatures in business, economics, and economic geography and directed toward understanding the particular global-local dynamics shaping Metro Vancouver's innovation economy. In particular, we fully appreciate our intellectual debt to a multi-disciplinary literature on innovation, especially in the Schumpeterian tradition of creative destruction, for which Dan Breznitz's recently acclaimed study provides an exemplar for a wider audience.⁷

As a brief synopsis of this tradition, we note that evolutionary economic theories emphasize the interdependent development of various economic and social factors over the long run. Within this evolution, innovation is particularly important and occurs in a multi-faceted and systemic manner drawing together science, technology, business, and governmental and non-governmental institutions into regional and national innovation systems.⁸ Innovation-based models of industry evolution and changing business organization have been part of this thrust.⁹ Adding geographic perspective, locational analyses of innovative activities have sought to understand both their agglomeration and clustering tendencies in place and their global connections across space. They are integrated into regional innovation systems when further incorporating place-based public institutions, industry associations, universities, and cultural contexts.¹⁰ The understanding of local geographies has been enriched by explanations that highlight the leading role of creative or knowledge-driven cities in driving contemporary post-industrial pathways of development.¹¹ Within evolutionary economic geography, the study of such trajectories by "adaptive" cities is a related focus that provides a specific springboard for this case study of Metro Vancouver, of how this particular place and innovative behaviour interact with one another.¹²

Underlying discussions of the wide-ranging adaptive trajectories of post-industrial cities is a visceral concern: how does a region substantively pursue so-called high-road rather than "low-road" development (see [Figure I.1](#)).¹³

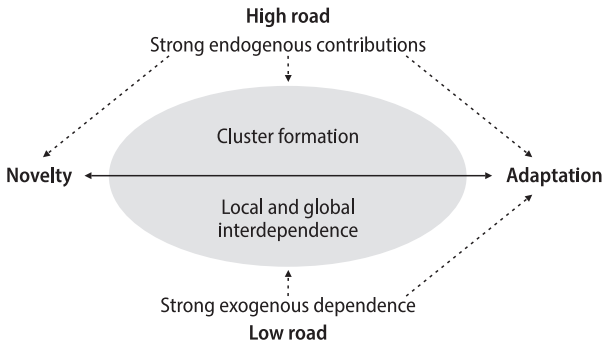


FIGURE I.1 This figure shows that knowledge-based clusters feature novel goods and adaptations that involve both local and global connections. Clusters that originate from local sources are considered a high-road form of development, and those originating from external sources are considered a low-road form of development.

For the former, innovation, talent, and creativity, especially when stimulated entrepreneurially, are widely deemed vital to local development that enhances regional competitiveness, productivity, and per capita income and that can address social goals related to equity and environment. In this scenario, local, innovative entrepreneurship offers key roles to create, endogenously, distinctive, sustainable specialties that can be scaled up and organically deepen locally supportive institutional architecture, all the while underlain by local roots, interests, and understandings. Metro Vancouver is potentially on such a path toward a high-performing, resilient local economy. But this path is not guaranteed; it can change and coexist with – even be challenged by – low-road alternatives. Although Metro Vancouver has not been associated with the classic low road of attracting low-wage “destructive” competition through routinized branch plant operations, a substantial share of its high-tech employees are paid less than their counterparts south of the border. Moreover, the region has been enthusiastic about “place-selling” strategies with little thought for self-generating growth momentum, regional competitiveness, or more social concerns.¹⁴ It might be churlish to describe Metro Vancouver’s global promotion of its real estate assets and tourism as low road, but these trajectories are limited in value-added, income-generation, and human-development potential and as a basis for improved productivity. Moreover, money laundering, often organized via casinos before entering real estate (and other) markets, has become contentious, not least for abetting house price inflation and drug pushing, imposing a (low-road) cost-of-living penalty, and failing to attract talent to Metro Vancouver.¹⁵ For the

region, ultimately, the most interesting question regarding the evolution of its innovation economy is the extent to which it reflects a high road to local development.

The purpose of this introduction is to provide context for understanding Metro Vancouver's innovation economy and to emphasize that innovation shapes and is shaped by the peculiarities of place. That shaping often occurs in unpredictable ways, at least until momentum is achieved (or lost). The analysis is especially stimulated by pleas for more investigations of the genesis and evolution of innovative private sector firms "to ultimately understand what creates sustainable competitive advantage" in particular places.¹⁶ Our study essentially seeks to appreciate Metro Vancouver's new innovation economy as a "local model" resulting from the distinctive global-local interactions forged by the dynamics of local entrepreneurship within an urban context in which metropolitanism has been built upon an enduring peripherality of geography and political economy.¹⁷ Given Metro Vancouver's population in 2022 of 2.6 million, this appreciation is boosted by recognition of the dynamic role of "intermediate cities," with populations between 300,000 and 5 million and often located in peripheral regions.¹⁸ Compared with megacities, which have been the prime focus of study, these cities, especially in advanced countries, have grown faster and experienced higher rates of innovation-driven productivity growth in recent decades. These cities offer both agglomeration economies and high levels of livability. The signs are promising for Metro Vancouver.

In the rest of this introduction, first we outline Metro Vancouver's growing service sector orientation and the decline of its forest commodity dependence. Then we note the (potential) high road toward innovative development, especially as led by high tech. And then we review this emergence through a global-local lens that links the broad trends of postindustrial transformations with the key distinctive characteristics of Metro Vancouver.¹⁹

The Resource Export-Urbanization Shift in Development

As David Ley's prescient analysis revealed, the stirrings of change toward postindustrialism and a service-dominated economy within Metro Vancouver were evident by the early 1970s.²⁰ To be sure, services, manufacturing, and resource activities are highly interdependent, locally and globally, but in a direct job- and wealth-producing sense service jobs have long dominated Metro Vancouver, albeit much stimulated by resource-driven wealth. The strength of that resource-services dependency might have made Metro Vancouver's search to replace an old resource-manufacturing-driven economy

with other independent sources of value generation more problematic. Awareness of the challenges facing such a transformation took root following the deep-seated recessionary crisis of 1981–85 and its termination in the optimism of Expo 86. These events were a critical, turbulent watershed that marked the beginning of the secular decline in forest commodity production and supporting activities (although not for the region's commodity-trading functions). The recession immediately sparked (high-road) thinking on whether rejuvenation should involve innovation-based renewal of forest industries or diversification into innovation-led high tech, then largely portrayed as alternative options. Meanwhile, Expo 86 kick-started two other divergent (and partially low-road) trajectories toward a new, postindustrial economy by placing Metro Vancouver in the eye of global tourists and property developers. In practice, as the old forest industries declined, within a service-dominated economy, all of these trends have occurred to some degree.

