

**Flexible Specialization and Green
Entrepreneurship: Secondary Wood Processing
in the Vancouver Metropolitan region**

by

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Abstract

This research assesses the location behaviour and environmental performance of 'value-added' wood processing activities in Vancouver Metropolitan region. Conceptually the study is informed by an integration of the flexible specialization model with green entrepreneurship. Empirically, the study adopts an extended case study approach and is based on in-depth semi-structured interviews with respondents of 41 small firms representing the major sub-segments of the value-added wood products industry in the Vancouver Metro region as well as research and industry associations. These interviews were stratified among three zones: the inner-city and suburbs, outer suburbs, and the Fraser Valley. The study found that these firms perceive diverse location advantages and disadvantages and are flexibly specialized to some degree with respect to local entrepreneurship, access to local labour pools, diverse markets, material supplies and external economies. As green entrepreneurs, they are adopters rather than leaders, and use and awareness about certification schemes is varied.

Keywords: value-added wood sector; flexible specialization; green entrepreneurship; Vancouver Metropolitan region; industrial districts; forestry

Dedication

To my parents, Irene and Jack McIlhenney, who have graced my life with their generous, loving hearts and unending support.

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List of Acronyms

AWMAC	Architectural Wood Manufactures Association of Canada
BCIT	British Columbia Institute of Technology
CLT	Cross-Laminated Timber
CSA	Canadian Standards Association
CWAP	Centre for Advanced Wood Processing (UBC)
FSC	Forest Stewardship Council
ILRA	Independent Lumber Remanufacturers Association
ISO	International Organization for Standards
LEED	Leadership in Energy and Environmental Design
NRC	Natural Resources Canada
OSB	Oriented Strand Board
SAW	Sustainable Architectural Woodwork
SMEs	Small to Medium-sized Enterprises
SFI	Sustainable Forestry Initiative
PEFC	Programme for Endorsement of Forest Certification
UBC	University of British Columbia
USGBC	US Green Building Council

1. Introduction

British Columbia has the largest forest industry in Canada (Schultz and Gorley, 2006). That industry evolved around the mass production of commodities, especially lumber, for export. This evolution peaked during the so-called 'Fordist' boom years from the late 1940s to the 1970s. Since the 1980s, however, the commodity industries have experienced sharp booms and busts with a levelling off of production and declining employment. Forest products are no longer the engine of growth they once were (Marchak, 1991; Marchak, 1997; Hayter, 2000; DeLong et al., 2007). In recent decades, in the context of crisis and restructuring, there have been many pleas for the industry to give greater emphasis to value-adding activities and small firms. This thesis examines this suggestion in terms of the location dynamics of small wood processing firms in the Vancouver Metropolitan region, or strictly speaking the Lower Mainland region of British Columbia which comprises Vancouver metro plus communities located just beyond in the Fraser Valley.

Many observers suggest that BC's forest industry over-reliance on commodity lumber has become a problem (Roberts et al., 2004; Martin and Porter, 2000; Kozak and Mannes, 2005). According to Thony et al. (2006, p. 77) "BC can no longer depend on its primary forest industry alone to increase production and employment over historical levels" (see also Wilson et al., 2001). Indeed, with the recent US market crash as well as the pine beetle epidemic, BC's softwood lumber production declined by 42% from 2006 to 2009, with only modest recovery since 2009 (Palmer and Taylor, 2012, p. 11). It is estimated that BC's lumber production will decline to about 11 billion board feet by 2020 (from a high of 17.4 billion in 2005) partly because the mountain pine beetle-killed timber will be too old and brittle to economically harvest (Palmer and Taylor, 2012, p. 11). BC's forest industry employment has declined from 99,000 in 2000 to 53,000 in 2011 (COFI, 2012). Various stakeholders over the past three decades have strongly suggested that in order to remain vital, the forest industry must shift from a commodity focused cost-

minimizing strategy to a focus on value maximization. Forestry stakeholders worldwide, such as, Scandinavia, Chile and New Zealand have embraced the notion of moving up the value chain as a means of managing declining fibre supplies, while increasing employment and conserving forest lands (Wilson et al., 2001). Faced with various economic and environmental pressures during recent years, the assumption is that a shift toward higher value products is beneficial on many levels. Environmental groups have often been at the forefront in BC promoting “value-added activities as a solution to achieve the tenuous balance of preserving forest lands, while maintaining employment and wealth” (Kozak and Mannes, 2005, p. 3). Despite the support for a shift toward value-added wood manufacturing, this sector of the forest industry is currently at a critical juncture in its development and its growth is hinging on a number of economic, social and environmental factors (Kozak et al., 2003).

As expressed by Kozak and Mannes (2005), the real failings of BC’s forestry sector are its continued focus on lumber and pulp and paper and a lack of investment in manufacturing more value-added products. In order to thrive in the increasingly competitive global marketplace, they suggest that the BC forest economy should move up the value chain with the appropriate end-use applications (Kozak and Mannes, 2005). Thus DeLong et al., (2007, p. 2212) suggest that “[m]aintaining the economic contribution from the forest [for generations] will require the diversification and maximization of the value of each unit of fiber harvested.” Moving up the value chain makes good sense for business and it is also touted by the environmentalists as a necessity. M’Gonigle and Parfitt (1994) and others (Wilson et al., 2001; Kozak and Mannes, 2005; Parfitt, 2011) have suggested that increasing efforts towards a value-added approach would help to manage BC’s forests more sustainably by removing fewer trees and creating more jobs per tree harvested. This is the common solution offered to mitigate against employment losses in the commodity sector while maintaining healthy forests. Small wood processing firms in BC have the ability to utilize small quantities of timber with highly variable and changing characteristics (Rees and Hayter, 1996). Further, the pine beetle misfortune of the past decade has encouraged the government to temporarily increase harvest levels before wood values are lost, but with the implication that harvest levels

will soon be reduced more than originally expected. This prospect reinforces arguments that BC's forest economy needs to shift towards smaller-scale value-added operations.

Value-added or secondary wood products manufacturing has been defined as “production activities that transform primary products (lumber and panels) into other wood products” (DeLong et al., 2007, p. 2212); adding incremental value to wood products through additional processing steps (Kozak, 2002; Kozak and Maness, 2005); crafting a piece of wood into a useful, saleable product that has more value than the original material plus associated costs (Cousins, 2000); increasing the overall net economic value generated by forest products through incremental additions per unit of raw material used (Schultz and Gorley, 2006); an array of items that begin as “primary” wood products that are then re-processed by “secondary manufacturing” (Parfitt, 2011). Schultz and Gorley (2006) recognize that value can be added at any stage of the manufacturing process, therefore, they prefer instead to use the term secondary manufacturing. In practice, however, the terms value-added and secondary manufacturing are used interchangeably in the context of the Canadian wood industries. The products that fall under the category of ‘value-added’ are diverse, and include treated lumber, engineered wood products, finished building products, pre-fabricated houses and components, shakes and shingles, posts, poles, log framed homes, moldings, pallets, flooring, fencing, architectural millwork, furniture, cabinetry, art and semi-finished goods.

While among the commodity industries employment has long been in decline, in recent decades there has been growth in the value-added wood sector at least until 2005. Since 2005, value-added activities have declined somewhat because of very difficult market conditions. Estimates of the size of the value-added wood industries vary. However, Statistics Canada estimates that peak levels of employment in BC were reached circa 2005 with almost 7,000 employees with the number of firms around 700. Both entry and exit rates have been high among these small firms (Edenhoffer, 2012). With job totals in the 6,000-8,000 range, these value-added industries only partially compensate for the job losses in the commodity industries. In keeping with these numbers, Kozak and Mannes (2005) suggest that the value-added wood sector has

been traditionally weak and remains so in BC. They characterize the sector as transient, fledgling and lacking momentum with small shops scattered around the province accounting for approximately \$5 billion (Canadian dollars) in sales (Neilsen, 2011). The frequently cited impediments to sustained growth in this sector are: access to fibre, costs (Schultz and Gorley, 2006) and difficulty accessing new markets (Kozak et al., 2003; Kozak and Mannes, 2005). Kozak et al. (2003) point to the paradox that the sector reports an inability to procure consistent supplies of solid raw materials when the province produced 12 billion board feet of lumber in 2011 (COFI, 2012). Others argue that “BC has a significant value-added wood products industry producing high-quality products; however, the concern is that they are not adding sufficient margins to sustain industry competitiveness” (Schultz and Gorley, 2006, p. 5). The lack of sufficient long-term margins is supported by Lantz (2004) who cautions that “even if the value-added increases in the sector over time, it may be that this growth is outpaced by variable labor/and or capital cost growth...and as those variable costs increase, profits will decrease without significant industrial restructuring” (Meil, 1990; Lantz, 2004, p. 725). Lantz (2004) and Hayter (2000) also note that the increasing costs driven by stricter environmental regulations will limit supply and increase costs forcing global production elsewhere where forestry practices are less stringent.

1.1. Conceptual Perspective

Conceptually, the point of departure for this study is provided by the idea of flexible specialization as pioneered by Piore and Sabel (1984) which has become an important theme in understanding the agglomeration of economic activities as organized by small firms. Piore and Sabel’s (1984) argument is that the 1970s were a ‘*second industrial divide*’ as mass production was being challenged by more efficient forms of craft production which they label ‘flexible specialization’. While the flexible specialization literature has been mainly concerned with jobs and local development, this study also addresses environmental issues. That potential connections between flexible specialization and environmental issues have been neglected is surprising. After all, Piore and Sabel (1984) advocated flexible specialization as an economic antidote to

mass production and consumption while the emergence of the contemporary global-wide environmental movement occurred at the same time, similarly rooted in antagonism towards resource commodification (Affolderbach, 2011). Yet, assessments of the flexible specialization thesis, within economic geography at least, largely ignore the environment. Similarly, environmental proposals in favour of smaller-scale production, such as M'Gonigle and Parfitt's (1994) plea for '*Forestopia*' in BC's forests that emphasises small firm based value-added activities, typically do not reference flexible specialization. However, recent discussions of 'green entrepreneurship', especially in business and economic geography, focus on initiatives, mainly by small firms that are profitable and environmentally sustainable, but without much reference to flexible specialization (Gibbs and O'Neill, 2012). Yet flexible specialization, green entrepreneurship and '*Forestopia*' are sympathetic formulations that emphasize the role of small firms, networking and innovation. For the present study, this lack of connection is important since the extent to which the relations between flexible specialization and enhanced environmental performance are complementary or contradictory can help integrate questions of economic and environmental sustainability. Admittedly, the interdependencies between economy and environment vary considerably from place to place. Consequently, in one form or another, geographic approaches to these interdependencies are vital, and our particular approach is appropriate for forest peripheries where small scale production can be economically viable.

Over recent decades, the processes of globalization have been associated with increased flexibility in production systems. According to Piore and Sabel (1984), globalization implies a '*second industrial divide*' that involves the transformation of the prevalent so-called 'Fordist' mass production systems towards more flexibly specialized and craft-based production systems as a basis for competitive advantage. Piore and Sabel's (1984) views are as much about advocacy and potential as documenting actual change. In their view the development of flexible technologies supports small and medium-scale manufacturing able to exploit external economies of scale, especially within clusters. After their work," many concentrated mainly on the study of regional clusters and industrial districts with a tendency to see industrial districts as an emerging alternative to large companies and as a model of economic regeneration" (Marangoni

and Solari, 2006, p. 74). However, flexible specialization has also been criticized for its limited, even declining extent as an empirical trend, and for being too idealistic and extrapolating from limited case studies as a policy trend (Amin and Robins, 1992; Marangoni and Solari, 2006). This debate continues as economic geography has remained centrally concerned with understanding processes of agglomerations and clusters, including with respect to flexibly specialized industrial districts.

Forestopia, written by M'Gonigle and Parfitt (1994) as a practical guide to the new forest economy, is based on a simple premise. This premise being that the volume-based forest economy of BC driven by large corporations, in which a large number of trees are cut and sold raw at a low cost, must be replaced by a new value economy, in which a variety of small-to-medium sized value-added industries thrive, employing local labour and realizing the wood's true value. Their work was a clarion call for restructuring BC's forest industry which envisioned long-term economic and environmental benefits by producing a range of products in conjunction with "forest stewardship that lives off nature's interest not its capital." (M'Gonigle and Parfitt, 1994, p. 86). They envision company towns giving way to integrated communities where local people control their forest resources. Their criticism rests with the big corporations which control the land base in BC, the provincial governments that have permitted over-cutting, and the accepted practice of exporting large volumes of raw timber for other countries' benefit. They believe that the provincial government has an obligation to redirect those resources to small businesses and communities in need. Their mantra is healthy communities are based on stable employment which has a steady supply of resources managed by local forest stewards, not distant shareholders. This economic diversification and the flexible businesses practices of small firms could break the dependency on the cyclical commodity-driven export market BC has been addicted to for decades. However, they make many assumptions in their tome, such as: the existence of a large supply of entrepreneurs who are interested in starting these businesses, an implied commitment to sustainable business practices by these entrepreneurs and small firms, the existence of significant and stable markets for these value-added products, the capacity to innovate to reach niche markets, and local forest stewardship whose mission

is to guarantee the healthy maintenance and support of forests rich in biodiversity. These areas need to be further explored.

In recent years, the business case for sustainable development and 'greening' of industries has grown, implying a response from the business community, be it pro-active or reactive. In the field of 'green management', "there has been growing recognition of the importance of such issues as the links between sustainability and innovation, the role of small-to-medium sized enterprises, the importance of sustainability in business development, the emergent significance of consumer demands on firms, and the green practices in a certain industry"(Schaper, 2005, p. 4). These suggest that industries can create economically viable and sustainable ventures. However, this literature has paid little attention on the role of the entrepreneur in SMEs. In small businesses, including 'green' ones, the entrepreneur is ultimately the "linchpin in the creation, development and growth of an organization and ultimately serves as a role model from which new ideas are widely disseminated into the larger business community" (Schaper, 2005, p. 4) 'Ecopreneurship' or 'green entrepreneurship', a relatively new area of study, lacks a widely-accepted definition of the concept and characteristics of a 'typical' green entrepreneur(Schaper, 2005). However, the common characteristics of an 'ecopreneur" are and individual who: undertakes a business venture of some risk, whose activities have a positive impact on the natural environment moving toward a more sustainable future, is highly intentional, deliberately acts in ways to improve the natural environment (Schaper, 2005) For this thesis the question that arises is to what extent do entrepreneurial individuals and firms play in the adoption of more sustainable business practices in the value-added wood sector in the Lower Mainland? This research will provide an entrepreneurial perspective in the sustainability debate in a resource-based industry.

The provincial government has also acknowledged the need to shift toward value-added production. In particular, the New Democratic Party (NDP), elected in 1991 and in power until 2001, understood the necessity, challenges and possibilities for restructuring the British Columbian forest sector towards greater value-added activities. They established the Peel Commission (1991) to "formally recommend a new policy of

enhanced stewardship designed to secure environmental as well as economic values from provincial forests (Hayter, 2000, p. 90). The policy initiatives that were an outgrowth of this Peel Commission were centred around increasing stumpage levels to more properly reflect forest values that in turn, it was hoped, would stimulate firms to add value. In addition, policy measures were undertaken to reduce fibre supplies in guaranteed tenures to large corporations provide more wood to non-tenure holders and especially to small firms. The NDP's so-called "high stumpage regime" (Hayter, 2000) has since been modified although the subsequent Liberal government, elected in 2001 also sought to provide fibre to small, non-tenure holders, for example, by increasing community forests and market arrangements. Even so widespread complaints about fibre supply continue to be heard, although it is not often clear whether it is price or availability that is the problem.

This research addresses the relationships between flexible specialization, location dynamics, urban agglomeration and green entrepreneurship with particular reference to the value-added wood manufacturers in the Lower Mainland. This research builds upon previous case studies of flexible specialization that have focused on relatively few case studies in particular segments of wood processing activities in different parts of BC, such as Rees and Hayter (1996), Hanna (2005) and Reiffenstein et al. (2006). In addition this research builds upon extensive surveys of wood processing activities across Canada that have focused on firm profitability. Delong et al. (2004) demonstrates that in the value-added wood sector managerial capability, entrepreneurial orientation, market knowledge, work force skills, innovation and adoption of new technologies influence successful performance at the level of the firm. This study also provided a list of ten factors crucial for success: cost, product innovation, process innovation, technology innovation, managing the value chain, clustering, managerial expertise, education and training, market orientation and firm specialization. Delong et al.'s (2004) study also acknowledged that labour costs, interest rates, exchange rates, security of raw material supply, physical infrastructure, distance to market and economies of scale are very important. However, these studies did not address the role of location factors, networking within clusters or environmental performance. Conceptually, the thesis explores the characteristics of value-added activities in the

Lower Mainland in terms of key dimensions of the flexible specialization model, especially with respect to location dynamics, labour, the supply of entrepreneurship, networking among firms via associations, and innovation efforts. In addition, it further connects flexible specialization to the emerging theme of green entrepreneurship that has been mainly developed in the business literature to assess and promote environmentally friendly initiatives by small firms. Indeed, the ideas of flexible specialization and green entrepreneurship would seem to be compatible, and that the latter might be facilitated by clustering and networking among small firms. Indeed, such connections are consistent with '*Forestopia*' (M'Gonigle and Parfitt, 1994).

In general, this study elaborates the idea of flexible specialization in the context of resource-based activities, and with respect to environmental issues. It hopes to make a contribution to the literature in several ways. Thus, with exceptions (Rees and Hayter, 1996), studies of flexible specialization have strongly emphasized secondary manufacturing while recent studies of clustering among SMEs (Small-to-Medium-sized Enterprises), whether explicitly connected to the flexibly specialized theme or not, have incorporated a wide range of service activities as well as manufacturing (e.g. textiles, shoes, cutlery, software, film, designers). This study's focus on a resource-based sector introduces important considerations of raw material driven supply networks that are not part of the conventional literature. Further it is unusual for resource-based activities to be associated with dynamic agglomerations, although examples exist. Indeed, the growth of the value-added wood industry has emerged at a time when the main forest-based commodity industries are consolidating and in decline. The proliferation of entrepreneurial firms is unusual for the late stages of industry life cycles, and studies of flexible specialization have not generally inquired into the origins of entrepreneurs. In addition, as noted, discussions of flexible specialization and green entrepreneurship have rarely been connected. Finally, it might also be noted that this study recognizes the possibilities that location factors, and that the associated advantages (and disadvantages) of agglomeration and clustering can similarly vary.

1.1.1. Research Objectives

In general, this research addresses the claims that value-added wood industries contribute towards an economically and environmentally sustainable forest economy in BC. Alternatively put, the work provides a pragmatic assessment of the polemics of *Forestopia*. Clearly, in contrast to the once dominant commodity industries, value-adding wood industries have added jobs and are less destructive of forests. Yet, value-added activities are overwhelmingly concentrated in the Lower Mainland and the rapidly urbanizing Okanagan region of BC's southern interior, not in more remote forest-commodity based communities. Moreover, even given this geographic mismatch the market potentials and environmental credentials of value-adding wood industries cannot be assumed but need to be assessed. The central research questions are: to what extent does the location behavior of value-added wood processing activities in the Lower Mainland conform to the idea of flexible specialization? To what extent is value-added wood processing economically and environmentally sustainable?

To answer these and related questions an interview-based survey of wood processing manufacturers was conducted across the Lower Mainland from May 2011 to July 2011.

