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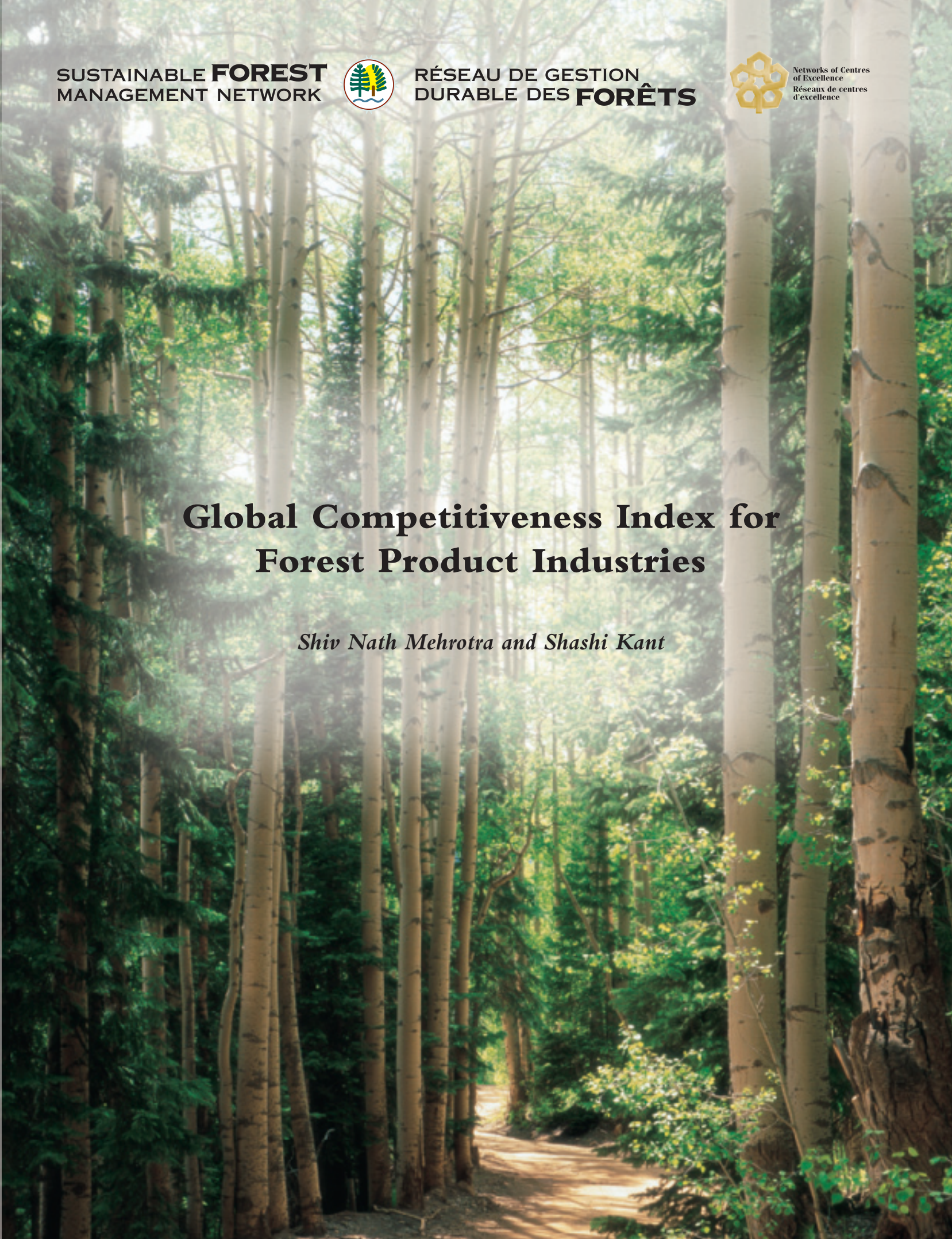

Global Competitiveness Index for Forest Product Industries

Shiv Nath Mehrotra and Shashi Kant

THE SUSTAINABLE FOREST MANAGEMENT NETWORK

Established in 1995, the Sustainable Forest Management Network (SFM Network) is an incorporated, non-profit research organization based at the University of Alberta in Edmonton, Alberta, Canada.