Forestry's Big Export Shoes

From the end of the nineteenth century, Vancouver grew as an industrial city, in tandem with the development of British Columbia's hinterland, around resource processing, control, and trading functions.²¹ Entry into Confederation (1871), arrival of the Canadian Pacific Railway (CPR, 1887), and opening of the Panama Canal (1914), along with immigrant populations and entrepreneurs, spurred development of the city's resource and export-led growth. The city was the gateway to the province's wide-ranging resource wealth of mining, energy, and fishing, but the forest sector especially thrived as a dominating force throughout Vancouver and adjacent communities. Commodity sawmilling, making dimensional lumber, became the iconic core of the region's industrial identity. It was the engine of growth and had a concomitant influence on society and politics, with the BC forestry sector reaching peak momentum during the 1950s and 1960s. However, the 1970s and 1980s brought repeated crises, not least in large-scale sawmilling and related commodity wood processing. Throughout Metro Vancouver, these activities became undermined by obsolescence, competition from elsewhere, and technological change. In tandem, driven by escalating concern over the forests' ecological and spiritual values, conflicts became widespread throughout the province, and environmental stakeholders welcomed large-scale forestry industry's relentless decline.²² In the following decades, sawmills and their contribution to development receded from Metro Vancouver's consciousness. Yet the opportunities and dilemmas that arose in commodity forestry's wake remain.

During the post–Second World War boom decades, forestry’s dominance in Metro Vancouver’s (industrial) economy remained evident until the recession of the 1980s. As one study noted, the metropolitan area’s manufacturing base in the 1960s was relatively large but “deceptively narrow” and centred on large-scale wood-processing mills supplying standardized commodity outputs – activities that accounted for 35 percent of the region’s manufacturing jobs that provided over 20 percent of its total employment.²³ Despite that narrowness, forestry processing helped to stimulate a wide range of linked activities, especially backwardly linked supplier connections in other forms of secondary manufacturing (machinery, transportation equipment, and metal fabricating) as well as in producer services (managerial, finance, legal, engineering, consulting, R&D). Often summarized with respect to “Fordist” characteristics, the main wood-processing mills were export-oriented, “landscape dominants,”²⁴ featuring relatively well-paid union jobs in support of standardized, large-volume outputs typically part of large, integrated corporations with head offices in downtown Vancouver.

Emblematic of Metro Vancouver’s industrial evolution, as Canada’s largest forest products corporation, MacMillan Bloedel (MB) opened its new, architecturally acclaimed head office on Georgia Street in 1968, with its flared footings reflecting an old-growth forest and at the time the tallest building in Vancouver. As the control centre of MB’s global operations, the office had over 1,200 employees at its peak and was part of a cluster of related head offices. But the forest industry was about to become more volatile and the 1970s featured two sharp recessions stimulated by global energy crises. Still, Metro Vancouver’s forestry activities continued to “bounce back” from downturns, culminating in 1979 and 1980 as record years for production, employment, and profitability. However, in a remarkably abrupt change in fortune, the recession that lasted from 1981 to 1985 provoked significant permanent downsizing and an immediate loss of over 30,000 forestry jobs in Metro Vancouver, with unemployment rates increasing from 6.7 percent to 14.7 percent.²⁵ As a turning point for forest commodity production in the region, this recession marked the beginning of its secular decline, which continued to unfold over the next two decades (see [Chapter 1](#)). By 2018, the old wood-processing mills (plywood and particleboard as well as sawmills) were gone, replaced by shopping malls, residential developments, and commercial uses. MB’s head office is still there, renamed the Arthur Erickson Building in 2021, but MB is not, and neither are its managerial jobs.²⁶ New service companies are now occupying the office spaces.

The Rise of the Service Economy

The service sector's domination of Metro Vancouver's economy is readily acknowledged, as is its highly varied nature, embracing wide-ranging activities that serve individual consumers (consumer services), businesses (producer services), and governments (public sector services).²⁷ In the Canadian census, following international conventions, services are distinguished from a goods-producing sector and further disaggregated into particular industry groups (see [Table I.1](#)).

Clearly, by 1970, the majority of jobs in Metro Vancouver were already overwhelmingly in services, a dependence that has deepened since then, while goods-producing jobs, especially in manufacturing, have declined further, at least relatively. Overall, Metro Vancouver recorded impressive growth, its population increasing from 1,077,480 to 2,551,000 and its employment increasing more than threefold from 416,200 to 1,474,000

TABLE I.1 Employment by industry: Metro Vancouver, 1971, 2001, 2019, and British Columbia, 2019 ('000s)

<i>Industry</i>	<i>Metro Vancouver</i>			<i>British Columbia</i>
	<i>1971</i>	<i>2001</i>	<i>2019</i>	<i>2019</i>
Construction	32.0	54.2	123.4	236.6
Manufacturing	78.8	104.2	96.2	165.7
<i>Total goods</i>	124.8	176.3	240.3	485.6
Trade (retail/wholesale)	85.7	165.6	230.5	389.2
Transportation and warehousing	50.0	67.1	88.4	140.8
Finance, insurance, real estate	28.2	77.2	113.9	158.9
Professional scientific and technical	n/a	95.9	154.8	223.7
Business, building, and support	18.2	42.3	69.3	112.3
Education	27.1	71.8	104.0	178.7
Health care and social assistance	30.3	96.1	160.6	312.6
Information, culture, and recreation	n/a	65.4	88.5	131.5
Accommodation and food	22.3	85.3	103.4	191.2
Public administration	22.3	41.8	51.6	116.0
Other	7.2	52.9	68.6	118.8
<i>Total services</i>	291.3	861.2	1,233.7	2,073.4
TOTAL	416.1	1,037.5	1,474.0	2,559.0

Sources: 2001 and 2019 data from Statistics Canada, Table 14-10-0098-01, "Employment by Industry, Annual Census (× 1,000)," <https://doi.org/10.25318/1410009801-eng>. For 1971 data, see Census of Canada, 1971, "Labour Force By Industry," <https://publications.gc.ca/site/eng/9.845602/publications.html>.

TABLE 1.2 Metro Vancouver GDP by sector, 2017 (%)

<i>Sector</i>	<i>GDP</i>
Finance, insurance, and real estate	31
Construction	9
Manufacturing	8
Professional, scientific, and technical services	8
Transportation and warehousing	7
Retail trade	6
Wholesale trade	6
Health care and social assistance	6
Education services	5
Information and cultural industries	4
Public administration	4
Accommodation and food services	3
Other services	2

Source: City of Vancouver, "Economic Structure of Vancouver: GDP of Metro Vancouver, Fact Sheet #1.5," Vancouver Economic Commission, Figure 1, nd, 1. A map showing 2021 data is available from the same source, but uses slightly different categories to the above.

between 1971 and 2019. During this period, the service sector increased its share of total metropolitan area employment from 70.0 percent in 1971 to 83.0 percent and 83.7 percent, respectively, in 2001 and 2019. Once the industrial heartbeat of Metro Vancouver, manufacturing employment increased slightly until 2001 before declining absolutely as well as relatively, providing just 6.5 percent of metropolitan employment in 2019. That the goods-producing sector as a whole accounted for 16.3 percent of employment in 2019 reflected the doubling in size of construction jobs since 1971.