1.2. Research design

This thesis employs an extended case study research design which combines features of 'intensive' and 'extensive' approaches. Thus, reflecting an intensive approach, detailed semi-structured interviews were conducted with the owners of small manufacturers of value-added wood in the Lower Mainland. The questions used were taken from the Canadian Forest Service survey of secondary manufacturing which has been ongoing since 1990, as well as from previous related surveys (e.g. Rees and Hayter, 1996). Using these surveys allowed for a comparison to the aggregate data as well as the ability to analyze the changes over two decades. These interviews allowed for a more in-depth examination of the qualitative contextualized and nuanced aspects of decision making that are vital to understanding the multiple dimensions of location

behavior in the various segments of value-added activities. The research design is also extensive in that it seeks to provide a 'representative' dimension to the selection of interviews. An inventory of BC companies active in value-added wood manufacturing was undertaken using information obtained in industry directories 2008/09 (Scott's Directories of Western Manufacturers, BC Manufacturers Directory, and Madison's Directory). From these sources, 477 value-added wood firms in British Columbia were identified, about 60% in the Lower Mainland, from these sources. The interviewed firms were then chosen by stratified sampling for three zones across the Lower Mainland (inner city and suburbs; outer suburbs; and the Fraser Valley). Each firm, which had an email address, located within the Lower Mainland was sent an email asking for participation in the research and all of the firms which responded positively were interviewed. In particular, approximately 20% of firms located in three regions were interviewed; these regions were Vancouver which consisted of North Vancouver, Vancouver and Burnaby, the outer suburbs consisted of Coquitlam, Port Coquitlam, Surrey, Richmond, Delta, and the Fraser Valley which consisted of Maple Ridge, Langley, Abbotsford, Mission, and Chilliwack. This stratification is based on the premise that location conditions, such as rents, wages, space, varies throughout the Lower Mainland. This sampling design, and the wide range of activities that are classified as value-added, led to the choice of a relatively large number of case studies to be interviewed.

Empirically, this study is based on personal interviews which were conducted between May and July of 2001 with 41 owners of firms operating across the value-added wood industries in the Lower Mainland area, supplemented by interviews with supporting research, marketing and lobbying associations in the Lower Mainland. A semi-structured interviewing technique was employed in which a template set of questions invited respondents to elaborate, even digress. In general the 'economic' questions explored the origins, structure and size of firms, location rationales, resource supplies and market dynamics, nature of innovation, contacts with associations, and hopes for the future. Specific environmental questions focused on certification issues and levels of environmental awareness and interest. Statistical data on general trends and distributions is also provided. The participants were largely open and gave thoughtful

and detailed answers. These owners were reflective and often spent more than thirty minutes scheduled because they were very engaged and often passionate. Those that were interviewed have been in the wood business most of their adult lives and appeared to be more likely to be senior members of associations. Newer firms which are not listed in the industrial directories, or firms without an email addresss, as well as and those which are not active in associations may be underrepresented. The interviews with the associations as well as research facilities were open and typically took 2 hours to complete. To provide broader context for these interviews employment trends by sub-industry between 1970-2009, and the distribution of value-added activities between 1980-2008 were derived from a data base constructed from directories and related sources (Edenhoffer, 2012).

1.3. Thesis Format

The remainder of the thesis is organized as follows. Chapter two explores the conventional thrust of flexible specialization on local development with respect to wood processing and gives an overview of the existing literature on the subject as well as outlines the general parameters of the study. The primary objectives of the chapter are to understand the spatial concentration of the value-added wood manufacturing sector in the Lower Mainland and assess the role of various location factors and the extent to which this agglomeration accords with the tenents of flexible specialization. In general chapter two addresses the relationships between flexible specialization, location dynamics and urban agglomeration with particular reference to the value-added wood manufacturers in the Lower Mainland. Chapter three integrates the themes of flexible specialization and green entrepreneurship and discusses the claim that value-added wood industries contribute towards an economically and environmentally sustainable forest economy in British Columbia while providing a pragmatic assessment of the polemics of *Forestopia*. Chapter four contains conclusions about the significance of the findings, their implications for the future of the value-added wood sector in British Columbia and its ability to remain viable while creating jobs and sustaining the environment.

2. Location Factors and Urban Agglomeration: the Value-Added Wood Manufacturing Sector in The Lower Mainland

2.1. Introduction

Piore and Sabel's (1984) *The Second Industrial Divide* used the concept of the "production model" to identify the crisis in mass production and promote the emergence of flexible specialization (Marangoni and Solari, 2006, p. 73). Reference to the '*second industrial divide*' is a call for economic restructuring from mass production to craft-based production, and in particular a return to flexible technologies which support small and medium-scale manufacturing able to exploit economies of scale due to clustering. The flexible specialization model, promoting industrial districts and regional clusters, was seen by Piore and Sabel (1984) as an avenue for economic regeneration. However, it was also criticized for its limited, even declining extent, being too idealistic and extrapolating from limited case studies (Amin and Robins, 1992; Marangoni and Solari, 2006). Nevertheless, economic geography has remained centrally concerned with understanding processes of agglomerations and clusters, including with respect to flexibly specialized industrial districts. This chapter addresses the relationships between flexible specialization, location dynamics and urban agglomeration with particular reference to the value-added wood manufacturers in the Lower Mainland.

In British Columbia since the 1980s, there has been a growing, geographically concentrated population of SMEs in the Lower Mainland and the rapidly expanding Okanagan region. The primary objectives of this chapter are to understand the rationale for this spatial concentration and assess the role of various location factors and the extent to which this agglomeration accords with the tenets of flexible specialization. The study complements previous assessments of flexible specialized clusters within British

Columbia, notably by Hayter and Rees (1996) and Reiffenstein et al. (2006) that examined specific segments of value-added wood manufacturing (respectively log, prefabricated homes and remanufacturing), and more aggregate analyses of trends of value-added activity at national and provincial scales (Kozak et al., 2004; Delong et al., 2007).

The chapter organization begins with economic geography's long standing interest in the agglomeration of economic activities especially in relation to flexible specialization, and the key location advantages associated with agglomeration are identified. Industrial agglomerations, clusters and industrial districts are closely related terms, and the significance of agglomeration in processes of economic development is usually traced to Alfred Marshall (1890) and the idea of a 'Marshallian Industrial District'. Piore and Sabel's (1984) concept of flexible specialization may be seen as a revival and modification of this concept contingent on developments in the 1970s. Next the chapter introduces the value-added wood sector of British Columbia, its recent growth is outlined and selected background characteristics of the surveyed firms are identified. The last, long part of the chapter explores the location dynamics of value-added wood activities in the Lower Mainland with respect to labour, the supply of entrepreneurship, networking among firms via associations, and innovation efforts. In conclusion, the extent to which these location dynamics reflect the model of flexible specialization is discussed.

2.2. Industrial Agglomeration and Location Dynamics

Firms that are the same or related may co-locate in space forming specialized districts or clusters to realize increasing returns in the form of external economies of scale. Agglomeration economies are generally classified as localization economies of scale or urbanization economies whose benefits or efficiencies are gained when several firms in the same industry locate in the same region. However, agglomeration is difficult to measure because it incorporates several distinct location factors whose advantages require development over time and need to be looked at both quantitatively as well as qualitatively. Marshall's (1890) classical work characterizes industrial districts as "the agglomeration of firms engaged in similar or related activities generating a range of

localized external economies that lower costs of clustered producers enabling small firms to be more competitive” (Lorenzen, 2005, p. 205). Markusen and Park (1994, p. 296) expand the definition to “a sizeable and spatially delimited area of trade-oriented economic activity which has distinctive economic specialization be it resource-related, manufacturing or services.” For Marshall (1890), the benefits accrued by geographical concentration were: “access to a common labor pool with little out-migration, the possibility of exchanging information and expertise through frequent personal contact; and the development of local supplier networks” (Hayter and Patchell, 2011, p. 36). Marshall believed what made the geographical clustering of small, locally-owned networked firms so vibrant was the local labour market which was internal to the district and highly flexible (Schmitz and Nadvi, 1999) as well as the frequent opportunity for knowledge spill-over on both a formal (through trade associations) and informal basis. Information is shared on “matters such as market development, technological change, government policy and labour issues” (Hayter and Patchell, 2011, p. 36). Localized clusters of related activities facilitate many kinds of untraded interdependencies such as “cooperative behavior, information sharing, and the positive externalities generated by competition, including innovation” (Hayter and Patchell, 2001, p. 259) that combine to enrich the production of ‘related variety’.

These industrial districts take on a variety of configurations. Markusen (1996) notes that in many if not most cases actual districts or localized agglomerations are a mix of the various types. Further broadly similar types can exhibit important, if nuanced differences in organization. In varying ways, for example, industrial districts exhibit both trust and cooperation and individualism and competition. Even though the geography of manufacturing is anchored in agglomerations, not all clusters are equally successful and because clusters compete with one another, these various agglomeration economies are always in a state of flux, be it growth, decline or adaptation (Hayter and Patchell, 2011).

Piore and Sabel’s (1984) seminal contribution to the agglomeration debate was to reinvigorate the discussion of the role of small firm dominated industrial districts, and to place this role in broad historical perspective. Thus Piore and Sabel (1984) connect alternative possibilities of technological advance and forms of industrial organization with

the economic development of advanced countries since the Industrial Revolution of the late 18th century. They especially emphasized two rival organization and technology forms: craft productions and mass production. In the case of craft production they argue that “machines and processes could augment the craftsman’s skill, allowing the worker to embody his or her knowledge in ever more varied products: the more flexible the machine, the more widely applicable the process, the more it expanded the craftsman’s capacity for productive expression” (Piore and Sabel, 1984, p. 19). Craft production, they claim, dominated the early stages of industrialization. In their view, however, craft production was undermined by the foundation of mass production which dramatically reduced the cost of goods by substituting machinery for human skill. For Piore and Sabel (1984, p. 20) “The visionaries of craft production foresaw a world of small producers, each specialized in one line of work and dependent on the other while the visionaries of mass production foresaw a world of ever more automated factories, run by fewer and ever less skilled workers.” By the late 1960s, the mass production system, supported through various governmental institutional structures, had saturated markets and was lumbering along unable to adjust to the changing global landscape which was impacted by a growing scarcity of resources. In related literatures, during the 20th century, this model has been labelled as ‘Fordist’. By the 1970s the ‘Fordist’ production system was running out of steam, becoming less productive (and environmentally damaging).

In illustrating the advantages of flexible specialization, and indeed craft production in general, Piore and Sabel (1984) focused on small firms in various countries during the 19th and 20th centuries such as silks in Lyon; cutlery in Solingen and Sheffield, and cotton goods in Philadelphia and Pawtucket. The firms in these clusters were independent crafts people linked by dependence on one another’s skills where competition and productive association were complementary and machinery was used to extend human skill, not replace it (Piore and Sabel, 1984). From this perspective, it was the flexibility of small specialized firms that provided key competitive advantages. Thus small, flexibly specialized firms produced a wide range of products for highly differentiated regional markets at home and abroad while constantly altering goods in order to open new markets. In more recent studies, this search has been interpreted in terms of ‘related variety’ when existing competences can be elaborated and used to

differentiate products (Patchell, 2008). This search for new markets, 'related variety' and the need to alter goods quickly required the use of flexible machinery, capable of rapid adjustment to alternative specifications. According to Piore and Sabel (1984, p.29), the creation of regional institutions that balanced cooperation and competition among firms were important to realize "productivity potentials and to encourage permanent innovation." These regional institutions define external economies, for example, as industrial associations that provide marketing, lobbying and/or research and development (R&D) services, government sponsored training institutions, and educational systems that provide a wide variety of supportive programs.

In general, theories of contemporary industrialization emphasize the importance of flexibility imperatives of one kind or another, in terms of industrial organization, technological choice and labour markets (Christopherson and Storper, 1989; Harvey 1987; Hirst and Zeitlin, 1991; Scott and Storper, 1986; Gall, 2009). Flexibility is generally defined as 'the ability to quickly respond to changed external circumstances' framing the actions of individuals as reactions or responses to, generally, the unique and changing nature of 'late capitalism' (Gall, 2009, p. 525). In Marxist-inspired models of flexible accumulation such flexibilities are indicators of exploitation (Harvey, 1987). For Piore and Sabel (1984), however, flexible specialization is an appropriate form of local development that contrasts with Fordism's rigid forms of mass production organized by horizontally and vertically integrated corporations. Within flexibly specialized systems, production is vertically disintegrated and dominated by a social division of labour. Collectively, SMEs form a "social division of labour which comprise interacting populations of small specialized firms that compete and cooperate by flexibly deploying workers and equipment in response to highly differentiated markets and complemented by the ability of entrepreneurially run firms to anticipate and respond quickly to changes in market conditions"(Hayter, 1997, p.40). In addition, collectively these firms manufacture a "wide array of products made by skilled labour and emphasize external economies of scale and scope" compared to Fordism's emphasis on internal economies of scale and manufacturing high volumes of standardized products by unskilled labour (Hayter, 1997, p. 37). It can be further argued that uncertainties over markets and the supply of inputs is an encouragement for flexible specialization by emphasizing the

importance of adaptability to changing, unforeseen circumstances (Rees and Hayter, 1996).

The flexible specialization literature gives explicit emphasis to the role of entrepreneurship in industrial districts. Some research shows that clustering draws out entrepreneurs because it makes it possible to advance by taking small and “calculable risks which are ultimately beneficial because small amounts of capital, skills and entrepreneurial talent can be optimized” (Schmitz and Navdi, 1999, p. 1507). In addition, “the seed-bed hypothesis provides a strong geographic rationale for the strong tendency of new firm owners to locate in their home region” (Hill, 1954; Hayter, 1997, p. 224). Geographically, new owners are most comfortable and have the most knowledge about their home environment which lowers the costs and uncertainties of starting a new business relative to an unknown area. What Hill (1954, p.185) so aptly noted decades ago, still holds true today, “if it [a new business] is not established where the originator wants it, it will not be established anywhere.” In terms of type of new activities created, both localization and urbanization economies are thought to be important stimuli to new businesses. Thus the Marshallian hypothesis is that new firms are likely to be spin-offs of established, related clusters of industry while Jane Jacobs argues that large cities can stimulate a diverse range of activities not simply connected to past specialisms (van der Panne, 2004). More generally (Hill, 1954, p.185) “[n]ew firms, considered as a supply of entrepreneurship, are an index of the health of regional economies” and are seen to contribute to local development through job creation, increased capital, incremental innovations and strong local linkages (Hayter, 1997, p. 239).

Typically SMEs are locally embedded by norms of competition and cooperation (Storper 1997; Patchell, 2008). In this regard, the idea of ‘collective action’ as an amalgam of competition and cooperation evolving from geographical, historic, and institutional conditions has received much attention (Boschma and Lambooy, 1999; Braczyk and Heidenreich, 1998; Cook, 1998; Crevoisier, 2004; Lawson, 1999; Maskell and Malmberg, 1999; Scott and Storper, 2003; Patchell, 2008). Collective action essentially refers to localization economies that involve the sharing of information on matters such as market development, technological change, government policy and

labour issues. Information exchange is facilitated by the chamber of commerce, industry associations, conventions and seminars. Industry associations provide collective inputs that individual members cannot or will not supply themselves: marketing services, labour training, research and development and political lobbying. However, Kingsbury and Hayter (2005, p. 607) caution that “the value of business associations are difficult if not impossible to measure in any precise way, even for individual members; by implication of their contributions as external economies are difficult to assess and not without ambiguity.” Urbanization economies provide services and institutional support which firms are able to draw upon which would not be as readily available in a remote location, such as universities as well as government funded research agencies which provide long-term research and problem solving expertise as well as highly trained labour for local industries (Hayter and Patchell, 2011).

With respect to ‘flexibly specialized’ industrial districts as an ideal type for achieving economic regional development, Markusen (1996) rightly warns that their success is not based on one or two characteristics. Rather the idea of flexible specialization and of agglomeration economies in general, invokes a complex range of different location factors that are largely qualitative in nature. For example, benefits include access to skilled labour, flexible marketing, labour policies and technological choices, information sharing, access to external economies and the ability to achieve collective action. Consequently, she suggests the need for detailed research into “more sophisticated and pluralistic profiles of industrial districts and how they operate both internally and externally” (Markusen, 1996, p. 310). It is a challenge to attribute location advantages to just agglomeration economies from other factors and to distinguish localization or urbanization economies. Some have criticized the industrial district model as being too optimistic regarding the advantages of agglomeration of clusters (Amin, 1993; Harrison, 1994; Staber and Morrison, 1999). The remainder of this chapter turns to one particular industrial agglomeration, value-added wood processing in the Lower Mainland, to better appreciate its location complexity based on in-depth interviews with constituent firms.

2.2.1. Value-Added Wood Industries in The Lower Mainland: Growth of Value-Added Sector

The forest sector has been the “cornerstone of the province’s economy and the foundation of its manufacturing sector for more than a century” (Government of British Columbia, 2009, p.3). However, over the past 30 years the main forest commodities sector has experienced significant job loss and considerable volatility (Table 2.1). Indeed, as Craig Campbell, a forest industry advisor at Price Waterhouse Coopers, predicted in 2008 “[t]here’s going to be more closures, more cash burn and more blood on the floor” as a result of the continued weak US housing market, the high valuation of the Canadian dollar and decrease in high quality fibre (Tulloch, 2008, para. 5). Among the commodity industries, however, job loss has long been in permanent decline. Thus as Table 2.1 shows since 1980 employment in logging, lumber, plywood and pulp and paper had dropped 40-60% by 2008. Generally speaking, among commodity industries production levels have remained much the same as factories have become larger and more capital intensive. In contrast, there has been noteworthy growth in the value-added wood sector, according to these figures especially between 1990 and 2005. Jobs in “other paper industries”, i.e. secondary converting operations, have declined. These activities, for example, fine paper, paper bags, tissue paper, were large-scale compared to wood value-added industries, have supplied local markets, and have largely been replaced by imports from even larger plants in the US. That is “value-added” potentials in BC’s forest economy have been realized with respect to solid wood processing (but not paper converting).