The SFM Network's mission is to:
- Deliver an internationally-recognized, interdisciplinary program that undertakes relevant university-based research;
- Develop networks of researchers, industry, government, Aboriginal, and non-government organization partners;
- Offer innovative approaches to knowledge transfer; and
- Train scientists and advanced practitioners to meet the challenges of natural resource management.

The SFM Network receives about 60% of its $7 million annual budget from the Networks of Centres of Excellence (NCE) Program, a Canadian initiative sponsored by the NSERC, SSHRC, and CIHR research granting councils. Other funding partners include the University of Alberta, governments, forest industries, Aboriginal groups, non-governmental organizations, and the BIOCAP Canada Foundation (through the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement).

KNOWLEDGE EXCHANGE AND TECHNOLOGY EXTENSION PROGRAM

The SFM Network completed approximately 334 research projects from 1995 – 2008. These projects enhanced the knowledge and understanding of many aspects of the boreal forest ecosystem, provided unique training opportunities for both graduate and undergraduate students and established a network of partnerships across Canada between researchers, government, forest companies and Aboriginal communities.

The SFM Network's research program was designed to contribute to the transition of the forestry sector from sustained yield forestry to sustainable forest management. Two key elements in this transition include:
- Development of strategies and tools to promote ecological, economic and social sustainability, and
- Transfer of knowledge and technology to inform policy makers and affect forest management practices.

In order to accomplish this transfer of knowledge, the research completed by the Network must be provided to the Network Partners in a variety of forms. The KETE Program is developing a series of tools to facilitate knowledge transfer to their Partners. The Partners' needs are highly variable, ranging from differences in institutional arrangements or corporate philosophies to the capacity to interpret and implement highly technical information. An assortment of strategies and tools is required to facilitate the exchange of information across scales and to a variety of audiences.

The KETE documents represent one element of the knowledge transfer process, and attempt to synthesize research results, from research conducted by the Network and elsewhere in Canada, into a SFM systems approach to assist foresters, planners and biologists with the development of alternative approaches to forest management planning and operational practices.

SFM NETWORK PARTNERS AND AFFILIATES AUGUST 2008

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Knowledge Exchange and Technology Extension Program (KETE)
Sustainable Forest Management Network

Global Competitiveness Index for Forest Product Industries

By

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EXECUTIVE SUMMARY

The process of globalization is producing new challenges and opportunities for the forest products industry. As firms and stakeholders at large respond to global changes, information on comparative competitive position is critical for efficient deployment of valuable resources. This study uses sector-specific Global Competitiveness Indices (GCI's) for benchmarking the performance of regions on selected indicators of the quality of business environment. The forest product industry GCI's are composed of seven sub-indices:

(i) factor conditions,
(ii) technology,
(iii) management systems,
(iv) markets,
(v) related and supporting industries,
(vi) government and public policies, and
(vii) company strategies.

This report covers two sectors of the forest products industry – softwood lumber and wood pulp. Data for the indices was collected through a survey, conducted in 2008, of senior industry executives and experts in six major trading countries/regions – Brazil, Canada, Chile, China, European Union, and USA.

Results show that Europe, USA and China, in that order, lead the softwood lumber GCI. Europe leads the markets, related and supporting industries, government and public policies and firm strategies sub-indices. USA leads in technology conditions and management systems while China outscores the competition in factor conditions. Canada, ranked fourth, suffers the most from poor market conditions (trade disputes with principal market, USA) and factor conditions (cost of timber, labour and energy).

Chile leads the wood pulp GCI, followed by Brazil and USA. Chile dominates the management systems, markets, related and supporting industries, government and public policies sub-indices. Brazil ranks among the top three positions on most sub-indices, as does USA. China, with overall fourth rank, leads the factor conditions, technology and management systems (shared with Chile) sub-indices but lags in other categories. Canada ranks last, performing poorly in technology conditions, management systems, market conditions, and firm strategies.