These broad trends are reinforced by GDP calculations. In 2017, for example, when Metro Vancouver's GDP amounted to \$135.6 billion, or 61 percent of British Columbia's GDP (\$239.2 billion) and the third largest metropolitan region in Canada, service sector contributions amounted to 83 percent of the total. Furthermore, GDP data confirm the decline of manufacturing and construction activities within Metro Vancouver's goods-producing sector, their combined GDP contributions dropping from 18 percent to 12 percent between 1987 and 2017. In contrast, finance, insurance, and real estate accounted for almost one-third of the region's GDP in 2017.

Moreover, services not only dominate employment and GDP but also are making, perhaps to a surprising degree, increasingly important contributions

in replacing wood products as the export foundation of Metro Vancouver's (and British Columbia's) economy. As Metro Vancouver (and British Columbia) have grown, exports or – as they often have been labelled – “basic” activities might have become a less strong “autonomous” predictor of overall growth compared with when the economy was smaller,²⁸ but they remain essential to its well-being in terms of jobs, income generation, and global roles. The rise of services in this regard is an important trend. Indeed, service exports have climbed dramatically, and by 2018 services provided \$32.5 billion or fully 46 percent of total exports (\$74.2 billion), about 13 percent of provincial GDP (\$246 billion).²⁹ BC service exports have also become greater than service imports and represent a higher proportion of GDP than in other provinces. It is reasonable to assume from the jobs and GDP data that most of those exports (70 percent or more) originate in Metro Vancouver. In 2018, transportation (gateway) services, tourism, and professional services were the most important categories (61 percent of service exports), and film and TV, education, and a category called “technology” provided 21 percent of service exports. However, although resource exports have declined relatively (and the province has been a net importer of goods since 2007), forestry (especially lumber), energy (especially coal), mining (e.g., copper), and agriculture still provided the overall leading (provincial) export industries in 2018 (and have since); forest revenues remain important to the provincial government even as they decline, and many service exports are resource related.³⁰

Metro Vancouver is vital in leading British Columbia away from this dependence towards more innovative activities, as high-road approaches prescribe. However, this challenge is not only about adding new services but about integrating an entrepreneurial culture into a highly structured industry-union culture. It has also occurred in tandem with government policies enthusiastic for place-selling approaches to local development.

Place-Selling Strategies

Expo 86 provided a much-needed immediate stimulus to the local economy and to government and business enthusiasm for promoting Metro Vancouver's attractiveness as a tourist destination and property market. The fair attracted tourists from around the world, and its success helped encourage the initiation of a cruise ship industry, the rejuvenation of the adjacent Coal Harbour, the building of the nearby “world-class” Whistler ski resort, and its hosting of the Winter Olympics in 2010.³¹ Tourists and visitors, including conference attendees, to Metro Vancouver have become important

to its economy, adding to its amenity levels for all to enjoy, and providing jobs, especially in accommodation, food, and recreational activities. However, many tourism jobs are low waged, seasonal, and inherently labour intensive, and it is difficult to amplify productivity through capital deepening and scale effects. Despite sophisticated service offerings and high incomes for owners and managers of tourism activities, such jobs generally provide workers with low incomes that reflect a low-road form of development.

More controversially, Expo 86 put Metro Vancouver on the maps of global property developers, especially in Asia, with the “transformational” purchase in 1998 of Expo lands as one block to Li Ka-shing of Hong Kong. This purchase of one of North America’s prime waterfront sites was made at the relatively modest price of \$320 million, further discounted by the province’s agreement to invest \$145 million for property remediation.³² Moreover, this deal helped to encourage a virtually uncontrolled (unregulated) flood of investment in housing stock, initially largely from Hong Kong, within a federally directed business investment immigration scheme, and after 2000 by a crescendo of investments from mainland China. Indeed, the increased penetration of foreign capital from Asia into Metro Vancouver property markets in recent decades has helped to commodify and globalize the region’s housing.³³ Admittedly, housing market pressures have been pushed by increasing demands from a rising population and a land supply naturally restricted by mountains and the ocean and institutionally restricted by the US border and the Agricultural Land Reserve (greenbelt). Even so, the degree to which accommodation has become unaffordable in Metro Vancouver has been heightened by foreign capital that left much housing empty or occupied by nontaxpayers, increased levels of house flipping, and involved purchases motivated to seek safe havens, spread risks, sanitize illicit funds via money laundering, and/or gain profit rather than more basic reasons of shelter for local residents. As a result, strong inflationary tendencies in housing prices (and rents) have led to a significant affordability problem that has “decoupled” house prices from wages for many residents, threatening the region’s self-styled livability characterization.³⁴ Paradoxically, as legacies of Expo 86, rapidly inflating house prices and low-wage labour in tourism-related activities stand in contradiction to aspirations to improve regional well-being.

To be sure, real estate and construction represent significant benefits to Metro Vancouver’s economy, adding to government tax revenues and supporting an increasing number of well-paid jobs that require wide-ranging design and technical expertise within building companies and among

professional services such as architecture, engineering, law, real estate, planning, and so on. These contributions readily complement a high road of local development. Yet finance, insurance, and real estate, along with construction, became unusually important in Metro Vancouver's economy, increasing their combined share of the region's GDP from 32 percent in 1987 to 40 percent in 2017, their growth faster than the other thirteen sectors shown (see [Table I.2](#)). For critics, however, land sell-offs, a not-well-thought-out investor immigration program, and a ("blind-eye") regulatory disregard for illegal financing have cast dark shadows over real estate and related activities. They argue, starting with billions of dollars from Hong Kong alone in the 1990s, and with increasing momentum until 2017, that provincial (and federal) governments became complicit in a "growth machine" organized by real estate developers in the global commodification of Metro Vancouver's housing market.³⁵ Indeed, "the Vancouver model" of money laundering from illicit sources in China via gambling in local casinos and its "cleaning" through house purchases has been well cited.³⁶ In effect, house sales became an export activity increasingly unaffordable to local residents even as it contributed to provincial government revenues.³⁷ Indeed, there is recognition that a decoupled housing market threatens Metro Vancouver's livability brand (and high-road hopes).³⁸ Conversely, a greater commitment to a high-road innovation economy, well expressed by but not limited to high tech, is seen as a way to address such problems.

Innovation for a High Road

Although the struggle to find a development foundation for Metro Vancouver might have veered onto the wealth offered by the low road of tourism and house sales, the resource industries' legacy simultaneously created an urban foundation for innovative and creative activities. They evolved organically at first but have been nurtured by Metro Vancouver's wealth, ambience, culture, and co-evolving institutions.