Estimates of the size of the value-added wood industries vary and, according to Statistics Canada estimates for BC, peak levels have reached almost 7,000 employees with the number of firms around 700 in 2005 which is probably conservative, bearing in mind the number of small firms, high levels of entry and exit exist (Edenhoffer, 2012) and there are some difficulties in identifying secondary from primary wood processing (the former can be a unit within the latter for example). The level of employment among a large number of firms, the fact that high death rates are matched by even higher birth rates among these firms (Edenhoffer, 2012), and strong clustering tendencies indicate that wood processing activities have collectively reached a critical, self-sustaining mass

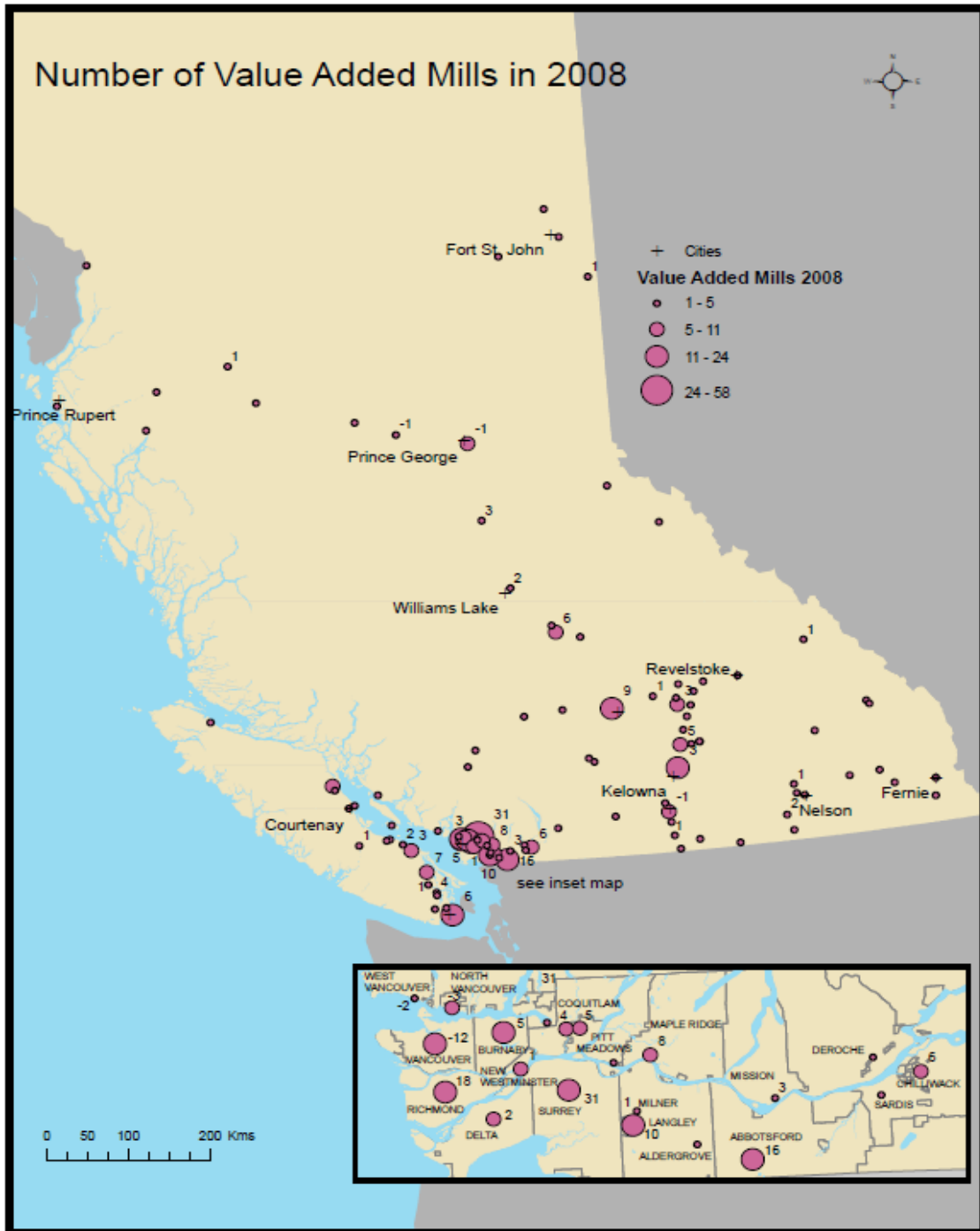
in the Lower Mainland. Since 2005, value-added activities have lost jobs (and sales) because of a severe recession beginning in 2008 induced by the global financial crisis, but they should bounce back to at least 2005 levels. Still with job totals in the 6,000-8,000 range these industries only partially compensate for the job losses in the commodity industries. More problematically, the wood value-added activities have not located in more remote, specialized forest communities, such as Prince George, Quesnel and Williams Lake, where closures of large mills have been especially devastating (Figure 2.1). Indeed, these communities have actually lost value-added jobs after 1980. The reasons for clustering of value-added wood activities in the Lower Mainland relate to the supply of entrepreneurship, skilled labour, accessibility to fibre supplies especially to desired coastal species, and access to local and US markets. Whether or not value-added activities can be promoted in BC's interior (beyond the Okanagan region) is an interesting question.

Table 2.1. BC forest industries, employment by sub-industry 1970-2009 (number of employees)

Year	Forestry and logging	Wood product manufacturing			Paper and allied industries		Forest industries in total
		Sawmills, planing and shingle mills	Veneer and plywood mills	Other wood industries	Pulp and paper mills	Other paper industries	
1970	18,581	28,212	6,986	3,131	14,831	2,258	73,999
1980	24,270	37,564	6,928	5,216	19,066	2,474	95,518
1990	18,143	28,743	5,413	4,534	16,541	1,661	75,035
2000	16,654	27,796	6,011	5,934	13,020	1,727	71,142
2005	19,390	21,924	6,298	6,896	10,406	1,717	66,631
2009	11,545	12,043	4,534	6,052	7,126	1,331	42,631

Data: Statistics Canada, Principal Statistics (CANSIM tables 3010001, 3010002, 3010003, 3010004, 3010006, 3010007)

Figure 2.1. Number of value-added mills in British Columbia in 2008



Source: Edenhoffer, K. (2012)

2.2.2. Background Characteristics of Surveyed Firms

The highly diverse, small-scale nature of value-added wood activities is confirmed by our survey. Thus the surveyed firms are in ten different categories and the two largest of these categories, remanufacturing and millwork, each account for 22% of the firms (Figure 2.2). Cabinets were the third largest category at 15% and furniture fourth at 10%. The majority of Vancouver firms are producing custom furniture and kitchen cabinets; the suburbs are producing millwork and cabinets; while the bulk of the remanufacturers are located within the Fraser Valley. The firms were owner-managed and all have remained SMEs. According to revenue figures (in Canadian dollars) for 2010 (Figure 2.3), 24% of the respondents reported earning less than a million dollars; 39% reported earnings in the range of \$1-5 million, with just over a third earning more than \$5 million. As expected, the larger firms are in the Fraser Valley (Figure 2.4). Thus the median firm in Vancouver, the suburbs and beyond progressively increased in size from \$1-5 million, \$4-5 million and \$9-10 million gross revenue. With respect to employment (2010) the largest firm interviewed had 55 full-time employees, and the average number of production workers per firm in Vancouver was 8, 16 in the suburbs and 25 in Fraser Valley, with an overall average of 16 full-time employees (Figure 2.5).

Figure 2.2. Firm types interviewed; all regions (n=41)

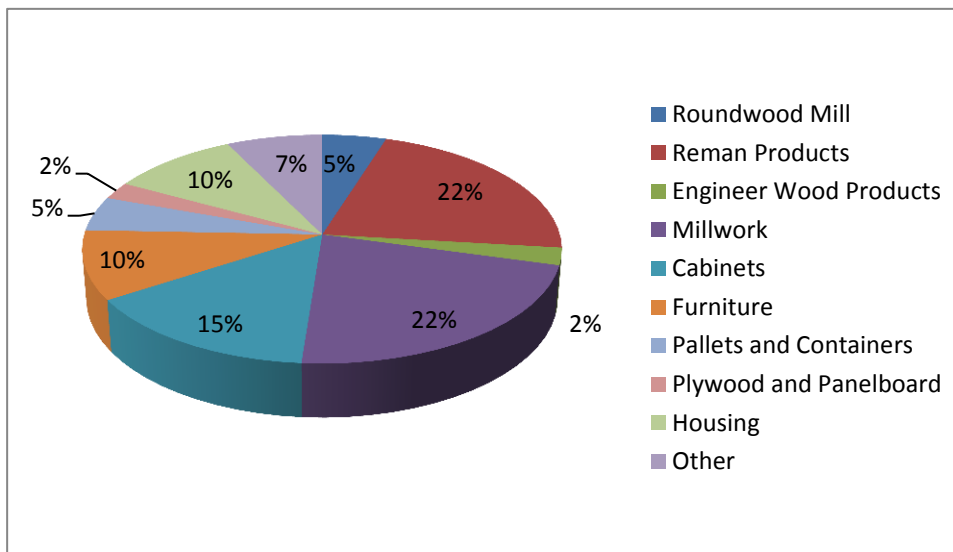


Figure 2.3. Firm size by 2010 gross revenue (Canadian dollars) (n=40)

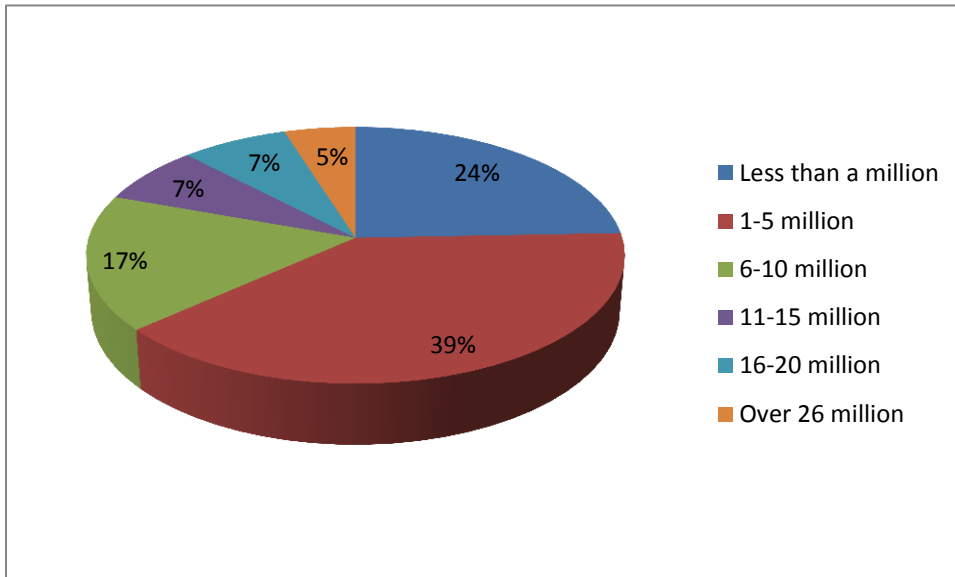


Figure 2.4. Firm size by 2010 gross revenue (Canadian dollars); by region (n=40)

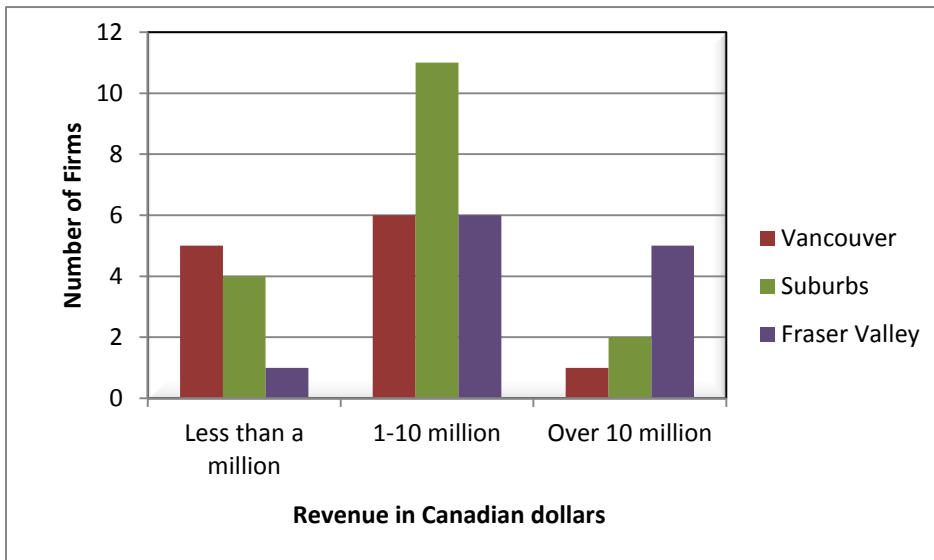
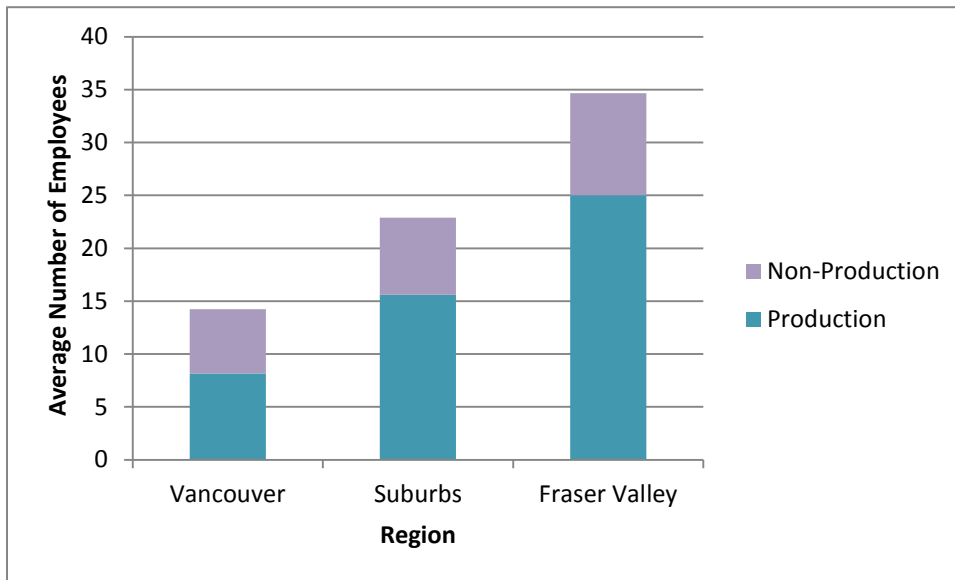


Figure 2.5. Average number of full-time employees per firm in non-production and production capacity; by region



In terms of origins, half of the surveyed firms began operations since 1990 which is consistent with the relatively recent growth of the industry and high entry rates (Figure 2.6). Most founders were from the forest industry—many reported having worked previously as employees of sawmills, other related corporations, or in a family lumber business. Many of these firms started as a result of the downsizing of the commodity industry which has morphed into a network of small shops in the Lower Mainland whose owners possess an intimate knowledge of materials and machines and strong relationships within the industry. Compared to the size and scope of commodity lumber producers, the Lower Mainland’s value-added wood industry is small; however, it has grown in terms of size as well as importance in the forestry sector over the last three decades. This clustering of small and medium-sized firms in the Lower Mainland can be characterized as flexibly specialized, locally owned SMEs, manufacturing a wide variety of products (Rees and Hayter, 1996). From a flexible specialization perspective, community development and resilience is inspired by locally-based ownership and control, the creation of a skilled social division of labour, strong diverse local supply networks, access to external economies and at least domestic market access. These competitive advantages can be potentially extended by market diversification and

exports, adaptability to change and innovation. In these respects, how do these firms perform? We turn to this question next.

Figure 2.6. Firm start year; by region (n=41)



2.3. Location Dynamics of Value-added Manufacturers

2.3.1. *Origins of Entrepreneurs*

In terms of origins, all the surveyed firms were started and controlled by entrepreneurs who had lived in the Lower Mainland and were mostly born there. The characteristics of the Lower Mainland's value-added wood manufacturers are that they tend to be small in size (employees and market share), owner-managed and able to take risks and adapt to a degree to market uncertainty. These overwhelmingly domestically owned, single-plant firms were located close to the founder's home. All but one owner had intimate knowledge and years of experience in the industry prior to starting their firm and a considerable number spoke about the impact their fathers had on their career choice. One man said, "[m]y father was a cabinet maker in Holland, so when he moved to Canada he bought a farm in the Fraser Valley and made cabinets in the barn. That is where I learned how to be a cabinet maker." Another responded, "[l]umber is in my

blood, there are six boys in my family and we all followed in my father's footsteps and became lumber men. My father worked at the largest sawmill in the Commonwealth." And finally, "[m]y family has been in the wood business in BC since 1943." The wood industry is culturally embedded in British Columbia and the majority of these owners are intimately connected to the forestry sector in one way or another.

Close to 90% of the owners interviewed would be retiring in the next ten years. This prompted questions regarding longevity of their firm and how they viewed the future of the industry. They were asked if they will encourage their children to take over the business on their retirement. The responses were split, 49% said yes and 51% said no. Those that have encouraged or would encourage their children to run the family business said, "[b]oth my sons work here and I want my grandson to work here, the world needs our wood." Three owners reported that their sons were taking over their businesses because as one commented, "[m]y son is currently buying into the business. I told him if he figures it out, he will be king because not lots of young people are getting into the wood business" and another father noted, "[b]usiness is cyclical, it will go up again. There are a lot of good people in this business; it's about the people I told my son." Those who responded in the affirmative all qualified their statement saying that the child had to be the right person for this type of business as well as have a passion for wood.

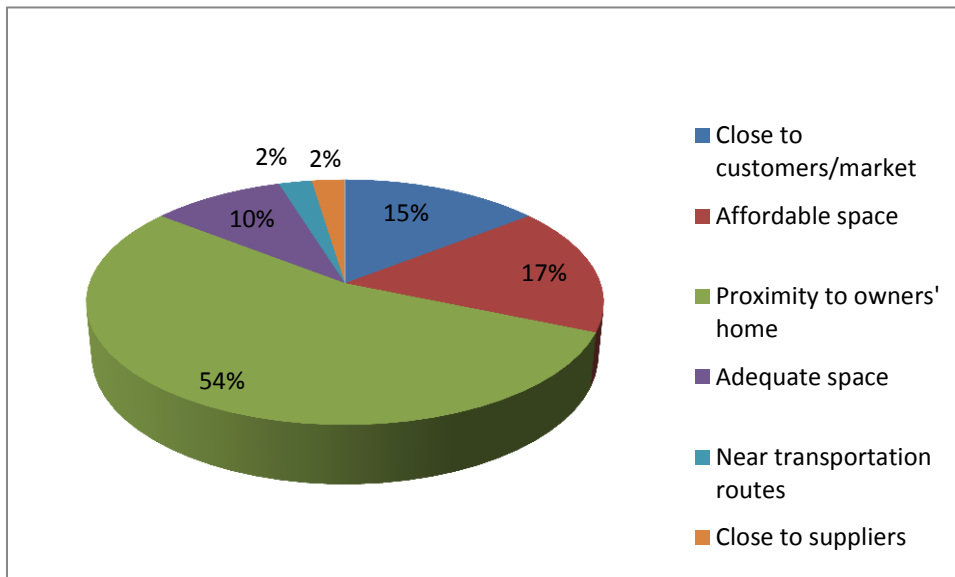
Having passion and a strong work ethic was consistently repeated as an imperative for success in this industry. Those that have discouraged or would discourage their children to take over the family business spoke about the instability and volatility in the industry as a result of increasing global competition from places like China and smaller profit margins. Three owners specifically reported that they encouraged their children to attend university and pursue more lucrative careers. One respondent said, "I would have encouraged my son 20 years ago, but the direction business is going now, I would tell him to find another area of work. The cost of doing business in Vancouver is becoming prohibitive." Based on the high prices of real estate in the Lower Mainland, the capital needed to purchase these firms would be considerable. Many firms reported the value of their land in the millions of dollars

coupled with the fact that the cash flow created from these companies is not sufficient for such an investment (50% of respondents are making less than a million dollars a year gross revenue) might lead to a disappearance of many of these firms in the future.

2.3.2. *Location rationale*

With the exception of one, all owners were involved in the wood business in some respect before starting their own company and in virtually all cases were 'local' residents. Many of these firms began as one person operations in basements or garages and were moved to larger locations, relatively still close to their home. When asked for the overarching factor for their location choice, 51% claimed that proximity to home was the most important consideration for firm location (Figure 2.7). Few were willing to commute more than 30 minutes even if land prices were cheaper further out in the Fraser Valley. One owner said, "[m]y time is money and if I am sitting in traffic for a total of two hours a day, that is a lot of money that is being wasted." Affordable space and proximity to customers/ market received equal consideration for the sector as a whole. Regionally, for those firms located in Vancouver, affordable space was reported by 40% as the overarching reason for location choice; however, this is misleading because all of those 40%, which are one person firms, are subletting space in the same building. 70% of those in the suburbs and 60% in the Fraser Valley said that being close to their home was important. In both Vancouver and the suburbs, being close to customers/markets was second in terms of importance but for the Fraser Valley was affordable space that could meet their business needs.

Figure 2.7. Location rationale of firms; all firms



The follow-up questions inquired about the location advantages and disadvantages of operating a small manufacturing firm in the Lower Mainland and the respondents were free to give multiple answers. As a sector (Figure 2.8), there was no clear winner in terms of location advantages and the responses demonstrate that the Lower Mainland offers a wide range of benefits: location close to the US border, good infrastructure, near markets and suppliers, access to raw materials as well as a large labour pool. Being close to the US border is crucial to many of these firms, both in terms of supplies as well as markets. One respondent said, “[a] lot of materials we use come from the US so we need to be close to the border” and another one noted, “[w]e need to be close to the highway because we get a lot of freight coming from the US.” In terms of infrastructure, “Vancouver is a marvelous transportation hub for the forest industry. The wood can stop here, be remanufactured, and then sent off to foreign markets easily.” The exponential growth in the Lower Mainland area over the past two decades was reported as a deciding factor: “[t]here is a lot of millwork opportunities in Vancouver, there is a lot of business here, this area is growing” and another commented, “Vancouver is a great place to live and invest your money, I think this local market will continue to grow.” Being close to suppliers as well as clientele was also important to many owners, “[w]e only use coastal Fir and coastal Cedar, and we need to be located

near the coast where those trees grow. It would not make sense for our business to be located further inland” and “Richmond is the perfect location, we are near markets and suppliers here.” Those companies producing high-end furniture or artwork said it was essential to be near clients and the design community. One respondent said, “[t]he design community can be high maintenance, they don’t want to travel too far to meet with us to follow-up on work.” Regionally, Vancouver and the suburban firms mentioned proximity to clients as well as raw materials, while, the most cited answer for the Fraser Valley was good transportation routes (Figure 2.9). The Lower Mainland’s location offers a wide variety of benefits to value-added wood manufacturers.