Among Canadian provinces, British Columbia leads the softwood lumber competitiveness index. British Columbia outscores Quebec, Ontario and Alberta on all sub-indices except factor conditions (lead – Quebec) and Government and Public Policies (lead – Ontario). Quebec leads the Canadian provinces in the wood pulp industry competitiveness index. Significantly, all provinces obtain very low scores on technology conditions in the wood pulp industry. Respondents identified bureaucratic red-tape and excessive government regulation of business, as well as inadequate government support for industry, as important obstacles to the global competitiveness of wood pulp and softwood lumber industry in Canada.

1.0 Introduction

In 2005, the forest products industry accounted for 2.9% of Canada's GDP and generated nearly 900,000 jobs spread across rural and urban Canada (Natural Resources Canada, 2006). The vast majority (55% by value, 2005) of its production is exported where it increasingly faces strong competition from rival producers from Europe, South America, and Asia. Softwood lumber forms the largest component of exports at 24%, followed by paper and pulp (17%), wood pulp (15%), newsprint (13%) and wood panels (12.4%) (Natural Resources Canada, 2006). The principal market for Canadian forest products exports is the United States (80% by value) which, along with the Finland and Sweden, has also been the traditional rival (Natural Resources Canada, 2006). For decades the Canadian forest products industry has held a comparative advantage, benefiting from access to its vast areas of natural forests and the high quality of timber available therein. These advantages were complemented by its proximity to the world's largest market (USA) for forest products, to which it has preferential access (North American Free Trade Agreement, 1994).

For decades the Canadian forest products industry has held a comparative advantage, benefiting from access to its vast areas of natural forests and high quality timber.

In the past decade these comparative advantages have been increasingly under threat from multiple sources (PricewaterhouseCoopers 2007). Foremost amongst the sources of threat is the development of new technologies enabling the use of non-traditional wood sources for the manufacture of products of comparable quality. Short rotation hardwoods grown in tropical plantations have emerged as an enormously cheaper substitute for the long-rotation wood grown in the temperate regions, in many applications. A second source of threat is a geographic shift in global forest products markets. With the rapid growth of Asian economies, the focus of global forest products markets is shifting away from the USA. Manufacturing activities, significant consumers of forest industry products, have been moving to low-cost Asia, drawing the forest products industry with it. Furthermore, the US market for some forest industry products, like newsprint, has matured and is even shrinking, while Asian and South American markets for these products exhibit significant potential for further growth. Emerging domestic markets in Asia and South America justify investments in large-scale and modern technology-based plants, while the Canadian pulp and paper industry faces stagnant or shrinking demand for its products in its traditional markets and struggles to find resources for investment in modernization.

Threats include new technologies enabling the use of non-traditional wood sources for the manufacture of products of comparable quality and a geographic shift in global markets.

Faced with these threats from globalization and coping with limitations of the domestic business environment, the Canadian forest products industry has responded with a wave of consolidation and rationalization (capacity rationalization) to improve cost competitiveness and profitability (Forest Products Association of Canada 2006). Moving up the value chain is a popular prescription for avoiding the commodity market trap and there are signs that the Canadian forest products industry is adopting this solution where feasible. Nevertheless, it is widely believed that existing measures do not adequately address the enormity of the challenges. At least in the short to medium term, the Canadian economy cannot escape the adverse consequences of a drastic restructuring of the industry (Forest Products Association of Canada 2006).

It is in this context that the present study seeks to benchmark the competitiveness of the global forest products industry. It seeks to highlight the strengths and weaknesses of the business environment of major participants for selected sectors of the forest products industry, to provide a basis for an informed debate and deliberation on future direction, and to aid in the identification of scope for profitable policy intervention.