High Tech

High-tech activities are central to Metro Vancouver's aspirations as an innovation economy, with local roots that can be traced to the 1960s with the emergence of Glenayre Electronics (1963), Sierra Wireless (1966), and MDA (1969), along with the even earlier pioneering efforts of Donald Hings (see [Case Study I.1](#)). These firms anticipated the locally based entrepreneurial origins of high tech in Metro Vancouver including important roles of Burnaby and Richmond as well as for Vancouver itself. Meanwhile, Lenkurt

CASE STUDY 1.1 Donald Hings: British Columbia's Inspirational High-Tech Pioneer

In 2001, Donald Hings (1907–2004) of Burnaby received the Order of Canada in recognition of his role as inventor and innovator, notably his pioneering work in the 1930s and 1940s on the “C-58 wireless set,” more popularly referred to as the “walkie-talkie.” Hings was three when he came to Canada with his mother, first settling in Lethbridge, Alberta, before moving to New Westminster, British Columbia. With only a few years of formal education, Hings became a self-taught pioneer in electronics, producing fifty-five patents, including for an aircraft landing system, the klystron magnetometer survey system, the thermionic vacuum tube, and an electronic piano in addition to the walkie-talkie. It originated in his work on a “bush radio” for a mining company in the 1930s, with the first fully operational walkie-talkie developed in 1937 while Hings was living in the remote community of Rossland in the BC Interior. Subsequently, at the government’s invitation in 1939, Hings developed this model in Ottawa with support from the National Research Council. His “revolutionary” walkie-talkie design was durable, simple, and versatile, and it allowed for two-way “talk-based” (rather than code-based) communication among troops in battlefield conditions while filtering out noise and preventing eavesdropping. Over 18,000 units were shipped from a Toronto manufacturing plant to Europe to support the Allied war effort, with Hings refusing any royalty payments. He received the Order of the British Empire in 1946 and soon after returned to British Columbia, where he established his home and business, Electronic Laboratories of Canada Ltd., on Capital Hill, North Burnaby, creating a mini complex of “towers, radar sheds, electronic shops and laboratories” as well as employee housing that formed a “hilltop community of scientists,” which remained in operation until the mid-1980s.

Subsequently, Donald Hings mentored his grandson, Guy Cramer, on “innovation” and together they formed Hyperstealth Biotechnology Corp in 1989 to develop hyperbaric chambers and sophisticated forms of camouflage (an established Cramer interest), designs of which have been exported to over 50 countries. Hyperstealth operated in Moli Energy’s old facility (see [Case Study 2.1](#)) until recently before relocating to Cramer’s Maple Ridge home.

Sources: C. Hanson, “Walkie-Talkie Design Had Origins in the Bush,” *Vancouver Sun*, August 17, 2001, B1, B7; T. Hawthorn, “Tinkerer Invented the Walkie-Talkie,” *Globe and Mail*, April 7, 2004, http://www.radioalumni.ca/z_1937_walkie_talkie.htm. G. McIntyre, “Hidden Gem: Maple Ridge Firm Supplies Camouflage Worldwide,” *Vancouver Sun*, January 9, 2024, <https://vancouver.sun.com/news/local-news/hidden-gem-maple-ridge-firm-supplies-camouflage-worldwide>.

Electronics (Burnaby, 1949), a Californian-based manufacturing subsidiary, foreshadowed the later arrival of foreign direct investment (FDI) in the sector.³⁹ Overall, however, high-tech growth remained tiny in scale until after Expo 86.

Indeed, the initial government reports that documented high tech in British Columbia began only in the mid-1990s.⁴⁰ Then the first statistical profile of the BC high-tech sector emphasized its growth for the 1988–95 period, albeit from small beginnings. As the report notes, in this period, high-tech GDP, employment, exports, and number of establishments all grew substantially faster than provincial averages: GDP in the BC high-tech sector more than doubled, from \$1,083 million to \$2,415 million; revenues increased from \$2,048 million to \$5,114 million, with exports increasing from 40 percent to 47 percent of these revenues; employment increased from 27,240 to 41,130; and the number of establishments expanded from 4,448 to 5,116 (see [Table I.3](#)). Since then, the BC government and other industry analysts with increasing frequency – BC tech reports are now annual – have documented the size and scope of the high-tech sector and invariably attest to its rapid growth. As these reports indicate, from 2006 to 2018, high-tech GDP, revenues, and jobs in manufacturing and services have grown substantially beyond 1995 levels (see [Table I.4](#)). The sector’s export performance has grown in tandem with export sales ratios above 20 percent since 2006, and the United States has been the dominant export market complemented by sales around the globe (see [Table I.5](#)). In summary, high tech’s share of provincial GDP increased from 1.8 percent in 1988 to 2.6 percent in 1995, almost 6 percent in 2009, and 6.5 percent in 2016, and in 2018 it contributed 6.4 percent of total exports.⁴¹

Not without ambiguity, high tech’s definition in these reports is derivative and seemingly tautologous, namely as “those that produce high-tech [manufactured and services] goods.”⁴² In practice, the BC government and other authorities conceive of high tech broadly as industries that embrace new activities indicative of a knowledge-based innovative economy, driven by research, development, design, and other sources of creativity. Although businesses in life sciences, electronics, and renewable energy employ contingents of highly educated scientists and engineers in R&D programs and are the high-tech bellwethers, the so-called cultural and new media industries that draw from softer skills and experiences for creative inspiration are also designated as high tech. In this regard, the acronym RD&D rather than just R&D is a better designation for BC high tech, although the latter is still the more conventional label. R&D expenditures in the province grew from

TABLE I.3 British Columbia's high-tech activities, 1988–95: Selected characteristics

<i>Sector</i>	<i>GDP (\$ million)</i>		<i>Revenues (\$ million)</i>		<i>Employment</i>	
	1988	1995	1988	1995	1988	1995
Manufacturing	266	628	620	1,193	7,100	8,600
Service	817	1,787	1,428	3,921	20,150	32,530
<i>Total high tech</i>	1,083	2,415	2,048	5,114	27,240	41,130
<i>Total BC economy</i>	61,148	94,118	11,561	14,516	1,167,800	1,402,600

Note: GDP is estimated at factor cost.

Source: BC Stats, *The British Columbia High Technology Sector*, 1996, joint project of BC Stats, Ministry of Finance and Corporate Relations, and Science and Technology Branch, Information, Science and Technology Agency, prepared by J. Lawrance, S. Miller, M. Monkman, and J. Plant; selected information from Tables 2, 3, and 4 (24–26).

TABLE I.4 British Columbia's high-tech activities in the manufacturing and service sectors, 2006–16

<i>Sector</i>	<i>GDP (\$ billion)</i>			<i>Revenues (\$ billion)</i>			<i>Employment</i>		
	2006	2016	2019	2006	2016	2019	2006	2016	2019
Manufacturing	1.3	1.6	1.8	2.7	4.3	4.5	15,480	14,360	17,380
Service	9.7	12.9	16.6	14.4	24.5	30.4	70,300	92,070	113,840
<i>Total</i>	11.0	14.6	18.0	17.1	28.9	34.7	85,878	106,430	131,220

Note: GDP is estimated in constant dollar prices.