Figure 2.8. Location advantages in the Lower Mainland; all firms

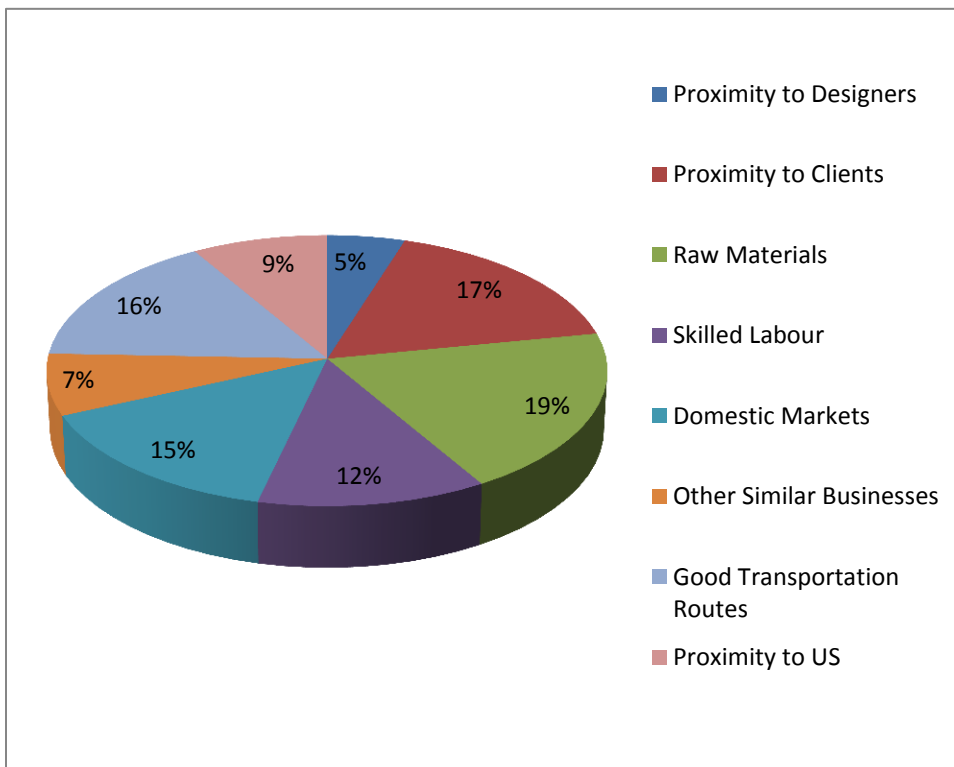


Figure 2.9. Location advantages in the Lower Mainland; by region



Location disadvantages were: cost of real estate, taxes, high wages, and traffic (Figure 2.10). Regionally, 60% of Vancouver firms reported real estate costs, 50% of suburban firms reported real estate costs and taxes, and the Fraser Valley firms' responses were equal (20%) for each category (Figure 2.11). Overall from a sector perspective, real estate costs are the overarching disadvantage because property rates in the Lower Mainland are some of the highest in Canada. One owner shared, "10 years ago we rented this space for \$4.50 sq. ft. and today it's \$7.00 sq. ft. Costs have gone up substantially. When a company goes through an economic downturn, there is very little availability to downsize rent in this area." Another noted, "[w]hen I bought this property twenty years ago, it was \$100,000 an acre, today I could sell it for \$700,000 an acre which is too valuable to process wood on" and finally, "It is getting harder to manufacture in the Lower Mainland, the cost of land is difficult to overcome, taxes and road infrastructure are quite problematic as well." Not only property costs, but taxes were also

cited as a major challenge, “[t]he taxes on my property are almost \$100,000, you have to cut a lot of lumber just to pay the taxes.”

Figure 2.10. Location disadvantages in the Lower Mainland; all firms

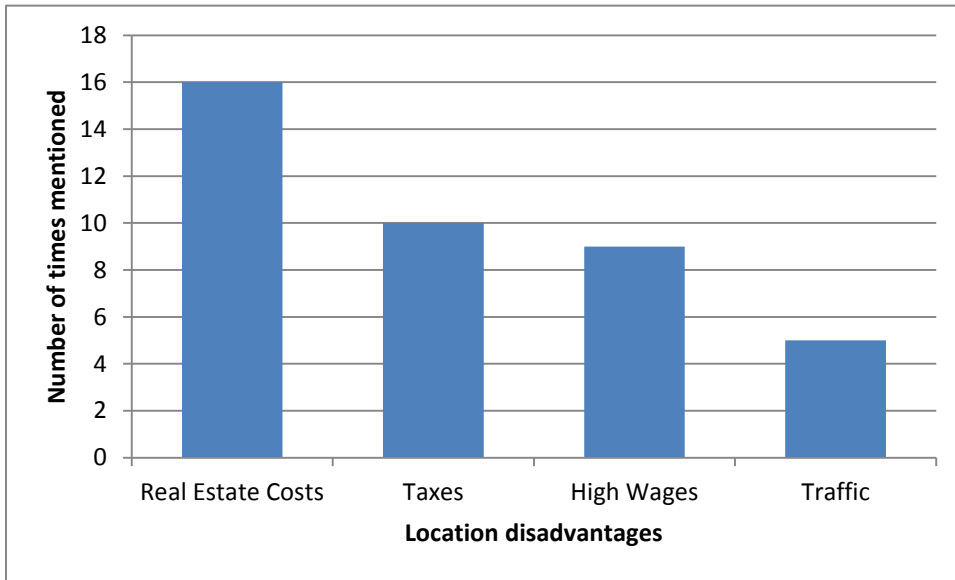
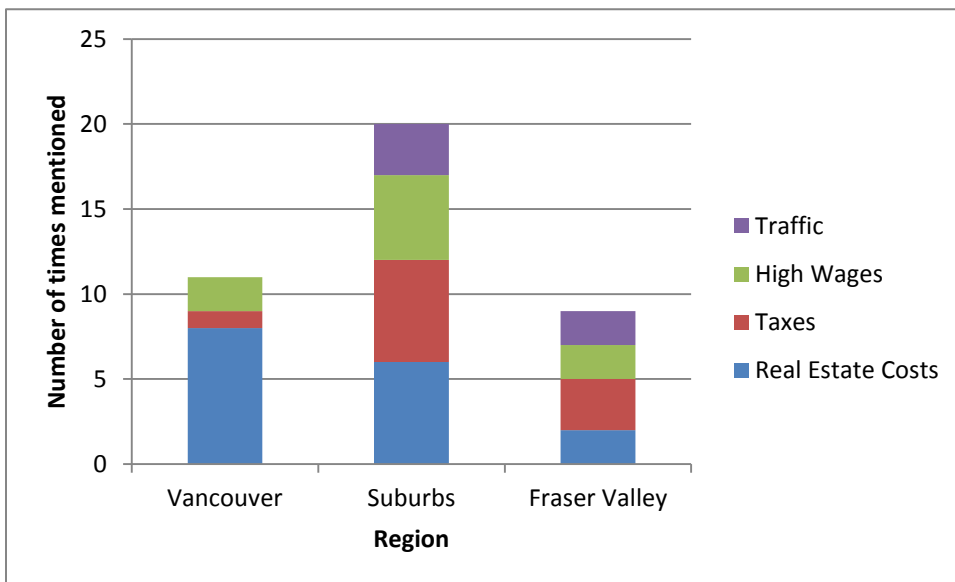


Figure 2.11. Location disadvantages in the Lower Mainland; by region



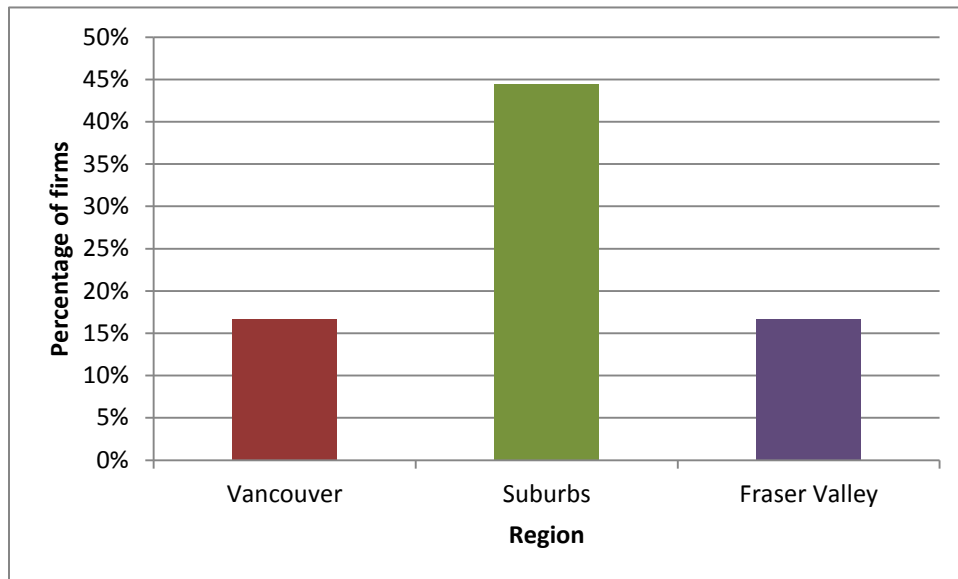
Since land costs and taxes were cited as major disadvantages, it was important to understand if these firms were willing to relocate, further out into the Fraser Valley

where property is cheaper or even further into the interior, to places such as Prince George or Quesnel. The majority responded negatively to relocation because; 1) they did not want to increase their commute time; 2) they personally wanted to stay in the Lower Mainland; 3) saw relocation as prohibitively expensive to their business; and 4) despite the real estate and labour costs in the Interior, the access to coastal wood supply, transportation costs and a lack of local markets would not make economic sense. One owner had researched the moving costs from the suburbs to the Fraser Valley and he was quoted a quarter of a million dollars just to have the electrical and duct work installed to meet code at the new site; he said he literally could not afford to move.

2.3.3. Labour

As expected, most firms are non-union. Of the three union firms, one begun as a unionized sawmill in the 1950s while the other two firms unionized in the 1990s in response to worker requests. Both owners regretted this change and noted that union contracts hindered flexibility. As previous research has indicated for remanufacturing firms (Rees and Hayter, 1996) employment relations, in terms of wages, non-wage benefits and, job flexibility, among those interviewed varied considerably. However, many firms, especially those with stable workforces, emphasized job flexibility. As one respondent commented, “[o]ne of our successes is that we are flexible. It’s a function of our size, the change in the industry and the value of a job. We can have a guy on a trim saw and then we can put him on a re-saw crew. Our workers are flexible; they have done all of the jobs [on the shop floor] because they have been here so long, all of that makes us really flexible.” Workers employed by the interviewed firms are overwhelmingly full-time and when demand increases rapidly these firms typically subcontract extra business rather than hire part-time workers (Figure 2.12). Part-time workers are hired occasionally for administrative and design purposes. In the recent, deep recession (2008-2011), most firms laid off workers.

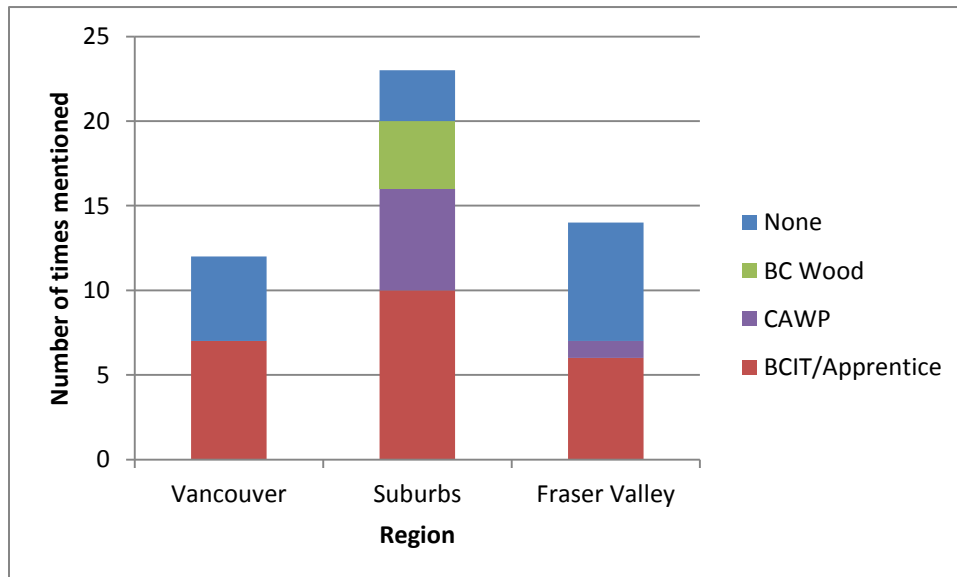
Figure 2.12. Percentage of firms using subcontractors; by region



Unexpectedly, virtually all firms indicated a lack of skilled workers in the industry, and only a few of the one person shops that had no interest in growing indicated otherwise. Indeed, although most firms reported a glut of workers has been available in the recent recession, skilled workers are not easy to find. As one respondent noted, “[t]here are a lot of people looking for work, I get many people who stop by with their resumes, but none of them are trained cabinet makers.” Many firms stressed their industry was not attractive to young people compared to higher wage alternatives. An owner said, “[t]he wood industry is slow because the wages are low. You can make much more money in other trades, such as carpentry” and another said, “[w]e have a very old workforce, young guys aren’t interested in getting their hands dirty, it’s hard to hire good people. It’s the nature of the industry, its dying. The highly skilled guys are getting older, close to retirement and there doesn’t seem to be many young people who want to get into this business.” Finally, “[y]ou can make money in lumber but it is really tough and young guys just don’t want to work that hard.” Yet close to half of the respondents, and most large firms in the Fraser Valley, reported that they were not even familiar with let alone used training programs (Figure 2.13). It was a surprise that the firms in the suburbs mentioned BC Wood as a training program because it is an industry association which offers seminars only. None of the Vancouver firms mentioned, Centre

for Advanced Wood Processing at UBC (CAWP) provides training, education, technical services and e-learning for the wood products manufacturing industries, possibly due to size. British Columbia Institute of Technology's (BCIT) two year program in Wood Products Manufacturing was the best known but given declining enrollment this has been downsized to an Associate's certificate recently and most surviving segments put online (<http://www.bcit.ca/study/programs/7550acert>).

Figure 2.13. Familiarity with local training programs; by region



2.3.4. Suppliers

The interviewed firms are strongly locally connected to local supplier networks and material supplies, the latter mainly for processed lumber but also including some wood fibre (Figure 2.14). Many firms obtained wood from mostly local market purchases within BC, 71% in 2005 and 64% in 2010, while 8% of the firms purchased fibre from BC timber sales (2005 and 2010). While imports of wood and fibre increased from 17% in 2005 to 21% in 2010, these supplies mostly came from nearby Washington state and Oregon. Just a few manufacturers (primarily the furniture makers) use hardwoods obtained their supplies from the East Coast of the US. Indeed, most interviewed firms use wood from coastal (softwood) species, especially Douglas fir, cedar and hemlock.

Only six firms reported using lodgepole pine from BC's interior, and in four additional cases pine wood was a minor input. Only one firm commented that the pine beetle epidemic in BC's interior impacted their business negatively.

Indeed easy, fast access to a diverse range of wood products derived from desired coastal species is an important location rationale for the clustering of wood processing firms in the Lower Mainland. Many owners commented favorably on their relationship with their local suppliers, according to one, “[w]e have a great relationship with their local suppliers. I can place an order on their website at 7am and the product will be delivered same day. Our suppliers are our partners. Without our suppliers, we are out of business and vice versa.” Moreover, many firms used a varied species mix of wood products, and could adapt to variations in supply availability (Figure 2.15). Concerns regarding availability and desired species especially referred to hemlock, “It’s hard to get hemlock, if you want it, you can’t get it. Our hemlock competes with Scandinavian white woods. It costs a company \$60 to harvest hemlock and they can only get \$45 for it on the global market so the companies don’t bother to cut it because they can’t compete on price so there is no hemlock cut for the local guys.” Other respondents were concerned about the stability of their supplies from sawmills because of production cutbacks or increased sales to Chinese markets. Another firm with a large government contract also noted, “[g]etting the desired species can be a problem. During the construction of the Olympic Village [for the 2010 Winter Olympics], they wanted FSC walnut and we could not find enough FSC walnut for that particular job so we ended up using something else.” On the other hand, price was generally not regarded as a problem in large part because as a furniture shop stated, “[p]rice really isn’t an issue because the cost of the wood makes up about 15% of the cost of the job. If one type of wood is too expensive for the client then you find a cheaper alternative but this rarely happens because the cost of the wood is such a small percentage of the overall job.” These firms have to be readily adaptable because fibre supply is highly variable and is often impacted by the government’s reallocation of resources, environmental issues, aboriginal claims, the pine beetle epidemic, weather, and a shrinking forest base. Even though decades of research point to the fact that these firms report not having access to

the fibre supply, it was evident that these firms are able to cope with uncertainty in the wood supply.