Section 2 of this report briefly describes the available approaches for measuring and benchmarking competitiveness and discusses the theory underlying the competitiveness index, as well as its criticism. Section 3 discusses the composition of the competitiveness indices developed for the forest products industry. Section 4 discusses data collection and analysis methodology, and describes the survey data. The results of the study, the competitiveness indices, are presented in two parts. Part I presents the global competitiveness indices while Part II presents competitiveness indices for Canadian provinces.

2.0 Measuring and Benchmarking Competitiveness

There is no universally accepted definition of competitiveness, and its interpretation is context specific.

There is no universally accepted definition of competitiveness, and its interpretation is context specific. For example, the competitiveness of a firm is understood to refer to its potential for consistently superior returns for the factors of production engaged by it. In contrast, the competitiveness of a nation has been defined as the degree to which a country can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the long run (OECD 1992).

Approaches to the evaluation of competitiveness can be divided into absolute and relative measurements. The important prerequisites for absolute measurement are that the target attributes be quantifiable, and in order to be comparable, the other conditions be controllable. The first condition results in limiting the empirical exercise to quantifiable attributes only. The second condition can hardly be satisfied by complex social entities like firms or nations. This results in a loss of simplicity in the interpretation of the measurements, thus defeating the purpose of the exercise. An example of absolute measurement of competitiveness in the forest products industry is the application of single attribute measures of productivity (technical change) by Nagubadi and Zhang (2006) to the sawmilling and wood preservation industries in the USA and Canada.

Given the abstract nature of the term competitiveness, its communication is easier when expressed in relative terms.

Relative measures of competitiveness are popular because they avoid the pitfalls associated with absolute measures. Given the abstract nature of the term competitiveness, its communication is easier when expressed in relative terms. The index approach uses ordinal measurement techniques to convey the competitiveness of the subject entities. The index approach also recognizes that measuring competitiveness cannot be accomplished by measuring a single or a

few attributes but that it requires the measurement of multiple attributes to complete the picture. Brown and Oritz (2001) compares the forest processing investment environment in New Zealand, Australia, Chile, Russia, Sweden and the USA, providing an example of the application of relative measurement of competitiveness to the forest products industry.

Buckley *et al.* (1988) argues that when competitive advantage is seen as an asset to the holder, it is an input to the value addition process of the enterprise that benefits from it. Firms can be visualized as utilizing the competitive advantage asset in their value addition process to realize enhanced returns to factors of production. Therefore, when measuring competitiveness, it is necessary to measure not only the availability of competitive advantage as an asset or input, but also the efficiency with which it is put to use and the results obtained from its use. The point is that the mere availability of competitive advantage may not automatically translate to enhanced returns. Buckley *et al.* (1988) criticizes the use of single indicators for ignoring the fact that competitiveness is a process comprising of the generation and maintenance of competitive advantages (competitive potential), the process of managing decisions and processes in the 'right way' (management process) and the ability to perform well (competitive performance). Hence, a comprehensive evaluation of competitiveness must benchmark the target entity on all three processes. This study adopts a comprehensive approach to the evaluation of relative competitiveness.

The mere availability of competitive advantage may not automatically translate to enhanced returns.

The idea of the forest products industry global competitiveness index (GCI) stems principally from the global competitiveness index and business competitiveness index (BCI) developed by Michael Porter and published annually by the World Economic Forum in its publication titled *Global Competitiveness Report* (GCR). A competing annual index is published by the International Institute of Management Development (IMD), Switzerland and bears the title *World Competitiveness Index*, included in the journal *World Competitiveness Yearbook*. The stated purpose of these indices is to benchmark the competitive position of nations using a common evaluation framework with a view to serve as a guide to policy deliberation for governments and intellectuals. The published national scores and rankings are ordinal in nature, but provide significant information for policy makers and resource managers in terms of temporal analysis of country rankings as well as comparative analysis across nations at similar stages of economic development. The indices seek to induce informed debate on development strategies for nations and learning from successful strategies of the past.