Sources: BC Stats, *Profile of the British Columbia High Technology Sector 2017 Edition* (Victoria: Prepared for Ministry of Jobs, Recovery and Innovation, 2017, by Dan Schrier); selected information from Tables A1 (12), A2 (18), 7 (52), and 10 (55); BC Stats, *Profile of the British Columbia High Technology Sector 2020 Edition* (Victoria: Prepared for Ministry of Jobs, Recovery and Innovation, 2021, by Dan Schrier); selected information from Tables A1 (8), A2 (13), 7 (45), and 10 (48).

TABLE 1.5 Estimated geographic distribution of British Columbia's high-tech exports, 2006–19 (\$ billion)

<i>Destination</i>	<i>2006</i>	<i>2016</i>	<i>2019</i>
United States	2.2 (69%)	3.3 (56%)	4.5 (58.9%)
European Union	0.4 (12%)	0.8 (13%)	0.9 (12.2%)
Pacific Rim	0.4 (11%)	0.8 (14%)	1.0 (13.4%)
Other	0.2 (7%)	0.9 (15%)	1.2 (15.4%)
<i>Total exports</i>	3.2	5.9	7.6
<i>Total revenues</i>	14.6	28.9	34.9

Note: BC Stats provides data on exports of high-tech manufactured goods to the above regions, and their shares in this regard are used to estimate the overall distribution of high-tech exports, including services.

Sources: BC Stats, *Profile of the British Columbia High Technology Sector 2017 Edition* (Victoria: Prepared for Ministry of Jobs, Recovery and Innovation, 2017, by Dan Schrier); selected information from Tables A4 (30), A5 (33), 27 (71), and 48 (93); BC Stats, *Profile of the British Columbia High Technology Sector 2020 Edition* (Victoria: Prepared for Ministry of Jobs, Recovery and Innovation, 2021, by Dan Schrier); selected information from Tables A4 (24), A6 (27), 27 (65), and 50 (89).

\$2.2 billion in 2004 to \$3.2 billion in 2014 and to \$4.2 billion in 2017, when business contributed 57 percent (\$2.4 billion) of the total (universities accounting for most of the rest).⁴³ Even so, Telus, as the largest of the business spenders, only ranked fourteenth in Canada, and there are high-tech firms that do not engage in long-term, substantive R&D, with design activities more prevalent.

Given its growth momentum in recent decades, four key characteristics of the BC high-tech sector are consistently highlighted in reports and can be summarized: its concentration in Metro Vancouver, service emphasis, diversified nature, and local entrepreneurialism. First, in terms of geographic distribution, initial estimates by BC Stats that Metro Vancouver accounted for about 67 percent of high-tech activity in the province in 1995 have been verified and perhaps are conservative.⁴⁴ Subsequently, PricewaterhouseCoopers (PwC) pioneered a direct sampling and mapping of high-tech businesses throughout British Columbia and produced several “techmaps” that indicated a deepening concentration of technology companies in Vancouver from 46 percent in 2003 to 54 percent in 2012 while further recognizing Burnaby and Richmond as important inner-suburban centres.⁴⁵ Overall, 82 percent of the 1,383 companies surveyed for the 2012 “techmap” were in Metro Vancouver. If adjacent areas such as Victoria and Squamish are included, then this share would increase.

Second, on all indicators, service sector activities dominate high tech; in 1995, they accounted for 74 percent of employment and GDP and 77 percent of revenue, by 2016 they accounted for 89.0 percent, 86 percent and 86.5 percent, respectively, of high-tech GDP, revenues and employment, and similar levels of dominance or even higher (for GDP) in 2019 (see [Tables I.3](#) and [I.4](#)). This domination highlights Metro Vancouver's transformation from an industrial to a postindustrial city in which manufacturing is restricted to prototype, custom-made, and specialized equipment functions.

Third, within Metro Vancouver, high tech has been remarkably diversified across multiple activities and is well illustrated by the range of innovative-driven product mixes pursued by the leading local firms (see [Chapter 2](#)) or controlled by MNCs (see [Chapter 3](#)). This diversity is not easy to classify, and the five to seven categories employed by BC Stats or KPMG are highly aggregated and contain much internal variation; indeed, PwC's 2003 and 2012 surveys of high-tech activities were allocated into twelve different clusters (see [Chapter 4](#)).⁴⁶ However classified, Metro Vancouver high tech comprises a remarkable range of activities in aerospace, computer hardware, software development in multiple business services, green energy and clean tech, electronics, artificial intelligence, biotechnology, film and TV productions, video games, and more. This diversification is a significant distinctive feature. The iconic Silicon Valley, for example, is over ten times larger in industrial scale but overwhelmingly focused on consumer and enterprise information technology.⁴⁷

Fourth, in Metro Vancouver high tech, more so than elsewhere, the population pyramid of firms is strongly weighted to small, entrepreneurial firms. Thus, the number of high-tech businesses in British Columbia increased from 5,116 to almost 11,000 between 1995 and 2018, when 80 percent of the firms employed fewer than 10 and over 95 percent employed fewer than 100, with only 220 firms employing more than 100.⁴⁸ Furthermore, according to KPMG, whereas just 50 employees are needed to be in the 10 percent of high-tech companies in British Columbia, the Canadian average is 100 employees, and California, Germany, and Israel, respectively, require 500, 150+, and 200+ employees to join this category. The increasing levels of FDI in Metro Vancouver's high-tech industries, including the world's largest MNCs, so far have not changed this characteristic. Although several local firms have become relatively large, beyond conventional definitions of small and medium-sized firms (SMEs), none has become a global giant or even a big mid-sized firm, and among this group there have been

failures and acquisitions by MNCs, and subindustries have experienced decline.⁴⁹ In comparison with other high-tech areas, Metro Vancouver, for better or worse, is highly fragmented by sector, dependent on SMEs, and, with a caveat regarding Telus, lacks dominant lead firms.

In summary, as of 2019, even as its profile has increased, high tech remains a modest (direct) component of Metro Vancouver's economy. Per capita R&D investments and patent counts also lag national and appropriate global averages.⁵⁰ If Metro Vancouver was assumed to have 75 percent of British Columbia's high-tech employment of 123,710 in 2018 (131,220 in 2019), then the resulting total of 92,376 jobs (98,415 in 2019) amounted to about 6.3 percent (6.6 percent in 2019) of its economy, roughly congruent with its share of the region's GDP. In terms of jobs, GDP, or exports, high tech is similarly about 6–8 percent of the region's economy. Yet, in comparison with the forest sector, high tech has become – at least since 2012 – as large in employment terms, and its growth more than compensated for the loss of commodity manufacturing jobs. Furthermore, even though not export oriented, it does serve global markets and has attracted much FDI.⁵¹ High-tech activities have also stimulated a supporting institutional architecture involving government policy, financing, associations, and universities. As a high-road approach, high tech has added growth and productivity to the economy, with potential for further growth; its wage levels are higher than the local average, if lower than other high-tech centres, and it might help to close the gap between income and housing affordability. High tech, with its overall emphasis on clean service jobs and efforts to develop renewable energy as part of its diversified portfolio, is also acknowledged, if often uncritically, in support of Metro Vancouver's green aspirations. Moreover, the region's search for a globally competitive innovation economy is not restricted to high tech.