Figure 2.14. Primary source of wood supply; all regions

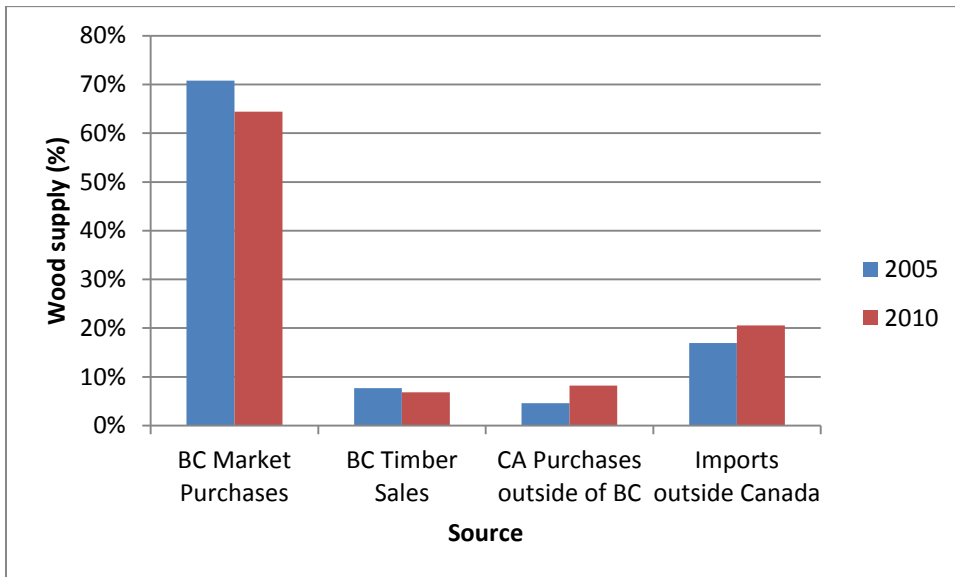
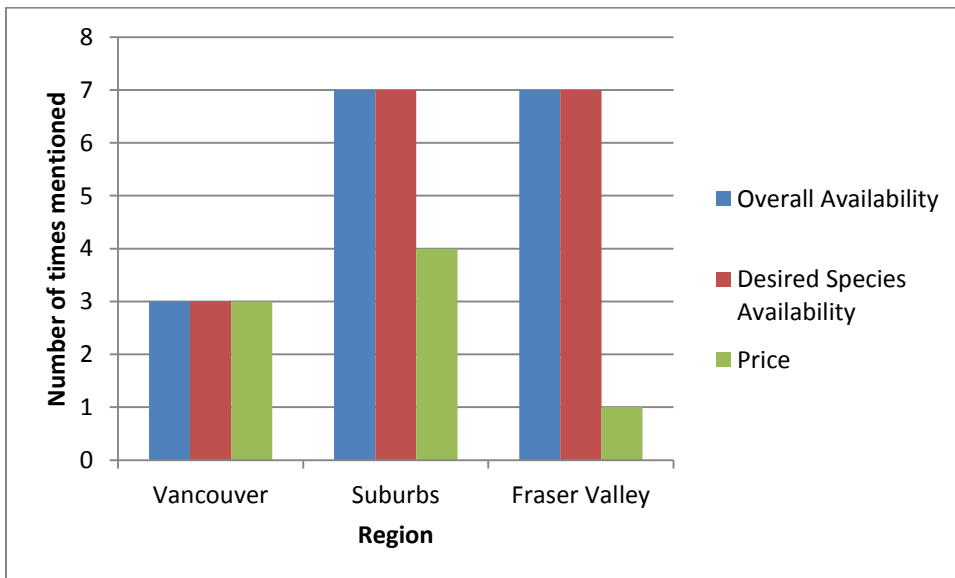


Figure 2.15. Challenges to wood availability; by region



2.3.5. Markets

The interviewed firms used their diverse wood inputs to produce a diverse range of products and serve a varied market geography in which the dominance of BC and US

markets were complemented by secondary sales links to the rest of Canada, Japan and Europe. With respect to recent trends, 2005-2010, the most important is the increased dependency on BC markets (Figures 2.16). This shift has occurred entirely at the expense of dependency on US markets which nevertheless remain important (Figure 2.17). The relative importance of other markets stayed almost the same from 2005 to 2010. After the US market crashed in 2008, one firm refocused their efforts locally, “[w]e were no longer able to deliver commodity products to the US anymore so we had to focus on specialty products that are higher-value and market them close to home.” Another reported, “I got burned once when I did a job in Washington State. The company went bankrupt a week after the install and I never got paid. I could not repossess because it was in a foreign country.” In contrast, another owner stated that even though growth has slowed he was still focusing on the US market, “[a]s a small firm, am I going to invest my time chasing ten BC design firms with all the other manufacturers chasing the same business? Or do I spend the same marketing dollars and focus on big US design firms that have big projects and big budgets? Despite the economic downturn, the US is still full of millionaires and billionaires.” However, among the interviewed, little or no interest was expressed in exporting to more uncertain markets such as India, China, Russia and the Middle East. These small firms seemed to be more often apt to adjust to market uncertainty more easily than the large commodity producers; however, the ways in which these producers adapted to market uncertainty varied.

Figure 2.16. Firm dependency on BC markets; all firms (n=37)

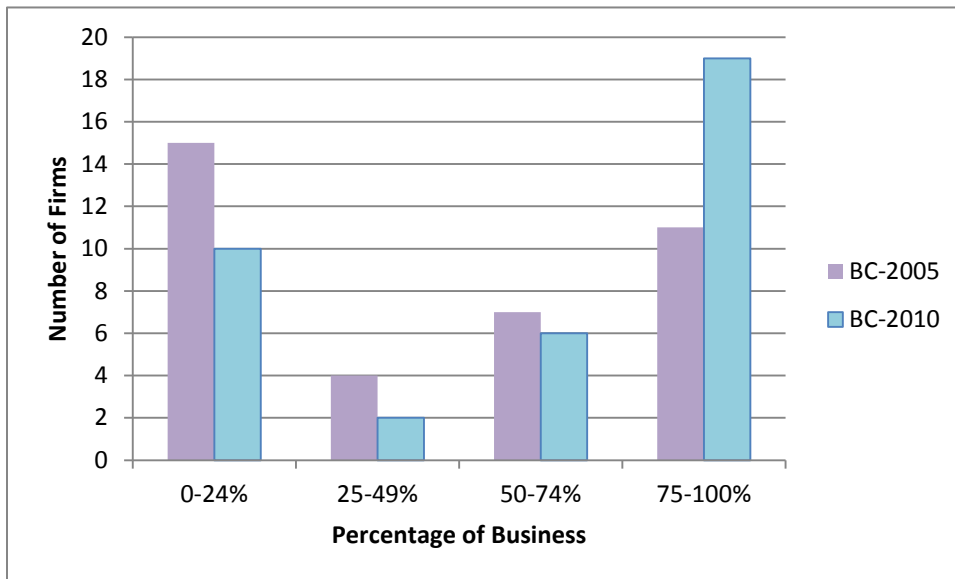
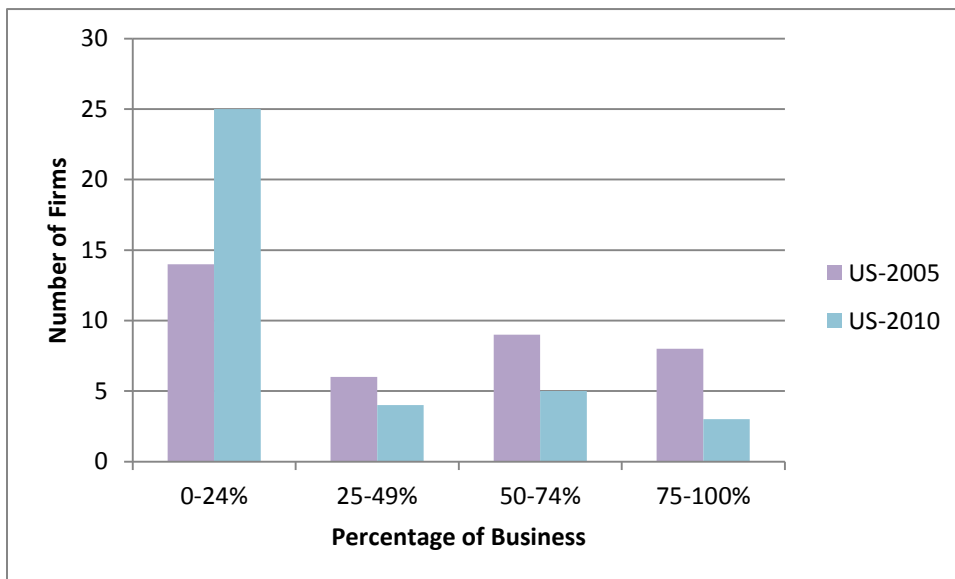


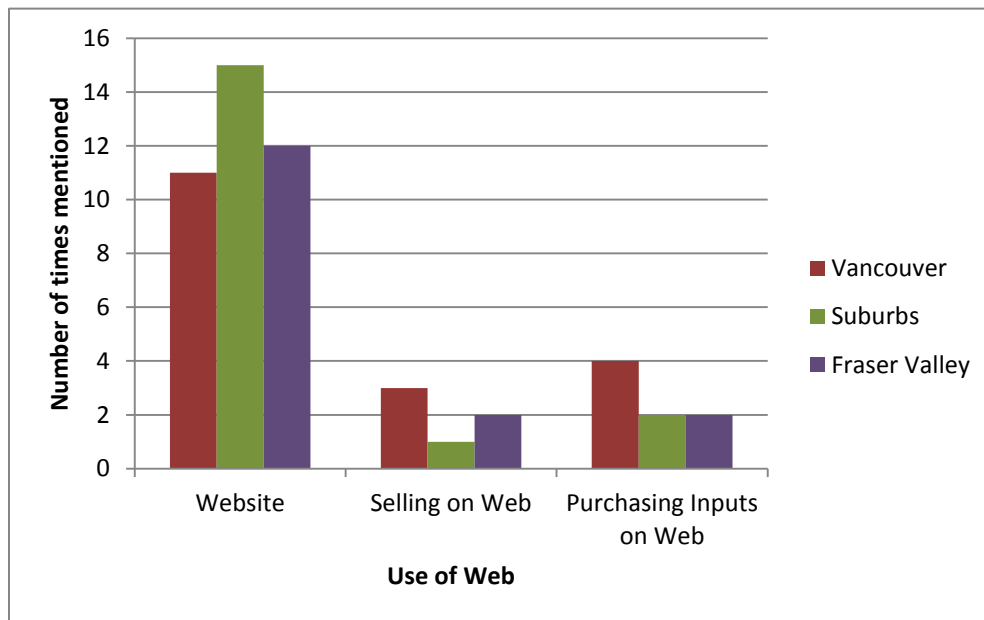
Figure 2.17. Firm dependency on US market; all firms (n=37)



These responses to reaching new markets rarely, if ever, included using information technology (IT). Kozak's (2002) foundational study of internet use and e-commerce adoption in the value-added wood sector in Canada found that only half of the firms surveyed in 2001 had active websites. In our study (Figure 2.18), 93%

reported having active websites; however, only 15% were selling online. Only 20% reported buying inputs [hardware and finishing products] on the web but were clear that they would not purchase wood on the web. These firms were primarily using websites as a means of increasing visibility (advertising) and not to reach new markets or conduct financial transactions. Similar to Kozak’s (2002) study we found that companies that produce higher priced custom wood products (homes, cabinetry, mouldings, millwork, flooring, etc.) are more likely to have a web presence than producers of lower value commodity goods such as remanufactures. Many said that they did not actively use their website but rather had one because, “in this day and age everyone has a website.” Unlike other industries that have adopted, implemented and deployed e-commerce solutions, a decade after Kozak’s (2002) foundational research, this sector has not fully embraced IT to reach new markets or support their business functions on a wide scale.

Figure 2.18. Use of electronic commerce; by region



2.3.6. Industry Associations

Locally, BC Wood, established in 1989 to provide marketing, information and political lobbying services, is the most important association with around 120 members

in 2012, while a much smaller Independent Lumber Remanufacturers Association (ILRA) represents its members in trade issues that in recent decades have been dominated by a softwood lumber dispute with the US. FPInnovations has been a strong local (Vancouver-based) presence for some time (under different names) that is dedicated towards stimulating innovations among its members throughout the forest industry including small value-added firms. Associations create external economies of scale, and provide benefits that would be cost prohibitive individually. Especially in supporting or marketing and sales efforts, and for other reasons, the interviewed firms paid fees to belong to various business associations, both local (BC-based) and non- local (primarily US-based). Indeed, most firms(>90%), including all those in the Fraser Valley (BC Wood is located in Langley), reported belonging to at least one association while 40% of interviewed firms the suburbs and Fraser Valley have or have had leadership positions in at least one association (Figure 2.19).

BC Wood is the most oft used association and benefits of membership are strongly related to marketing and sales, especially related to help in providing contacts in foreign countries, seminars/workshops, sponsoring tradeshow, relationships with competitors, advertising and cost-sharing marketing, certification and accreditation, voice in government and networking (Figure 2.20). The Architectural Wood Manufactures Association of Canada (AWMAC) was also valued for its help in promoting collaboration and competition, collective learning and creativity. As one respondent said, “[w]e competed in the bidding process, but what also happens if I am too busy, I can call a competitor and ask him to help by doing a portion of the job. We don’t have large firms around here, so if one of us gets a big contract for millwork, say \$5 million dollars, we contact each other and put a group together to get the large job done. We know each other well and our specialities and that is how we coordinate to get big projects done.” Another owner shared, “[t]hrough the associations you become friends with people. I talk to my competitors. If I have a problem with something, I call them up and they help me solve my problem. We do it all the time.” Another owner noted, “[o]ne association I belong to is an educational lobby group, and they make sure wood stays front and center when they change building codes and especially promoting it with LEED buildings. Another association makes a huge amount of information available to us

through subsidized seminars, trade shows and provides multiple networking opportunities throughout the year.” Some industries are regulated and membership in specific associations was mandatory and seen to be valuable for providing quality assurance to customers: “Our association provides quality guarantees as well as a warranty program so customers are more likely to do business with you because they see it as less risk. Many customers are comforted knowing you belong to an association.”

Figure 2.19. Degree of activity in industry associations; by region (n=41)

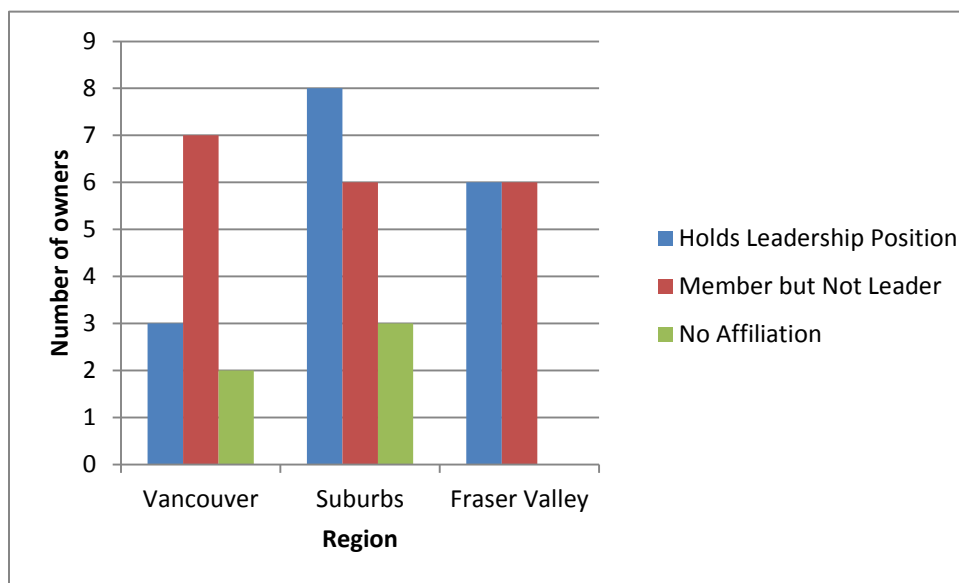
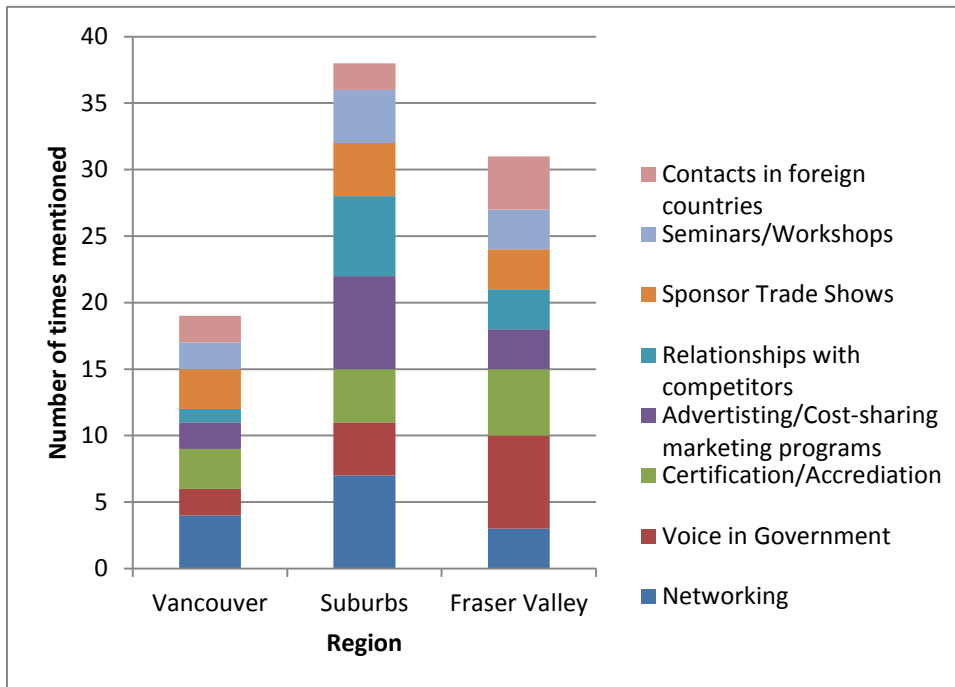
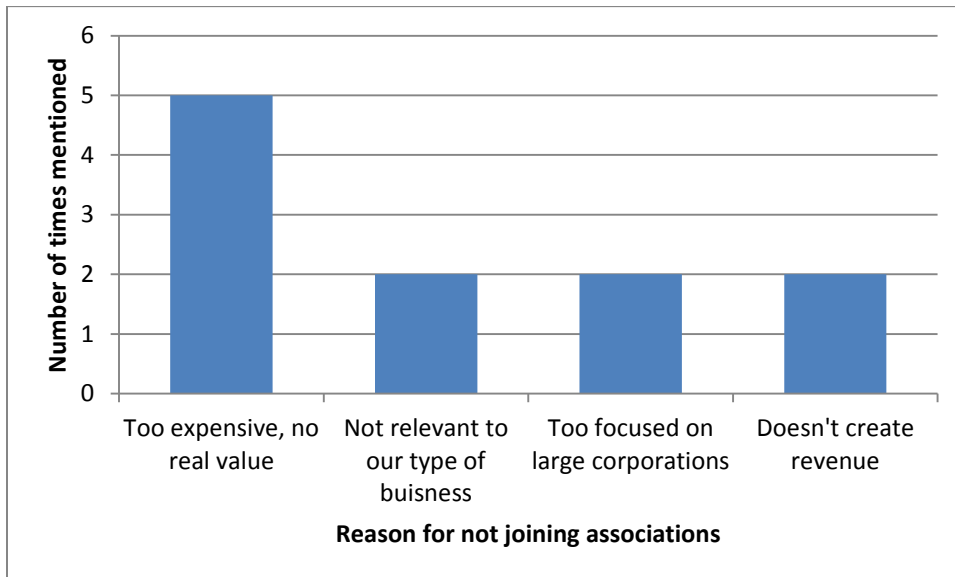


Figure 2.20. Benefits from association membership; by region



A few firms cited problems with associations, and reasons for not participating: too expensive/no real value, not relevant for their business, too focused on large corporations, and not a source of revenue (Figure 2.21). One owner who is still a member was questioning his commitment: “[t]en years ago I joined for marketing purposes, but I don’t see any real advantage today. I am not sure why we are still members other than we’ve done it for almost a decade” and “[t]he association is good because it promotes cedar as a whole, but does not promote our company specifically so I think the overall benefits are negligible. I would rather spend the money to hire a salesman to promote our company.” Most disappointing was that the interviews revealed little or no knowledge or interest in FPInnovations, despite its long-standing presence, size and emphasis on innovation.

Figure 2.21. Reasons for not joining associations; all regions (n=5)



2.3.7. Innovation

The external economies created from the agglomeration of industrial districts are evident to some degree in the value-added wood sector: local labour markets, supplier networks, and cooperation via associations, but very few, if any incidences of innovations in products, capacities, and technology were evident. The following statements epitomized the historical experience of this industry, “[t]his is a smallish, low-tech kind of business. The manufacturing is higher tech but the overall industry is small and low-tech” and the trepidation of trying something new is evident when one owner shared, “[t]he one thing you can’t do as a small company in this industry is do something too outside of what you are doing. It would cost too much and would be a gamble, a gamble you can’t afford” and another owner unwilling to invest in new technology said, “[o]ne of my employees wants to get a Computer Numerical Control Machine (CNC) but I have never seen anyone in this city in thirty years use a CNC to cut anything but cookie cutter kitchen cabinets. I have never seen anyone doing anything creative in furniture on a CNC and make money at it.”

The industry as a whole demonstrated a lack of focus and investment in innovation. Many acknowledged that this is a “sunset industry” and industry in decline

which has passed its boom period; however, they did see various opportunities for innovation still existed, but few to none had been realized. One respondent noted, “[t]here are all kinds of products that could be produced in BC that would allow us to stretch our raw fibre further but that would require a few million dollars to set up a pilot project and no one is willing to spend the money” and another shared, “I think the industry has missed the boat in what I consider to be a glorious opportunity in an area like structure lam (glue-laminated beams). Structure lam takes conventional lumber products and turns them into engineered beams. They have created an even newer product called CLT (cross-laminated timber) which is a wall made of solid wood laminating in different directions but no one is manufacturing either one in Vancouver. I think the forest industry has missed the boat on developing a wide range of engineered type products.”

Innovation and an investment in technology was sporadic. This apprehension was echoed when one owner shared, “[i]f we were feeling more secure with the raw material supplies and the markets, we would spend the money on machinery that would make us more efficient but that is not the case right now” and another said that his strategy to weather this economic downturn was “[w]e are not planning on investing in new equipment right now, we will just retool if we need to.” Firms which recently purchased new equipment were doing so to reduce labour costs and not necessarily to reach new markets or do something innovative, “[w]e have just bought a new sander and a CNC machine. We will buy only if we can reduce labour costs using a new piece of equipment” and another respondent said, “[w]e are buying an in-line press and some sanding equipment, which will reduce our labour costs” and finally, “[w]e are more likely to buy equipment over R&D and training. We just purchased an automated manufacturing system, state of the art from the US, to save labour costs.”

2.4. Conclusions

In the context of the Lower Mainland’s value-added wood industries, this chapter has sought to assess the degree of flexible specialization in this localized cluster of interacting SMEs. The conclusion is that these relationships exist, are promising but are

not as strong as they might be. Economically, value-added wood activities in the Lower Mainland have grown in recent decades even as the commodity industries controlled by large corporations have declined as job generators. In response to the recent global, financially inspired crisis, the value-added industries have shown resiliency, downsizing rather than closing and seeking local market opportunities when possible. Because of their small size, as a cluster these firms seem easily able to adjust to an uncertain fibre supply by relying on their strong relationships with their suppliers. Much research points to the fact that this sector is unable to access fibre; however, this did not seem to be a hindrance for these firms. The industries themselves remain highly diversified serving a variety of market niches, and they are embedded in local entrepreneurial, supply and marketing networks while helping to sustain several local (and some international) associations that provide services for them. Yet, local networking activities are modest, and inter-firm cooperation outside of loose affiliation to associations is not strong. Despite the fact that there are institutions doing R&D in the forestry industry, dissemination of information was weak. Few firms were informed as to the educational opportunities that were available in their industry, or took advantage of the training programs or seminars held by various associations or research institutions. In terms of innovation, one owner commented, "We are price takers, we make what the market demands, we are not innovators. That is our problem." Few, if any, were embracing new technology to improve innovativeness or reach new markets.

For Piore and Sabel (1984), the model of flexible specialization which leads to resiliency and regional economic development is one of technological innovation, a reallocation of resources and labour through constant subcontracting arrangements, and the search for new products. There are some isolated instances of each of these activities in the Lower Mainland's value-added wood sector; however, it has not evolved in such a way as to harness the disparate innovative energy of each of the firms. Martin and Porter (2000) conclude that Canadian companies should be leaders by creating a business culture of "innovation" and not following one of "replication" (Kozak and Mannes, 2005, p. 2). "New product development is thought to be essential for firm success" (Taylor and Associates, 1998; Globerman et al., 1999; Hovgaard and Hansen, 2004; Delong et al., 2007, p. 2224). Bellandi (2002) touches upon one possible

explanation for the lack of firm level technological innovation when he speaks about the embeddedness of small and medium-sized firms into a local system where SMEs become dependent upon the R&D and marketing strategies of the larger firms. In 1999 the headquarters of the last major forestry company, MacMillan Bloedel, shut its doors in Vancouver, taking with it the last well-funded R&D laboratories and marketing department which could explain the lack of consistent innovation in the sector if the small manufacturers had been simply riding on the coat tails of the large firms.

BC and the Lower Mainland's forestry sector was founded by entrepreneurs seeking to supply local and then eventually global markets and that spirit remains in the Lower Mainland's value-added sector; however, the question of the future of this industry is in question as the source of the next generation of entrepreneurs is uncertain. The debate continues regarding the importance of small firms to a local economy and the vitality of the value-added wood manufacturing sector in the Lower Mainland is in question as this generation is on the verge of retirement. Much research suggests that "new firms, considered as a supply of entrepreneurship, are an index of the health of regional economies and are believed to play a distinct role in local economic development" (Hayter, 1997, p. 239). Barriers to entry for new owners seem to be many and may have a detrimental effect on the continued growth of this industry.

Lastly, this extensive case study of three sub-regions in the Lower Mainland allowed for a broader understanding of the strategies and structures of individual and clusters of firms' decision making in terms of employment, markets, training, and membership in industry associations as well as organizational characteristics. There are clear limits to the networking that occurs around training programs and a limited investment in skill formation in this sector which hinders innovative possibilities. To some degree, these small firms in localized networks have adapted challenges in mature industries like other industrial districts but with limited success. Despite the decades of research touting the benefits of flexible specialization and the clustering of small and medium-sized value-added firms on economic growth and regional development, the Lower Mainland's value-added wood manufacturing sector remains vulnerable to market

and supply uncertainty, global competition, and the ever-increasing costs of doing business.

3. Sustaining Jobs and Environment? The Value-Added Wood Industry in The Lower Mainland, British Columbia

3.1. Introduction

The specific objective of this chapter is to address the claims that value-added wood industries contribute towards an environmentally as well as economically sustainable forest economy in BC. Alternatively put, the chapter provides a pragmatic assessment of the polemics of *Forestopia* in environmental perspective. The issue of economic sustainability was addressed in the previous chapter. Conceptually, the chapter offers a case study of green entrepreneurship, especially in relation to small firms. While the flexible specialization and environmental literatures have not crossed paths to any extent there are obvious potentially mutually reinforcing complementarities that are intimated in the concept of green entrepreneurship (Tagar and Cocklin, 2005). Thus both flexible specialization and green entrepreneurship are critical of energy intensive mass production, and both emphasize the “social virtues” of entrepreneurship, often (if not always) with respect to new and small firms (Piore and Sabel, 1984; Schaper, 2005). Indeed, the networking among small firms to realize collective advantages that strengthen regional development, which are at the heart of the flexible specialization model, can readily incorporate green entrepreneurship that emphasizes increased environmental awareness among firms, especially small firms. The greening of flexible specialization is one particular lens to focus debates about the interdependencies between economy and environment. Given that these interdependencies vary considerably from place to place, geographic case studies are vital. This thesis provides one such case study, specifically of value-added wood industries in the Lower Mainland, based on interviews contextualized within broader trends occurring across British Columbia.

Importantly, this research does not support Piore and Sabel's (1984) claims and advocacy of a *general* shift in the pattern of industrialization towards flexible specialization. Such a shift has clearly not occurred, while hopes for a green future or sustainability transition largely need the by-in by large corporations. Even so, small firms continue to be widely prevalent in all economies and in some places and industries there are important clusters or agglomerations of small firms that potentially have roles to play in sustainable futures.

In terms of format the remainder of the chapter examines the relationships between flexible specialization and green entrepreneurship. This discussion provides the context for an examination of BC's value-adding wood industries in the Lower Mainland. In the second part of the chapter these value-adding industries are assessed in terms of their economic sustainability while the third part of the chapter explores the economic and environmental performance of the surveyed firms.

3.2. Flexible Specialization and Green Entrepreneurship

While the flexible specialization and green entrepreneurship literatures evolved from different roots (cf Piore and Sabel, 1984 with Schaper, 2005), without formal recognition of each other, they rest on complementary thinking and their integration may be mutually empowering. In general terms both claim roots in the need for contemporary 'paradigm' change in economic organization and technological practices. Thus Piore and Sabel (1984) advocate flexible specialization as an antidote to Fordist-style industrialization based on mass production controlled by increasingly large corporations while Schaper (2005) envisages green entrepreneurship as another example of 'creative destruction' and how industrial economies will transition to sustainable development, or some related label. Whether or not either framework provides an effective signpost of paradigmatic change, both flexible specialization and green entrepreneurship highlight the role of entrepreneurial firms, their adaptability, flexibility and innovative nature. Flexible specialization, unlike green entrepreneurship, builds on more explicit geographic foundations and recognizes the power of place in realizing localization economies and various forms of social embeddedness. Yet, green entrepreneurship has recognized the

influence of local cultures and 'social norms' in shaping green strategies by firms (Meek et al., 2010) and Gibbs and O'Neill (2012) argue that the elaboration of this influence is an important research priority. Meanwhile, green entrepreneurship is vitally concerned with those firms playing leadership roles in achieving sustainable development, while flexible specialization has not directly addressed environmental imperatives. The question that arises is: can the external economies and networking activities involved in flexibly specialized production help reinforce and diffuse green innovations?

Thus flexible specialization features populations of small, entrepreneurial and interdependent firms that employ pools of skilled labour and provide competitive advantages based on external economies of scale and network. Flexibilities are realized at both the level of the firm and cluster. Thus small, typically owner-managed firms, as opposed to corporate bureaucracies, can make fast decisions in response to market needs or crisis and in terms of organizing effective use of capital and human resources, the latter typically non-union. For Christopherson and Storper (1989, p.331) the "purpose of flexible production organization is to make labour and capital inputs more variable." Indeed, the ability of firms to respond to market and supply uncertainties is an important feature of flexibly specialized firms and clusters (Rees and Hayter, 1996). At the level of the cluster, flexibility and speed of response is achieved by the presence of alternative rival firms and suppliers in meeting input and output requirements, and by external economies such as industrial associations that provide collective marketing, research and development and lobbying expertise, and forums for information sharing. The flexible specialization literature, however, has shown little interest in how SMEs cope with environmental concerns, the central priority of green entrepreneurship approaches. Thus Isaak (2005, p.14) distinguishes 'green firms' from 'green green firms'; the former comprising existing firms who are striving to meet environmental obligations and the latter that are "designed to be green in processes and products from scratch, as start-up, and, furthermore, is intended to socially transform the industrial sector." Although admittedly concerned with firms of all sizes, green entrepreneurship studies have placed emphasis on entrepreneurship within SMEs and the founding of new firms (Tagar and Cocklin, 2005; Walley and Taylor, 2005). This emphasis is also implied in Gibbs and O'Neil's (2012, p.3) recent suggestion that green entrepreneurs are individuals "who

combine environmental awareness with entrepreneurial action [and] will form a key driver in any move towards a green or low carbon economy.”

Further Tager and Cocklin (2005) debate the possibilities for developing green entrepreneurship to the networking activities within clusters of SMEs, specifically within Australia’s environment industry, in a way that resonates closely with flexible specialization. Thus their general argument is that SMEs can offset the disadvantages of limited capital, human resources and knowledge networks by clustering together and sharing the benefits of networking. In effect they note that individual SMEs with limited capabilities of realizing internal economies of scale can collectively facilitate access to external economies of scale through clustering and various forms of economies of scale and scope. In this regard, their discussion of the benefits of networking, such as the sharing of equipment, pools of skilled labour; the exchange of information and know-how via personal contact based on high levels of trust, cooperation in marketing, exporting and R&D; the development of a collective identity; fast adaptation; and strong commitments to product differentiation and economies of scope are the key characteristics of flexible specialization, as indeed they indicate (Tager and Cocklin, 2005).

At the same time, Tager and Cocklin (2005) recognize that clustering is not a magic bullet solution to the search for best practice behaviour among SMEs with respect to the environment (or from other perspectives). As they note (*idem*, p. 151), spatial association itself does not imply information sharing and trust, there are disadvantages in locating in clusters and large agglomerations, and innovative SMEs may depend crucially on non-location relations. It is also important to recognize that, even when networking does exist, shared routines may institutionalize obsolescent as well as innovative behaviour. Further, in the context of environmental performance certification poses especially awkward issues for SMEs.

Certification is widely regarded as an important indicator of appropriate environmental behaviour and its compliance encouraged by the promise of market access, price premiums and a more abstract sense of social license. Nevertheless, for SMEs certification adds especially burdensome costs and rules constraining behaviour,

and there is confusion of the appropriate forms of certification. In the forest sector in the early 1990s, for example, several environmental certification schemes began as a means of protecting endangered forests primarily in poor countries. Organized by ENGOs, the Forest Stewardship Council (FSC) certification scheme attempts to trace products via a 'chain of custody' from logging activities to the final consumer. Less costly and bureaucratic alternatives to FSC have since developed, for example the Canadian Standards Association (CSA) and the (US-based) Sustainable Forestry Initiative (SFI) while in Europe the Programme for Endorsement of Forest Certification (PEFC) was developed in 1999 to help small scale forest owners and to endorse national schemes. In addition, International Organization of Standards (ISO) 14000 focuses on certifying environmental management systems within factories. In addition, the US Green Building Council (USGBC) is a non-profit that sets LEED (Leadership in Energy and Environmental Design) requirements in buildings. With respect to timber supplies, only FSC certification is recognized by the LEED system which is the source of contention for the other certification schemes. (Even so, FSC certified timber has very little weight in LEED ranking systems).

Notwithstanding the costs and ambiguities over the value of certification, networking and cooperation among SMEs within clusters may encourage adoption by shared, progressive expectations, the creation of a green identity, through cost sharing, and perhaps even by stimulating innovative behaviour. Moreover, Tager and Conklin's (2005) focus on the environment industry can be readily extended to other clusters of SMEs that seek to become or intensify their greenness. In this context, clusters and flexible specialization model provide a geographic foundation to green entrepreneurship. This geographic perspective is enriched by recognition that pro-environmental sympathies and attitudes vary by regional context, and that the more favourable contexts in this regard would be more likely to generate stronger environmental policies and green commitments among firms to become green (Meek et al., 2010; Gibbs and O'Neil, 2012). From these twin geographical perspectives clustering in the context of positive pro-environment social norms – the greening of SMEs within the Lower Mainland's wood processing activities may be anticipated.

3.2.1. *Place-based Greening: Towards a Sustainable Forest Industry in British Columbia*

As a periphery, the industrialization of BC was predicated on the export of commodities to the world's markets. Resource policy, for example as related to forests, was industrial policy, and trees were seen primarily in terms of market values. In recent decades, however, there has been a comprehensive re-imagining of BC's resources and global role that has given increased priority to environmental values. This transformation is captured by the birth of Greenpeace in Vancouver in 1971 and its rise to one of the world's biggest ENGO. Even though Greenpeace's head-office is now in Amsterdam, BC is home to a large, vibrant environmental movement. Another indication of BC's embrace of environmentalism is the re-election of Gregor Robertson as the city of Vancouver's mayor and his avowed intention to make the city the 'greenest' in the world (The City of Vancouver, Greenest City Action Plan 2020). More fundamentally, over recent decades successive governments of British Columbia have legislated wide ranging environmental initiatives that have included the remapping of extensive forested areas from timber supply to conservation areas (Affolderbach 2011; Affolderbach et al., 2012), and the introduction of carbon taxes and pricing schemes that are distinctive initiatives in a North American context.

The higher policy priority given to environmental values with respect to BC's resources admittedly has been highly contested, reflected by relentless 'wars in the woods' (Hayter, 2003), and presently by vigorous ENGO-led opposition to the building of new oil pipelines through the province from Alberta. But the conflicts exist because they have much public support, and public opinion in BC is clearly strongly 'pro-green' and increasingly so. In the case of the forest sector, in addition to the substantial creation of conservation areas that comprise extensive forest resources there has been a plethora of policies that have dramatically changed logging and forest product operations to improve environmental performance (Hayter, 2000). From a situation of no certification in the early 1980s in BC, as of 2010, 2.7 million hectares is FSC (4.7% of total forest area) while SFI, CSA and PEFC combined have 50 million hectares under certification (86% of the total forest area)(McDermott, 2011, p.8).

Moreover, pleas for adding value in wood processing to resuscitate BC's forest sector as it has matured and become high cost has been advocated by industry consultants and academic observers since the deep recession of the early 1980s (Woodbridge Reid, 1984; Hayter, 1986). Over the past two decades, these arguments have been reinforced by environmental arguments that stress the role of small firms in adding value and creating jobs while using fewer timber inputs (Druskha et al., 1993; M'Gonigle and Parfitt, 1994; Wilson et al., 2001). According to Parfitt (2011) increased emphasis on product diversity and value would not only add jobs and reduce timber requirements but would help stabilize the forest economy that has been plagued with commodity-based boom and bust cycles. Small wood processing firms in BC also have abilities to utilize small quantities of timber with highly variable and changing characteristics (Rees and Hayter, 1996). Further, the pine beetle epidemic, which has damaged vast swaths of interior forests for a decade has encouraged the government to temporarily increase harvest levels before wood values are lost, but with the implication that harvest levels will soon be reduced more than expected. This development is reinforcing arguments that BC's forest economy needs to shift towards smaller-scale value-added operations.

There is statistical support for the view that the value-added wood sector can add jobs with fewer timber inputs, at least partially offsetting declines in the commodity industries. According to Natural Resources Canada (NRC) (2011), for example, the sales value of secondary manufacturing products per cubic metre of harvest wood rose by 75%, from \$51/m³ in 1993 to \$89/m³ in 2007 and while the sales of secondary manufacturing wood products jumped 189% and increasing its share of forest product sales from 15% in 1995 to 35% in 2007. Environmental protection arguments also underline the potentials for value-added growth in BC's forest economy by pointing to the greater values obtained from wood harvested in other jurisdictions. Parfitt (2011, p. 5), for example, notes that in 2010 Ontario generated one full-time forest industry job for every 205 cubic metres, Quebec one job for every 298 cubic metres, and BC, one job for every 1,189 cubic metres (see also Druskha et al., 1993). But realistically what is this potential in British Columbia for substantial as well as sustainable job creation in this sector?

The ability of small-scale, value-added wood activities to generate sustainable jobs has been questioned on economic grounds (Dufour, 2009; NRC, 2011). Thus the low jobs to wood cut ratios in BC may indicate very high levels of productivity, while potential for growth of the value-added wood industries needs to be related to market opportunities. It also cannot be assumed that existing activities are immune to market fluctuations. For Dufour (2009) the market access problems, including protectionist pressures from its main trading partner the US, that face added-value wood industries in Canada are being compounded by the acceleration of technological innovation and the need to comply with the principles of sustainable development. Moreover, the green entrepreneurship credentials and large markets for value-added products, tacitly assumed in *Forestopia*, (M'Gonigle and Parfitt, 1994), need to be assessed. The ability of value-added wood activities to compensate for declines in commodity production in economically and environmentally sustainable ways is therefore a matter for debate. The remainder of this chapter explores this debate.

3.3. British Columbia's Value-Added Wood Industries

Information sources are summarized to provide insights into economic and environmental performance and sustainability for the value-added wood sector in the Lower Mainland. Thus from an economic perspective, growth trends in the size (number and employment) of firms, their ability to serve diverse markets, use diverse species, innovate and respond to crisis are important parameters presented in chapter 2. From an environmental perspective the awareness of certification options, use of certification, recycling behaviour and related practices provide important benchmarks for summarizing green entrepreneurship.

From a flexible specialization perspective, community development and resilience is inspired by locally-based ownership and control, the creation of a skilled social division of labour, strong, diverse local supply networks, access to external economies and at least domestic market access. These competitive strengths can be potentially extended by market diversification and exports, adaptability to change and

innovation all within an environmentally sustainable context. In these respects how do the surveyed firms perform?

3.4. Environmental Performance

The certified sustainable forestry management practices movement has been gaining exposure as a means to “curb environmentally destructive and unsustainable harvesting practices in Canada, [which] though it isn’t perfect, has made great strides and is among the leaders in the best-practices forestry management movement” (Tulloch, 2008, para. 19). It is widely believed that with pervasive buy in from all members of the value chain, environmental certification can enhance the attractiveness of BC wood products. To provide insights into environmental behaviour and green entrepreneurship, respondents were questioned about their use and understanding of certification, recycling practices and pollution.