The Innovation Economy beyond High Tech

Beyond (new) high tech, innovation has stimulated globally distinct competitive advantages in Metro Vancouver's economy in mature industries, including through forest sector rejuvenation and emergence of new consumer-driven lifestyle activities.⁵² In these industries, innovation has typically been incremental, design centred, and market driven, with some investment in formal RD&D programs. In the forest sector, the recession in the 1980s sparked a chorus of pleas for innovation to overcome obsolescence, even as rationalization and cost cutting then dominated industry behaviour. With gathering momentum, however, since the 1990s, innovation

has helped to restructure Metro Vancouver's forest-related activities, especially through new entrants in equipment manufacturing, engineering, and other services, a reorganization of industry R&D, and an array of value-added operations, often involving small firms. Indeed, Metro Vancouver has been a pioneering (R&D-driven) hub of provincial expansions of engineered wood introduced commercially at Expo 86, even if its potential has been appreciated only within the past decade or so. Similarly, after much debate, forest sector R&D across Canada was reorganized in 2007 through the establishment of FPInnovations, a private, nonprofit organization with a major research centre in Metro Vancouver. FPInnovations mainly serves the provincial forest sector through new technologies and state-of-the-art advice while moving beyond its traditional sector and regional mandates.⁵³ These initiatives collectively support pleas for a knowledge-based forest sector economy.⁵⁴

In Metro Vancouver's evolution to postindustrialism, changing patterns of consumption have helped to spark new demand-driven initiatives that complement as well as contrast with high tech. Indeed, one lively assessment of Metro Vancouver's postindustrial identity as West Coast "cool" and "laid-back" features not only new high-tech activities but also various lifestyle-related initiatives that range from distinctive restaurant chains to clothing design companies.⁵⁵ In these activities, entrepreneurs started locally and then expanded their brands through exports and investments across Canada and sometimes throughout North America and globally. Lululemon, Arc'teryx, Mountain Equipment Co-op, Aritzia, and Fluevog headline the apparel ventures, and other innovative examples ranging from mountain bikes to beer brewing can be cited. Essentially, these lifestyle ventures have spun out of traditional (low-tech) industries (clothing, brewing) based on design-led innovation. As in high tech, the local jobs created by these initiatives are primarily in services, with any local manufacturing involving small batch or niche production or prototype creation and large-scale manufacturing of these innovations occurring primarily elsewhere (see [Chapter 7](#)). Exceptionally, Lululemon has become a global and very large mid-sized company.⁵⁶

The Global Context of Metro Vancouver's Innovation Economy

As a local model of development, Metro Vancouver's transformation to an innovation economy is both a distinctive and a shared experience. From this perspective, Metro Vancouver's evolution as part of broader trends – such as deindustrialization, globalization, and shifts toward knowledge-driven

service economies – is largely grounded by its peripherality and the contingent performances of its endogenously inspired entrepreneurs, themselves globally connected to R&D, markets, finance, and ownership.⁵⁷

Local Transformation as Shared Experience

Within the context of widespread deindustrialization, globalization, and restructuring, the rise of innovation-driven knowledge and creative economies has become a central theme in postindustrial cities' search for growth, adaptability, and resilience. The downsizing of Metro Vancouver's resource industries during the 1980s, for example, was part of the "deindustrialization" and massive loss of manufacturing jobs that occurred in cities throughout the historic manufacturing belts of Europe and North America.⁵⁸ In tandem, Metro Vancouver, as elsewhere, experienced an intensification of globalization processes that increasingly opened national and local economies to exogenous sources of change, including with respect to the shift of global export-oriented manufacturing capacity to emerging economies, especially in Asia.⁵⁹ From an evolutionary perspective, the restructuring of the technological and organizational foundations of global and local economies has been summarized as the transformation of "creative destruction" from Fordism to an information and communication technology (ICT) paradigm.⁶⁰ In this view, the signature characteristics of Fordist production systems, standardized mass production, unionism, and energy intensity were becoming increasingly obsolete. As models of replacement, micro-electronics and flexible manufacturing were the driving forces of ICT, generating novel industries and rejuvenating established Fordist industries by improving their productivity through more flexible, diverse forms of organization and employment, often in new economic spaces. The contemporary transformation of Metro Vancouver's economy has been interpreted along these lines, including the recognition that mass production, whether in resource industries or in secondary manufacturing, is cheaper elsewhere.⁶¹ Metro Vancouver has had to jump on the innovation bandwagon or be left behind.

Vital to economic growth since ancient times, innovation and the application of new knowledge have spurred several waves of industrialization over the past 250 years, becoming an increasingly intense mantra for development over the past half century. Local development policies emphasizing innovation imperatives are now widespread.⁶² Attempted clonings of Silicon Valley – through regional innovation systems or entrepreneurial ecosystems – have been prevalent strategies in this regard, albeit with varying degrees of success.⁶³ With high tech as the most significant marker,

contemporary postindustrial transformations toward knowledge-based local economies around the globe, including in Metro Vancouver, are distinguished by six key (related) trends: (1) a deepening of knowledge-based production functions, (2) the enhanced role of universities in national and regional innovation systems, (3) the creation of new activities as sources of employment, (4) the organization of local high-tech clusters that are also part of global innovation systems, (5) the rise of specialized financing, and (6) a search for sustained competitiveness that increasingly has engaged environmental imperatives.

First, the transformation toward postindustrial cities has become driven increasingly by innovation, the development and application of various forms of knowledge, and ongoing commitments to learning as inputs within production functions. Indeed, the imperatives of innovation, creativity, and problem solving are pervasive throughout the economy and not restricted to formal RD&D or to professional white-collar groups. In turn, these imperatives have required a sea change in attitudes toward local competitiveness among postindustrial cities that emphasize (local) knowledge creation and thinking skills rather than reliance on repetitive physical, administrative, or service labour.

Second, the growth of knowledge- and learning-intensive activities has been associated with an evolution in the nature of regional or local innovation systems. These systems typically evolved as specialized components of national counterparts, formally since the end of the nineteenth century, centred on the activities and networks of a “triple helix” of corporate, government, and university (and hybrid forms of) RD&D, which both supplemented and supplanted dependence on individual business innovators.⁶⁴ For industrial cities, private sector corporate R&D was typically the major driving force orchestrating innovation. However, for postindustrial cities, universities have become more proactive within the triple helix, engaging more fully in applied and generative technological transfer activities, in addition to their traditionally important roles of teaching and basic research.⁶⁵ The increasingly sophisticated knowledge required in RD&D processes, the policy imperatives attached to innovation, and the income to be acquired from licensing, patenting, and so on have supported this trend. In the United States and globally, the Bayh-Dole Act of 1980, which granted universities patenting and licensing rights for innovations funded by the federal government, was an important milestone. Again, the well-recognized close association between Stanford University and the firms of Silicon Valley has been the exemplar of university-industry technology transfer for other

regions around the world to follow. Indeed, a significantly enhanced role for “entrepreneurial universities” that more fully engage with innovation and its commercialization, including in peripheral regions where business-led innovation traditionally has been under-represented, is a widespread trend, even if university claims in this regard can be exaggerated.⁶⁶ Nevertheless, university roles in regional innovation systems have been widely expanded, including in Metro Vancouver, where the University of British Columbia and Simon Fraser University (SFU) have ramped up their industry liaison and entrepreneurship programs since the 1980s. Indeed, their increased participation in local innovation systems is associated with changing roles in postindustrial urban and regional transformation: from support systems to established industrial specialties, such as forestry, to becoming proactive sources of high-tech diversification.