3.4.1. *Variations in green entrepreneurship*

With one possible exception, none of the interviewed firms represent “green green” entrepreneurship, that is a firm set up to pursue explicit strategies of environmental sustainability from start-up. However, there are considerable variations among the interviewed firms in terms of environmental awareness as reflected in their knowledge, motivations and practices that in this study focused on environmental certification and wood waste and pollution problems. Thus, with respect to environmental certification three main categories of firms can be recognized (Figure 3.1)

Briefly, category 1 firms have little or no knowledge of, or interest in, environmental certification; Category 2 firms have invested in environmental certification, are reasonably aware of its execution; and Category 3 firms are environmentally certified, have good knowledge about certification, and seek to ensure they meet chain of custody requirements. Overall, 22 firms are in Category 1, 13 firms in Category 2 and just 6 firms in Category 3. Note however, that the amount of certified wood used by Category 2 and 3 firms was never more than 20% of total wood inputs. Among the 19

firms who had certified, 10 had chosen FSC and 9 had chosen other alternatives and there is a modest tendency for environmental awareness from this perspective to be associated with location and size of firm. Thus category 2 and 3 firms are more likely located in Fraser Valley than in Vancouver or even the suburbs; just 4 of 13 Fraser Valley firms are in category 1 while 18 of 28 Vancouver and suburban firms are category 1 (Figure 3.1). With respect to firm size in terms of (2010) sales in three of the four smallest size groups Category 1 firms dominate while all but one of the five firms with annual sales in excess of \$15 million are in Categories 2 and 3 (Figure 3.2). Clearly, in addition to location and size other factors such as products are associated with green entrepreneurship.

Figure 3.1. Commitment to Certification; by region (n=41)

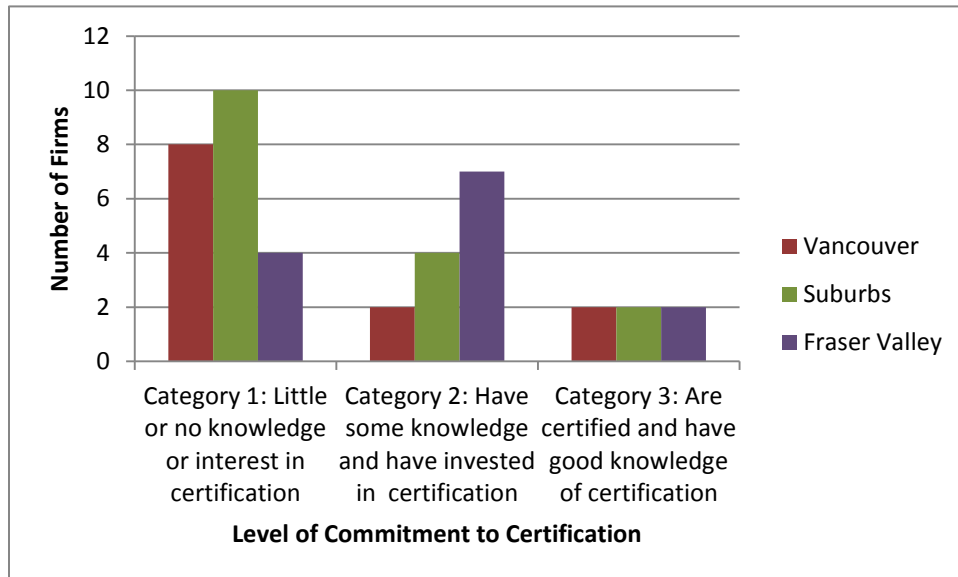
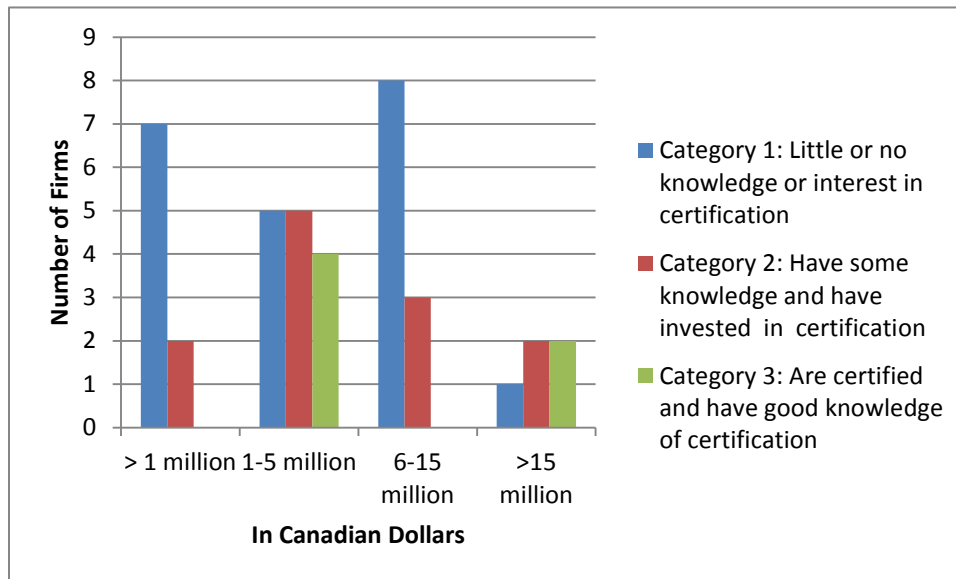


Figure 3.2. Commitment to certification; by firm size (n=41)



Among the six category 3 firms one may be potentially seen either as a Category 4 or as a (category 1) “green green” firm with a strong, explicit commitment to environmental sustainability. The owner of this firm (sales <\$5 million) has been in the millwork business for over two decades in the Fraser Valley. He noticed more and more customers asking for products that were more environmentally friendly so he spent months researching the various certification schemes to better understand the benefits to his firm. He realized that none of the certification programs worked for his company because they “were a huge expense in terms of time and money” and he did not see the extra value it was adding for customers. His goal to provide products that are environmentally friendly was subsequently achieved with assistance, as a member, from AWMAC’s BC office that led to a program in 2011 called SAW (Sustainable Architectural Woodwork). While certification programs such as FSC only certifies wood, SAW certifies the entire product, from being to end, taking into account the wood inputs, manufacturing process, disposal of the waste, finishing of the product and that waste, and the level of off-gassing of the final product. This program focuses on educating the consumer about the environmental impact of the product and not just a certification of

the wood input. It is now a national program endorsed by AWMAC and was launched in 2011 in two American sister associations.

As another Category 3 example, the owner of a relatively small furniture firm (sales < \$5 million) located in the suburbs was inspired by his thirteen year old son to be conscious of his firm's environmental impacts, leading him to be an early adopter of FSC certification. He recalls his son, who frequently would spend his summer vacation at the plant, watching two of his workers use the veneer press. When the press was in operation, a considerable amount of toxic fumes were released which caused his son's eyes to burn. He asked his father why that happened and the father explained that it was a result of the noxious off-gassing which occurs in the process of veneering. The son showed great concern for the health of the employees operating the press and asked his father to make his shop a "healthy" place to work. Encouraged by his son, the owner has now switched all of his veneers to a water-based product which is non-toxic and went further in investing in becoming an FSC certified shop as a means of "greening" his entire operation which he attributes to improving the quality of the work environment for his employees.

In contrast, the 22 Category 1 firms have no environmental certification, and 19 expressed no interest in becoming certified. These firms are located in either Vancouver or the suburbs and are typically tiny in size. Of the 10 firms which are in the suburbs, 5 indicated interest in certification in the future, in most cases because it was seen as a "cost of doing business." Several category 2 firms often expressed difficulty in remembering with whom they were certified. Moreover, Category 2 firms that indicated that they were FSC certified, that is they were certified shops (FSC designation is only given if it applies to the entire operation), but in practice they also used non-certified wood. One owner responded when asked what type of certification his firm used he said, "[t]he green one, and the sustainable one, I am not sure what they are called. I think it's FSC. Yes, we use FSC and some other certified wood too."

For the interviewed firms, advantage over competitors, market demand/access and requirements for doing business were the main perceived benefits from certification (Figure 3.3). Several reasons were also cited by 19 firms for not certifying, including 7

who considered themselves too small (Figure 3.4). The three firms citing “too much paperwork” is also size related. The high cost of FSC certification in particular is obviously important to very small firms. Thus FSC costs between \$3,500-10,000 to join and then there is an annual fee (starting around \$1,500) plus paper work and the possibility of inspections. The larger firms are able to absorb these costs compared to the smaller firms. Indeed, the small, 1-2 person shops in Vancouver tended not to see the necessity and found it both a burden economically and administratively. One owner said, “I don’t see the value in certification, the time and effort spent filling out the paperwork makes it costly for the small guys.” A few who have been in the business for decades commented that certification of Canadian forests was a moot point because they believed that Canadian forestry practices are some of the most sustainable in the world. For example, one owner echoed such sentiment when he said, “[w]e have the best forest practices in the world in Canada, in my mind it’s all certified anyways. I see added costs in certification.” The larger firms in the Fraser Valley, however, tended to see certification as the “cost of doing business”, as one owner commented, “[t]he value of certification is that we get work that wouldn’t otherwise be available, it is pure marketing.” There was an overwhelming belief by the firms that were certified that it would effectively differentiate them from their competitors and give them access to certain markets such as LEED. One respondent said that being certified “is more of a requirement that will enable us to engage with a more sophisticated customer and higher-end markets.” Another shared, “[w]hat drives me are my customers, if they don’t ask for it, then what is the purpose? My customers are the only reason to use certified wood; I don’t see any other need to use it.”

Interestingly, there were a few firms who dropped FSC certification because they did not see an increase in business (because they are still certified in other programs these firms are classified in Category 2). One Fraser Valley firm, (sales >\$16 million) said, “[w]e were FSC certified for 7 years and it probably cost us \$3,000 per year but we did not see a benefit for the added expense so we dropped it.”

While most firms claimed that they would consider certification if the market demanded it, their experience was that once the customer was told the premium for

certified lumber, they were rarely interested. The overall consensus was that these firms have not seen a dramatic increase in the demand for BC eco-certified wood, but rather reported that only certain niche markets were asking for it. The support and understanding of certified wood amongst the firms interviewed was limited.

Figure 3.3. Perceived benefits of certification, all regions (n=21)

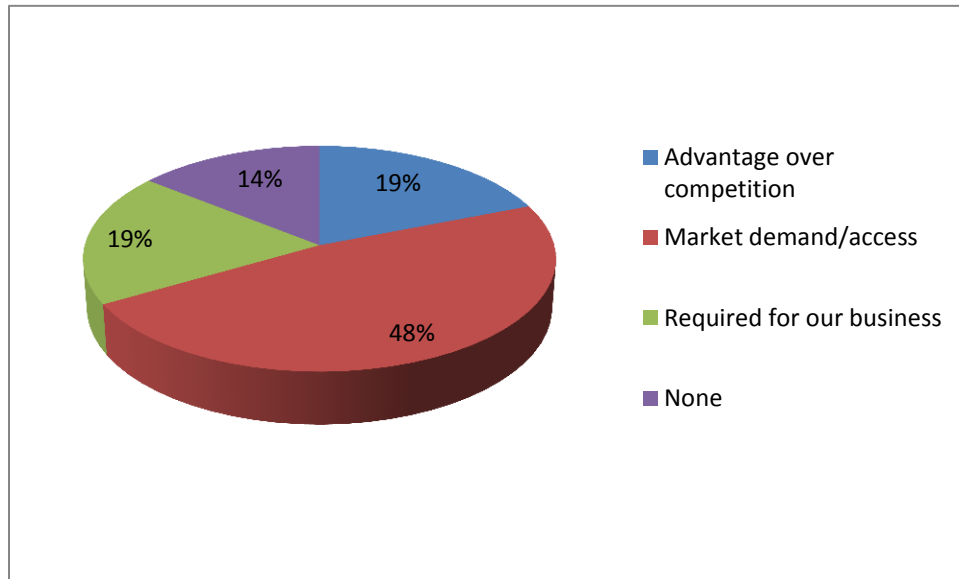
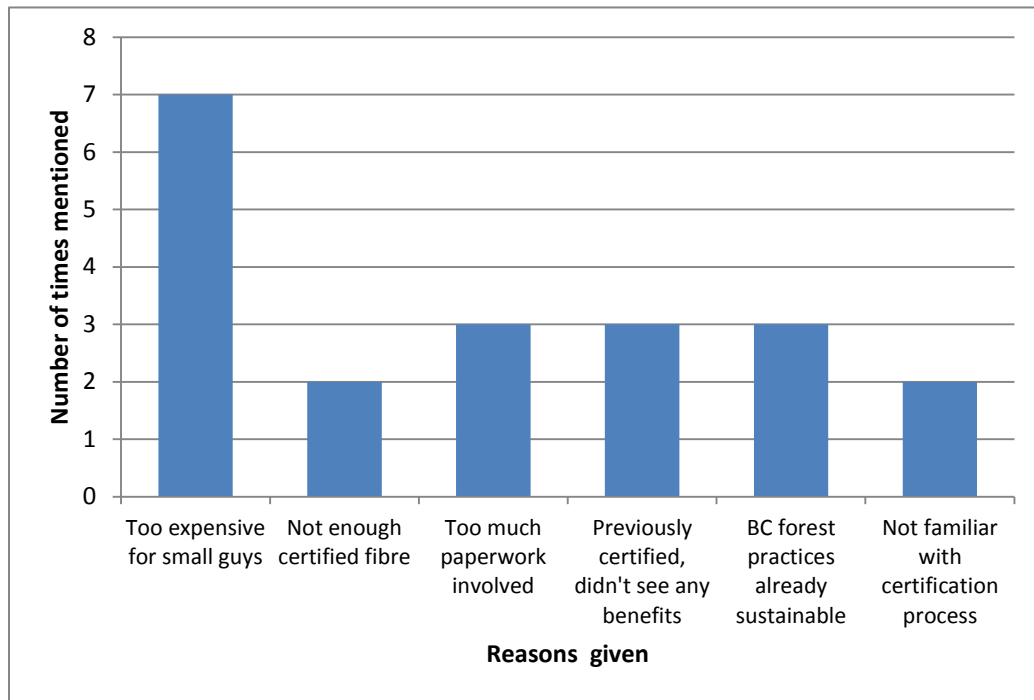


Figure 3.4. Reasons for not using certified wood in 2010 (n=20)



The interviewed firms also varied greatly with respect to performance and attitude to wood waste and anti-pollution technology (Figure 3.5). Compared to the distribution of firms across the certification categories (Figure 3.1) there are many fewer Category 1 firms, just nine. With one exception, Category 3 firms are the same and there are more category 2 firms.

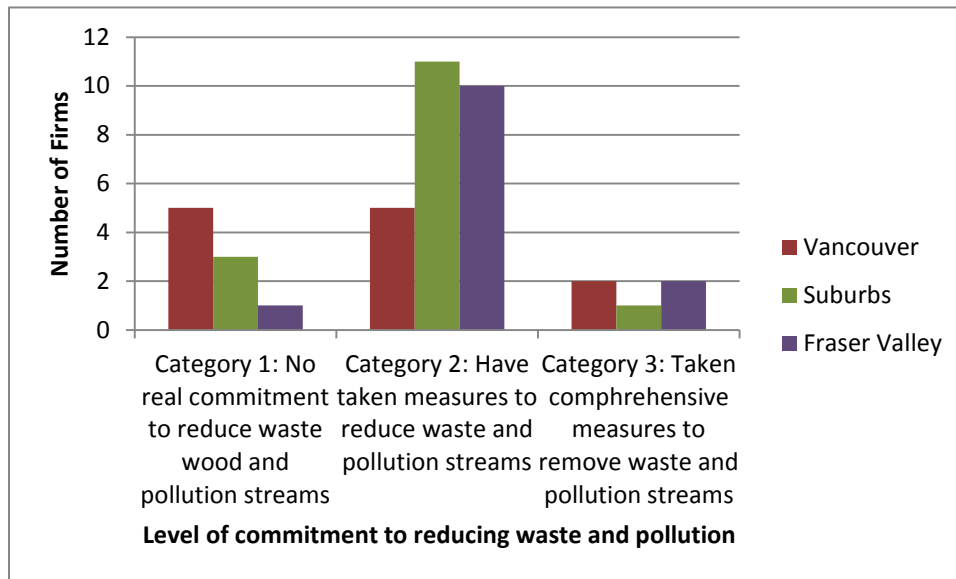
In general, the modest tendencies for environmental awareness towards wood waste and pollution to be associated with location and size is confirmed. Thus Category 1 comprises nine firms that have not taken measures to reduce waste, and in most cases these firms are among the smallest interviewed, located in either Vancouver or the suburbs. The reason why virtually none of them are actively involved in wood recycling is because the amount of wood waste they produce is so minimal no one is willing to pick it up for recycling. However, despite the fact that many of these small firms don't recycle in a traditional sense, they are trained to reduce wood waste demonstrated

when one owner said, “[t]hrough my training I have been trained to never throw away things you haven’t used 3-4 times. My scraps are so small and it takes me months to fill one trash can, it’s not economically viable to pay anyone to remove one trash can every few months.” Even though this firm and other of the really small firms don’t actively recycle, it is important to note that they tend to minimize wood waste because they have been trained to do so. And finally, many of these firms already see themselves inherently ‘green’ because they are working with wood, a renewable resource.

In practice, the majority (26) firms have taken measures to reduce wood waste and pollution streams. For one owner, “[w]e are 99.9% recyclable, we only produce about 4 trash bags of waste a year which is usually disposable gloves.” Indeed, many firms have found increasing economic benefits to recycling, notably in the suburbs and Fraser Valley from selling their wood waste to local farmers. As one respondent in the Fraser Valley said, “[w]e bought a wood grinder and have gone from approximately spending \$800/month on disposal of wood waste to \$150/month. A company picks up our sawdust for a small fee and they sell it to local farmers. It’s the right thing to do for various reasons.”

The distinguishing feature of the five Category 3 firms stems from their investments in anti-pollution technology as well as in wood recycling. One owner commented that as a company, they looked at their energy management and decided to install a computerized waste gate system to improve dust collection. This technology cost the company an extra \$25,000 four years ago and he thought it would take 10 years to see a payback in energy savings. Another owner indicated that they improved their insulation, lighting and installed new HVC units through a program supported by BC Hydro. The same owner added that he would be interested in installing solar panels or lessening the company’s carbon footprint in other ways if the government would create a program that would off-set the costs. A few firms expressed an interest in investing in various improvements but said the costs were prohibitive especially in this economic climate. A respondent said, “[w]e investigated what it would cost to use our cutoffs and scrap lumber to heat our building in the winter, but it was so prohibitively expensive for the small guy to invest in that technology.”

Figure 3.5. Commitment to Reducing Wood Waste and Pollution; by region (n=41)



In general for these SMEs greening is a financial decision and while location and size matter so do other factors related to the specific activities of firms and their consumer relations, experience with certification and personal considerations.

3.4.2. Reflections and conclusions on flexibly specialized green entrepreneurship

In the context of the Lower Mainland’s value-added wood industries this chapter has sought to assess potentially promising mutually reinforcing relationships between green entrepreneurship and flexible specialization conceived as localized clusters of interacting SMEs. From an environmental perspective, the interviewed firms did reveal environmental awareness and commitment to green entrepreneurship as indicated by the number of firms environmentally certified, who were thinking about it and who had taken other measures to improve environmental performance. But this awareness and these commitments on the whole are rather modest, and variable. There is confusion about appropriate forms of certification, its value to firms is ambiguous, and for small firms the administrative costs can be high. Little real innovativeness or leadership was evident to support emergence of “green green” entrepreneurs while several firms either

ignored environmental imperatives or responded in purely reactive ways. Indeed, little or no evidence was found regarding the collective creation, sharing and dissemination of environmental information or consciousness among the firms or in the associations. In general the ideals proposed for value-adding wood processing activities in *Forestopia* (Parfitt and M'Gonigle, 1994) remain to be realized. This is not to say such ideals should be abandoned. Rather, they need to be promoted in pragmatic ways that are based on an understanding of the actual environmental performance and attitudes of SMEs. In this regard, there needs to be recognition of the need for stronger information programs and leadership by both firms and associations. From a policy perspective the provincial government may wish to tie the funding of local wood associations to the promotion of environmental values. In addition, the big building store chains, such as IKEA, Rona, and Home Depot perhaps could be in some way encouraged to buy from local small firms as well as large-scale suppliers.

With respect to the broader literature on flexibly specialized green entrepreneurship the proposal is for a more rigorous investigation of the criteria for the classification of variations in environmental awareness and performance and application to a wider range of geographical and industrial contexts, and a wider size range of firms, than has been possible in this study. Such investigations – an approach not dissimilar to attempts to classify the export commitment and performance of SMEs (Hayter, 1986) – have theoretical and practical value. Thus the classification of firms into different categories or stages of green (and green green) entrepreneurship could be correlated with other aspects of behaviour and social impacts, and be used to identify potentials for improvement. More direct research into how networking within clusters promotes or inhibits the diffusion of green entrepreneurship would also be useful, especially if integrated with the idea of social capital (Kusakabe, 2012). Such studies would contribute to Gibbs and O'Neil's (2012) agenda for an economic geography of green entrepreneurship. In policy terms such a classification recognizes that initiatives and drivers of change need to be related to different capabilities and attitudes, with a view to populations of SMEs transitioning through the various stages.

The dramatic changes brought on by the environmental movement over the past two decades have had far-reaching implications and opportunities for the BC forest industry. “From certified sustainable forestry management practices to the introduction of non-food based biofuel production, the forestry industry has many opportunities to explore within the green movement” (Tulloch, 2008, para.14). The research institutes and the government over the past decade has supported the move toward higher value-added products such as Oriented Strand Board (OSB) particle board and the creation of bio-fuels, however the volume of these goods remains marginal and their overall impact economically and environmentally remain elusive. There is a growing commitment amongst the largest lumber retailers, Home Depot and Rona, to increase their supply of eco-certified wood; however, the same commitment is not evident with the value-added manufacturers.

Many subscribe to the idea that British Columbia should focus on a model exemplified by twin pillars, one based on emerging value-added product markets and the other focusing on sustaining the environment. Decades after *Forestopia*, Parfitt (2011) continues to champion the idea that healthy forests, and a healthy, diversified forest industry as crucial for sustaining BC’s environment and economy. As the vision set forth by the provincial government in the 2009 Report, *Generating More Value from the Forests*, states:

By 2020, British Columbia’s environmentally sustainable forest sector will generate more economic value per hectare of forest land than any other jurisdiction on earth. Such economic activity will be driven by a more diversified and high value manufacturing capacity and expanded markets. This will be achieved through innovation and a broad partnership among forest stakeholders, ranging from governments to First Nations to industries and workers; from small firms to global companies; from rural communities to large urban centres. (p. 12)

The question remains whether or not British Columbia can radically restructure its forest industry to realize *Forestopia*.

4. Conclusions

BC's forests are one of its most valuable assets. The period of the 'Fordist' boom lead to a rapid expansion of commodity exports creating huge economic gains throughout the province. However, there has been a sharp drop in the relative importance of forest products in BC as a job, income or export generator. For example, forest product exports declined from comprising nearly half the provincial export economy in 2002 to just over 30% today (Cayo, 2012). The forest industry is no longer an economic juggernaut. Sputtering along, the sector has been greatly impacted by global recessions, increased environmental oversights, aboriginal land rights and growing global competition from lower cost regions. Since the early 1980s, BC's forest economy has adjusted to a 'post-Fordist' economy, where large firms and mass production are being supplemented with SMEs which are more "flexible" organizations. British Columbia's once mighty forest sector has undergone restructuring and is a good case study with which to focus on the role of flexible specialization, industrial districts of SMEs and environmental sustainability. In this context of crisis and restructuring there have been many pleas for the industry to give greater emphasis to value-adding activities and small firms. This thesis examined this suggestion in terms of the location dynamics of small wood processing firms in the Lower Mainland region and how these activities can increase jobs while sustaining the environment.

This conclusion is organized in two sections. The first section explores the main points and findings in chapters two and three. The second section discusses the research questions and suggests further areas of research, specifically with respect to labour supply, training, uptake of R&D and themes of green entrepreneurship and environmental sustainability.

4.1. Summary of Findings

The main goal of this thesis was to address the relationships between flexible specialization, location dynamics, urban agglomeration and green entrepreneurship with particular reference to the value-added wood manufactures in the Lower Mainland. Piore and Sabel's (1984) flexible specialization has become an important theme in economic geography in understanding the agglomeration of economic activities as organized by small firms. This study examined flexible specialization in terms of location dynamics and elaborated on the idea in the context of wood processing with respect to environmental concerns. Various literature has been reviewed, yet the intersection between flexible specialization and environmental issues around sustainability has been neglected. In addition, the source of entrepreneurs, as well as the nascent sub-section of green entrepreneurship, in this literature, has either been taken as a given or completely ignored and therefore needed to be examined further. While flexible specialization literature has been mainly concerned with jobs and local development, this study addresses the environmental issues as well. This thesis contributed to the debate on location dynamics, flexible specialization, urban agglomeration and environmental sustainability in several ways. It explored the characteristics of wood value-added activities in the Lower Mainland in terms of key dimensions of the flexible specialization model, especially with respect to location dynamics, labour, the supply of entrepreneurship, networking among firms via associations, and innovation efforts. In addition, it also assessed the polemics of *Forestopia*.

Despite the cyclical nature of the forest industry, the 1990s were a time of growth in terms of numbers of firms, sales and employment in the value-added wood manufacturing sector in British Columbia (Stennes and Wilson, 2008). The growth of the 1990s notwithstanding, this sector remains small in terms of revenues and employment numbers. In a survey of secondary wood manufacturers in BC, for the Canadian Forest Service, Stennes and Wilson (2008) reported that a third of the firms were selling \$1 million or less, while 70% earned revenues of \$6 million. For our study 24% of our firms reported selling \$1 million or less, while 63% of our firms reported revenues of \$5 million or less. In terms of plant size distribution, our research mirrors that of Stennes and

Wilson's (2008) survey and earlier more partial surveys (Rees and Hayter 1996; Reiffenstein et al. 2001) and consultants' reports into BC's wood value-added industries which reported that most firms were non-union with a median number of employees at 12, and very few large firms. Much research has touted the necessity of moving toward a value-added focus to increase jobs; however, employment numbers *per firm* have not increased significantly since the 1990s. Stennes and Wilson's (2008) survey also stated the biggest constraints to expansion were: labour, wood supply and then markets. Our findings overlap but differ; thus our firms ranked: markets, land and taxes, wood supply and then labour as the biggest challenge.

Stennes and Wilson's (2008) work suggested research was needed to provide a better understanding of location rationale for these value-added wood manufacturers in urban areas. Our study found that the variety of benefits provided by agglomeration economies in the Lower Mainland is the primary reason for location even if all of these firms don't access all of the positive externalities. These benefits, such as, a history of wood processing activities, geographic proximity to domestic and international markets, strong supply chains, a large local labour pool, and infrastructure might be a challenge to recreate in more rural resource areas in the province where jobs are desperately needed. However, growth in the value-added sector in more rural communities like Prince George or Quesnel could be possible since there are low barriers to entry in this sector.

Historically, the Lower Mainland has been a significant wood processing centre and therefore home to an extensive labour pool which saw opportunities to start businesses locally which is consistent with the seed-bed hypothesis which states that to minimize risk, people start businesses close to their homes. Despite this, the supply of entrepreneurs is difficult to ascertain. Not only are entrepreneurs in short supply, but so are young people interested in pursuing a career in the forestry sector. DeLong et al. (2004) and Kozak (2007) suggest that a highly skilled workforce and improved training is a necessity if this sector is to be competitive. Despite the fact that a majority of firms claimed that there was a lack of highly skilled workers in their field, few firms acknowledged a commitment to pay for training outside the workplace. This lack of

skilled workers exists at all levels of the forestry sectors. A recent article in *The Vancouver Sun* suggested that training throughout the forestry sector is crucial to its survival. In order to increase job training sector wide the article noted that old sawmills, in Prince George, BC and High Prairie, AB “are gaining new life as training centres to address the skilled-labour shortage that has hit the forest industry as it pulls out of the deepest downturn in its history” (Hamilton, 2012). Keta Kosman, publisher of *Madison’s Canadian Lumber Reporter* said:

There is going to be a serious supply-chain issue coming soon because the industry has been gutted, the workers are not in the business anymore. They have moved on or have retired. Their equipment has been repossessed or they are working in other sectors or have moved to other regions (Hamilton, 2012).

Not only are there few workers with the experience necessary, the industry faces stiff competition from the Alberta oil sands. Statistics Canada reported as of July 2012, the average weekly wage for those employed in the BC sawmill was \$1,109 compared to the average weekly wage in the Alberta oil industry of \$2,297. Attracting, retaining and training employees in the forestry industry needs to be a priority at the firm level but also government support is needed as well.

Significant research over the past two decades has reported the following constraints to growth in the value-added wood manufacturing sector as: markets, wood supply, labour and finance. The limitations to market diversification were clear from the research. The major avenue to reaching new markets was through association membership, but this seemed limited to historically favorable markets such as Japan and Europe. None of the firms were using the web to reach new markets which was consistent with Kozak’s (2002) findings a decade ago. Perhaps even more significantly personal contacts with new markets were not being made, or at least limited in nature. All value-added wood manufacturers continue to struggle to some degree against the fragile US economy and competition from low-cost producers as well as dwindling fibre supply in the aftermath of the pine beetle infestation and tightening restrictions on use of old-growth forests. Consistent investment around innovation, the key to economic viability, was sporadic amongst our cohort. These small firms seem often unwilling and

unable to devote the time and resources to diversify their products or reach new markets.

Many claim that making wood fibre more readily accessible to producers has resulted in sector growth; however, the value-added lumber sector in BC has yet to capitalize on this opportunity. Wood supply is reported in the majority of studies as the greatest challenge; even so, the overwhelming majority of the interviewed firms reported BC markets sales as the source of their lumber. Kozak (2007) suggests that BC needs to re-examine its forest tenure and adapt it in such a way which would make it more conducive to higher margin wood products which seems to be discussed with every administration but without real change. Small firms need less fibre and can deal with a mix of fibre supply, because of these reasons; government should strenuously support the growth of SMEs in the forestry sector.

Certification in the forestry sector helped shift the landscape of sustainable production and consumption and has significantly raised the standards for forestry management. As an industry, some businesses are 'greening' their message with varying success. The VP of Canfor recently shared his 'green' approach to attracting and retaining younger workers, accentuating the sustainability of the sector. He said, "[s]ome folks have been turned off by going into forestry because of the experience their parents had during the lean years. There is a need for awareness building about what the industry is all about. It is sustainable, it is green and it's also technologically very forward-thinking" (Hamilton, 2012). The 'green' credentials of the value-added manufactures were minimal and few of the owners could be categorized as 'ecopreneurs'. These firms did not seem to be in business to make a positive environmental impact, for many, it seemed to be an afterthought. Additionally, the technological innovativeness that the VP of Canfor speaks of was not demonstrated in our interviewed firms and is questionable since the industry has been gutted for decades.

Forestopia's vision for BC as a vibrant, economically and environmentally sustainable forest industry has not been realized at this point. This work was speculative, yet it lacked integration within the larger commodity sector and the

awareness of various components that are necessary for vibrant clusters of value-added SMEs: a supply of entrepreneurs, supply networks, large pool of local labour, networking and innovation. The nature of these small firms is that there is a high exit and entry rate which might not deliver the stable employment they profess. Finally, there is also a need to acknowledge that not all small value-added manufacturers are inherently environmentally aware or committed to sustainable business practices.

Finally, if the interviewed firms were specialized and flexible in many ways, the extent to which they are collectively flexible specialization is debatable. As a sector there are clear limits to their ability to innovate, adopt new technology, and diversify their markets as well as product mix.

4.2. Further Areas of Research

For decades, there has been a resounding call for restructuring of BC's forest sector toward value maximization. Despite various attempts by provincial governments, associations and research facilities, this transformation remains unrealized. The barriers to this transformation are many and one or two provincial policies around increasing timber supply to SMEs will not be enough. The focus, both on an industry level as well as provincially, needs to be on attracting and retaining a young workforce with incentives for training throughout one's career. This is essential for the forest industries survival and requires investigation. DeLong et al. (2007) suggested further case studies are needed to better assess how these firms can use the industry associations to partner with training and education efforts, leverage market research, and provide new incentives for product development and information. R&D is being done; however, the information is not being disseminated in a manner which these firms are likely to respond to, find relevant, or valuable. Possibly pilot projects need to be used in order to encourage the transfer of the specific R&D knowledge to some of these firms which could then be champions for the new products and processes. Our study concluded that those gaps still remain in those areas.

The economy and the environment were at odds a decade ago, but today, the majority of business owners have at least some awareness that there is a benefit to sustainable business practices. There is a spectrum of environmental performance among firms, and more research into the environmental practices of the value-added sector needs to be pursued to better investigate the existence of truly 'green' entrepreneurs and if regulatory change is necessary to engender innovation in the sector. Geographically, green entrepreneurs could perhaps benefit from their location within flexibly specialized clusters through networking and sharing of information, and possibly by incentives to innovate around sustainable goals. Through formal networks such as the associations, firms could share the costs of certification by creating a certification management group for example. This collective could provide the following benefits: substantial savings as compared to the cost of individual certification, reduced administrative costs, support on interpreting and meeting certification requirements, and assistance in market connections. There are a great many possibilities for environmental stewardship via networking and information sharing in terms of certification and recycling of waste that collectively, as clusters, would strengthen and actively promote collectively a "green" identity for this sector. Creating an institutional setting to complement and promote sustainable business practices in the value-added sector should be an objective in the Lower Mainland.

The idea of cooperation through clustering has taken root with a group of thirty value-added SMEs in Ontario as a means of boosting their output and speeding up their manufacturing process. The cluster, known as the Bluewater Alliance, has already seen in a year's time, a growth in sales and small gains in market share previously lost to competitors from abroad (Grant, 2012). To support their efforts further they are accessing the local colleges and universities to aid them in training as well as in market research. One member demonstrated his excitement for the alliance when he said, "[w]e can't beat China on price, but we can get there quicker and with better quality. Technology is the future for us. We might be behind Europe but with this alliance, we can catch up" (Grant, 2012). This might be the next necessary step for the value-added wood manufacturers in BC, creating alliances and cooperatives as well as actively

partnering with local universities/colleges and research institutes to support product development, market research, training, innovation and green initiatives.

As a whole, this sector has reached a critical mass, has diverse characteristics, but the trends are ambiguous. It seems that as a sector they should survive but they are very vulnerable. Whether or not wood value-added activities can be dispersed to the Interior of BC is an interesting question and requires further research. As the Lower Mainland becomes more costly and congested interior communities may become more attractive to investments in added-value wood. Finally, effective responses to problems with labour supply, training, and the dissemination and uptake of R&D will be required to strengthen this sector of the forest industry.

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Appendices

Appendix A.

Questionnaire for Value-Added Wood Manufacturers

A. General Information

Company Name: _____

Address: _____

Respondent: _____ Position: _____

Single Plant firm: _____

Domestic or Foreign Owned: _____

Approximate 2010 gross sales revenue:

- a) Less than a million b) 1-5 million c) 6-10 million d) 11-15 million e) 16-20 million f) 21-25 million g) over 26 million

What year was the company started? Where was it started, what was the size and scope of the company at start-up and how has it evolved since then? Why did you locate in the Lower Mainland?

Based on the majority of your 2010 sales (over 50%), please indicate your business type:

- a) Roundwood mill
- b) Reman products
- c) Engineered wood products
- d) Millwork
- e) Cabinets
- f) Furniture
- g) Pallets and containers
- h) Plywood and Panelboard
- i) Other

Spatial Characteristics: What are the core competitive advantages for small firms in the Lower Mainland? What are some of the disadvantages of location? Basically, why are small value-added manufacturing firms located in or near expensive urban areas?

B. Associations

Which associations do you belong to and for how long have you been a member? If not, why not?
What are the specific benefits your company has received from being a member of these associations? What is your level of involvement?

C. Labour

Please indicate the number of employees in 2010 and please indicate (circle) if they are unionized.

Unionized

_____	Full-time production staff (worked 220 days or more)	Yes or No
_____	Part-time production staff	Yes or No
_____	Full-time non-production staff	Yes or No
_____	Part-time non-production staff	Yes or No

Is there a lack of highly skilled workers in your field? What has been the trend over the past 5 yrs?

In terms of training, what programs are you familiar with that are training people in value-added wood products? Follow up: Have you sent your production employees to any of these off-site programs and if so, how did you measure the success of your investment?

D. Production Inputs

Please estimate the volume of wood raw material used in 2005 and 2010:

	2005	2010
Logs (m3)	_____	_____
Lumber (1kfbm)	_____	_____
Plywood (sq ft)	_____	_____

Other _____

Sources of lumber/logs supply in 2005 and 2010 approximate percent:

	2005	2010
BC Market Purchases	_____%	_____%
BC Timber Sales	_____%	_____%
Canadian Purchases outside of BC	____%	_____%
Other tenures	_____%	_____%
Imports from outside Canada	_____%	_____%

- either direct supply or in the form of lumber or log trade

Estimate Species use by total volume for 2010

Lodgepole pine _____%	Spruce _____%
Balsam _____%	Douglas-fir _____%
Hemlock _____%	Cedar _____%

Other Softwoods: (please specify)

Hardwoods: (please specify):

With respect to wood based inputs, has your company been challenged by the following over the past 5 years?

- a) Overall availability
- b) Desired species availability
- c) Price

Did you use environmentally certified wood in 2010?

What percentage of total wood used in 2010 was certified wood?

What type of certification?

What was the cost of certification to your company?

What is the value of certification to your company?

Does your company plan to increase or decrease or keep constant the amount of certified wood used?

If you did not use certified wood in 2010, why not and do you plan on using it in the future?

Have you been directly encouraged to use certified wood by the following over the past several years:

Customers/Market

BC Government

Environmental Groups

Suppliers

Other

How do you recycle your waste product and how have you invested in anti-pollution technology?
 Follow-up: How have you adapted your firm/factory for improving its impact environmentally? How important are environmental regulations to these improvements?

Follow up: In terms of environment, are you adding value through waste streams in any way? (pelletization or energy production)?

E. Products and Services

List the top 4 products manufactured at your plant and indicate approximate percentage of 2005 and 2010 total sales revenue.

	05'	'10
a) _____	_____	_____
b) _____	_____	_____
c) _____	_____	_____
d) _____	_____	_____

F. Markets

What are your current market areas by percentages %?

- a) BC _____%
- b) Canada outside BC _____%
- c) USA _____%
- d) Europe _____%
- e) Japan _____%
- d) China _____%
- Other _____%

What are some new market areas of interest? How have you learned about new markets? How long does it take to change production process to enter into a new market (be it domestic or foreign)?

Are you reaching your markets through the use of electronic commerce? If so, since when and in what ways?

- a) Website b) Sell on web c) Purchase or locate inputs using web

G. Capacity

What was the approximate percentage of capacity your plant was operating at in 2010?

_____ %

Are you running one or two shifts? _____

Do you plan on expanding your manufacturing capacity in the next three years (2012-2015)?

Yes No If yes, by what percentage _____ %

What is the impetus for investing in new equipment?

Since 2005 have you developed any new product lines or differentiated your product (s) in any way? Where did the initiative come from?

What are the constraints that exist to capacity expansion now and in the foreseeable future (please rank)?

- a) Wood supply b) Skilled labour c) Markets d) Finance
e) Mfg advice f) Other

Please expand on what it is specifically about these areas that has caused constraints for your firm.