Third, at the forefront of postindustrial transformation are technologies and products (goods and services) that did not exist prior to 1970 or 1980, and these new activities enable, indeed compel, competitive innovation. Many directly feature new information and communication (electronic and computer-related) products and processes, and the new digital technologies are widely used in other applications, including advances in biotechnologies, health sciences, and energy-related activities intended to reduce environmental impacts. These new activities have highlighted the importance of innovation to competitiveness and injected into local economies new skills, businesses, and employee relations as well as forms of RD&D. The increasing reference to RD&D, rather than just R&D, reflects the growing importance of design activities that typically involve computer assisted design and manufacture (CAD-CAM) techniques and are focused on technology transfer to (industrial and individual) consumers. Moreover, within advanced high-cost economies a focus on R&D and technology creation has been associated with declines in manufacturing’s importance. Even Silicon Valley has witnessed a substantial restructuring along these lines with the mass production of semiconductors largely relocated to lower-wage regions in Asia and the rural United States in recent decades. As noted, manufacturing in Metro Vancouver has similarly declined.

Fourth, the geographies of postindustrial transformations broadly share, even if they vary locally, the clustering or agglomeration of activities that, as Metro Vancouver’s experience demonstrates, are both complemented and threatened by processes of globalization. The mutual benefits that arise from local interdependencies are conventionally defined as agglomeration

or external economies of scale and scope and further disaggregated as localization and urbanization economies of scale.⁶⁷ The former emphasize the development of talented labour pools, information sharing, supplier networks, and associations in support of *related* activities, whereas the latter primarily reflect the advantages provided to all businesses by the development of urban infrastructure (transportation, housing, etc.), amenities, and educational systems. Innovative and creative activities in general are predicated to a considerable degree on where talented entrepreneurs and labour forces wish to live, typically places that already provide or have the potential to provide high levels of amenities (educational, social, recreational) in safe, welcoming spaces (urbanization economies scale), and where job prospects and satisfaction in wide-ranging, high-income occupations that feature mutually expanding information exchanges and job opportunities are plentiful (localization economies). From these perspectives, the growth of innovative activities in Metro Vancouver reflects the location preferences of talent and its global ranking as a desirable place to live.⁶⁸ Hitherto, agglomeration diseconomies such as growing congestion and inflated house prices have not (yet) undermined this ranking.

For innovative activities, proximity is a powerful force facilitating information exchanges and networking within clusters. However, specialized inputs might not be locally available and require access from more distant places. In this regard, localization economies developed in particular places that become more accessible to firms located elsewhere shift from being “immobile,” available only to local adjacent firms, to being “mobile,” external economies that can be accessed globally.⁶⁹ Indeed, the globalization of “spatial information systems” linking high-tech clusters around the world through various forms of information exchange and expertise suggests that mobile external economies have become more important, including as a source of entrepreneurial spinoffs and venture capital.⁷⁰ In the case of Metro Vancouver, key high-tech initiatives often have depended on accessing crucial inputs from elsewhere, such as venture capital and specialized research activities, not available locally. That is, globalization has complemented local clustering for Metro Vancouver’s distinctive experiences of postindustrial transformation.

Fifth, a growing commitment to innovation has required specialized forms of financing and incentives. Financing is necessary for aspiring entrepreneurs to fund initial capital and human resources expenses to develop technologies and products in their early stages and to support various stages

of development so that a start-up can scale up. This financing must accept risk and be selective in choosing viable companies. Usually, investors also provide guidance for management, networking, and further development. Such financing comes in various forms, directly from venture capitalists, angel investors, and initial public offerings (IPOs) and indirectly through incubators and other means of providing facilities and managerial guidance. Coupled with finance are the incentives of payouts to the entrepreneurs, whether through buyouts by other firms or through IPOs. Scientific recognition, fame, and other incentives might help to spur on an innovation system, but financial payouts are the most high powered. Although Vancouver once was infamous for the risk taking in its mining-based stock market, it has had to construct a new system of institutions and organizations to support the financial needs of its innovation efforts and to rely on external funding and expertise.

And sixth, as climate warming and biodiversity degradation have become global problems, locally generated policy responses that enhance environmental as well as economic values have received increasing priority, including widely at urban scales.⁷¹ Metro Vancouver, the birthplace of Greenpeace in 1971, has been part of these efforts. Its environmental opposition to resource corporations and industries grew rapidly, becoming especially strident since the 1980s. Policy efforts to promote a green economy in Metro Vancouver have been slower to develop, however, and in the past decade or so they have been associated loosely with support for high tech, as indicated by Vancouver's proposal in 2010 for a green economy. Indeed, this plea itself was stimulated by the emergence of local, environmentally motivated businesses, led by Ballard (see [Chapter 2](#)). A notable facet of Metro Vancouver's development dynamics is that environmental politics fervently have sought the demise of the resource commodities while supporting a new innovation economy to foster its postindustrial development.⁷²

Entrepreneurialism and Peripherality as Defining Local Attributes

For Metro Vancouver, the nature of its expanding innovation economy, in the first instance, directly reflects its entrepreneurial foundations. Here as elsewhere, these foundations both shape and are shaped by extant development, often in ways that are hard to predict, serving both to reinforce and to redirect local trajectories.⁷³ Conventionally, this unpredictability has been captured in terms of Marshallian or Jacobs effects on local urban diversification. According to the Marshallian viewpoint, new firms reflect the impacts of localization economies and serve cumulatively to add to established

industrial specializations and/or to elaborate them in closely related backwardly and forwardly linked activities. Alternatively, so-called Jacobs-style (urbanization) externalities generate new firms that might have little to do with existing specialties but represent completely different trajectories rooted in the diversity of the backgrounds, interests, and networks of growing, dynamic, urban populations.⁷⁴ For Metro Vancouver, its industrial identity in resource-based, especially forestry-related, activities can be interpreted readily along the lines of Marshallian agglomeration economies and linked activities. In contrast, formation of the pioneering high-tech firms in the 1960s such as MDA, Glenayre, Sierra Systems Group, or Hings's Electronic Laboratories represented new economic trajectories that reflect Jacobs's viewpoint, further reinforced by the continued strong role of local entrepreneurs in the diversification of the region's high-tech endeavours. In general, local innovative firms serve to retain local control, commitments, and direction of local transformation, and they help to embed supportive local institutional architectures. The proliferation of local firms also builds up local labour pools and talent that can stimulate spinoff developments, raise possibilities for their own growth as core firms, and attract MNCs from elsewhere looking to diversify geographically sources of innovation and forms of knowledge. Yet Marshallian and Jacobs effects are not always easy to distinguish; the extent and nature of relatedness of new activities to existing activities can vary substantially, and there is the question of when a new trajectory becomes an established one. Nevertheless, the regional diversification literature strongly suggests that expanding through forms of related variety is more likely to succeed in the long run than isolated separate trajectories.⁷⁵

The entrepreneurial initiatives driving Metro Vancouver's innovation economy are necessarily contextualized by a particular form of urbanization in which a dominant narrative of metropolitanism is shaped by an enduring peripherality of geography and political economy. Even as Canada's dynamic third largest metropole, Metro Vancouver remains defined as a "city on the edge" in socio-economic (as well as geological) terms, located near the end of the world's time zones, at the margin of British Columbia, Canada, the North American Pacific Coast, and the Pacific Rim region.⁷⁶ Certainly, the region's core status in controlling, processing, supplying, and transporting the rich and varied resources of its hinterland has long defined British Columbia's space economy and provided the (economic) basis for its emergence as a metropolitan city-region by the 1960s.⁷⁷ Since then, and especially since Expo 86, metropolitanism and postindustrialism have deepened as Metro

Vancouver has increasingly embraced services and the knowledge economy.⁷⁸ In tandem, contacts around the Pacific Rim are increasingly evident. As a sea and air hub, Metro Vancouver offers important advantages in accessing Asia Pacific and becoming part of its extraordinary dynamism while offering adjacency to key US Pacific seaboard cities. Regarding the latter, Metro Vancouver is in the same time zone and only a short flight to any of San Diego, Los Angeles, San Francisco and Silicon Valley, Portland, and Seattle. Proposals for a Cascadia region linking Washington, Oregon, and British Columbia reflect growing functional ties within the Pacific Northwest. In terms of global rankings of cities, in addition to its high ranking in terms of livability,⁷⁹ Vancouver has become recognized for its knowledge-based local development.⁸⁰ The idea of Vancouverism as a planning model further captures the sense of metropolitanism and influence on the global stage.⁸¹

Even so, Metro Vancouver remains peripheral in geographic, economic, and political spaces. For local businesses, the immediate provincial market encompasses a noteworthy but relatively small market of 4 million people, with Canada's population of 39.3 million people (2021) largely located far away in other provinces. If Canada's strong federal structure is partly a response to the challenges of governance in a geographically huge country, then British Columbia (among other provinces) is peripheral to Canada's heartland of Ontario and Quebec and the centre of "national" policies and priorities. For both British Columbia and Metro Vancouver, these policies, when applicable, are a "sharing exercise" requiring mediation with federal bureaucracies on scope, funding, and regulations. In practice, geographic distances, a deeply divided heartland, and strong provincial governments have contributed to highly regionalized Canadian markets. Moreover, Canada itself is peripheral within North America, overwhelmingly dependent on the United States for both markets and supply sources, rendering Metro Vancouver doubly peripheral and its economy (like those of other Canadian centres) pulled strongly southward, always countering eastern integration into the national economy. In relation, Metro Vancouver (and British Columbia) have shared national tendencies in terms of openness toward the forces of globalization, including with respect to FDI, long dominated by the United States, helping to reinforce north-south connections. In this regard, more so than other Canadian cities and regions, Metro Vancouver is strongly connected with the major US Pacific Coast cities but without implications for changing the locus of decision-making power in the latter. Meanwhile, connections in Asia Pacific might be burgeoning, but they are

far away geographically and with different political, regulatory, and usually more powerful economies and political regimes. For Metro Vancouver, peripherality implies both challenges and opportunities for an innovation economy.

Conclusion

As a postindustrial city-region, Metro Vancouver is certainly not a quintessential periphery,⁸² but it is peripheral, and this peripherality has shaped its innovation economy. With private sector R&D limited, and an industrial economy dominated by mature industries preoccupied with processing efficiencies of standardized commodities, the rise of an innovation-driven knowledge economy more or less started from scratch. This development was dependent on the emergence of individual scattered, small-scale pioneering efforts in advanced technologies and products and their stimulus, gradual at first, to a more rapid accumulation of endogenous technological capabilities by a growing pool of entrepreneurs and the building of supportive infrastructure. Simultaneously, peripherality has also meant necessarily a strong reliance on exogenous access to markets, expertise, finance, and manufacturing capability. Peripheries require external contacts in all phases of innovation, “from the first vision to ... usage,” an imperative readily apparent in Metro Vancouver. An important challenge facing its innovation economy is balancing the pros and cons of greater self-reliance with the pros and cons of connections elsewhere. The former enhance local multipliers, “buzz,” and other impacts, but too much can lead to parochiality and institutional inertia, while the latter provides vital inputs and markets not available locally but can lead to excessive dependency and foreign control.⁸³

Metro Vancouver clearly has much potential to elaborate its innovation economy in which local actors play proactive global roles. Indeed, its bottom-up, entrepreneurially dominated, innovative diversification illustrates a high-road approach to local development that enhances high-income, globally distinctive forms of competitiveness and sustainable specialties with deep local roots that can engage proactively in global value chains. Moreover, Metro Vancouver is a high-amenity location attractive to entrepreneurial initiatives and required talent. Still, questions can be raised regarding the region’s entrepreneurialism about whether it is too diversified, whether it is ineffective in generating local core companies that can grow to expand employment, and whether the attraction to FDI will be reinforcing or dampening. Furthermore, the emphasis on “place-selling” strategies by the provincial and local governments in recent decades, though generating

wealth and employment, have raised housing costs and congestion, both problematic for the high road of an innovation economy. Whether Metro Vancouver's hybrid forms of local development can shift more emphatically toward high-road options remains to be seen.

In the remainder of this book, we focus on the evolutionary geography of businesses, along with their institutional networking, that contribute to Metro Vancouver's global identity as an innovation economy. High tech is central to this contemplation because of its newness, dynamism, relative size, and potential to promote local development. In addition, providing bookends to the high-tech analyses, we explore distinctive innovation-led developments rejuvenating the forestry sector and promoting lifestyle business specialties within Metro Vancouver. Emphasizing the proactive role of local entrepreneurialism, we pay particular attention to local businesses that have scaled up and become higher profile. Certainly, as is documented, FDI has become an increasing force in high-tech and lifestyle activities (arguably less so in rejuvenated forestry), and foreign ownership has become an important attribute of the contemplation of future trajectories. Yet, with caveats aside, FDI in innovative activities has been attracted largely to the region by the emergence of a large pool of local companies, a growing talent pool, and growing local markets – features that FDI can be said to be reinforcing. In the final chapter, we reflect on the overall implications of Metro Vancouver's innovation economy as a local innovation model, its development prospects, and its role as an innovative city. The high road is possible but can be arrested and become part of hybrid trajectories of greater or lesser importance.

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