The GCI is structured around the concept that productivity is the key to national competitiveness in the modern globalized economy. The GCR believes that traditional sources of comparative advantage like natural resource endowments, cheap labour or capital are nullified by the increasing ease and speed of mobility of these factors of production in the modern global economy. Commitment to investments in technological advancement is the only source of sustained competitive advantage according to the GCR (GCR 2003-2004). Thus, the GCI emphasizes the concept of productivity, seeking to rank nations according to their potential and achievement on this front.

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The GCI/BCI approach developed by Porter is widely acknowledged as a useful synthesis of the literature on economic growth and development – however, it is not without its critics.

The GCI/BCI approach developed by Porter is widely acknowledged as a useful synthesis of the enormous literature on economic growth and development. However, the approach is not without its critics such as Rugman (1991, 1992), Rugman and D'Cruz (1990, 1991, 1993), Moon *et al.* (1995) and Cartwright (1993). The principal criticism is directed at Porter's Diamond (Porter, 1990), a model that seeks to link the important indicators of competitiveness in the microenvironment and forms the basis for the BCI. These critics argue that in an attempt to develop a universally applicable model Porter misses the irrelevance of the 'home or local environment' for the modern firm or multinational. The multinational firm operates globally and chooses to locate its operations based on proximity to markets that permit the achievement of economies of scale. Similar criticism is directed at Porter's dismissal of the comparative advantage flowing from natural resource endowments. Several developed nations with significant natural resource endowments have small domestic markets and comparatively large international trade based on their natural resource. Small domestic markets are not conducive to development of industrial clusters but the reliance on international trade exposes the national firms to intense international competition and provides the opportunity to benefit from 'supranational' clusters. This seems to weaken the concept of domestic or local clusters, crucial to Porter's Diamond.

Porter's emphasis on clusters as an important indicator of productivity follows from his belief (Porter 1990) that natural resource dependent industries do not form the backbone of advanced modern economies, which are defined by technology intensive industries. Maskell and Lorenzen (2004) argue that clusters are a result of unstable supply and demand conditions, and cluster formation is a form of industrial organization aimed at reducing transaction costs. They suggest, in support of their arguments, that the phenomenon of clustering is common for "industries with highly ambiguous consumer tastes or customization, where firms form projects to find solutions to a specific consumer's demand within a definitive period". However, if a firm's upstream and downstream relations are stable, it will choose to benefit from networking or developing dyadic relations to reduce transaction costs. Since forest based industries like lumber, pulp and paper or even wood based panels have a relatively stable upstream and downstream environment, the significance of the absence of clusters to their competitiveness is questionable.

In the larger context of these debates, this study utilizes a framework for benchmarking the competitiveness of the forest products industry that accepts productivity as the key to competitiveness while accommodating the criticisms leveled at Porter's Diamond.

This study defines the competitiveness of a regions' industry as the attractiveness of the region to investments in the industry. The *World Competitiveness Yearbook* (2006) defines business competitiveness as "the ability to design, produce and market goods and services, the price and non-price characteristics of which form a more attractive package than those of competitors". Thus, it is a firm's customers which ultimately determine whether or not the firm is competitive.

However, industries, the collective of firms, do not compete in the sense that individual firms or nations do. It may be argued that industries like France's wine industry or Italy's furniture industry compete with similar industries elsewhere. But this competition is not in the same sense as the competition of individual firms. A nation's industry is not a distinct entity, mutually exclusive from another nation's industry. Firms in one nation routinely operate units in other nations. And these units of a multi-national firm, operating across nations, do not compete for markets or profits. Also, the firms in a nation do not act in concert to compete with the firms of other nations. Only individual firms compete. As a result, simply benchmarking the performance or prospects of the existing collective of firms cannot be the objective of a study of the competitiveness of a nation's industry.

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Nations compete as locations for industries. Investment in each industry seeks and is attracted to a distinct set of factors. The nations that offer the best combination of these desirable factors successfully attract investment in the corresponding industry. An enquiry into the competitiveness of industry in a region must be concerned with the ability of the region to compete with other regions in attracting investments for the industry. Thus, the investor is the ultimate arbiter of the competitiveness of a nation's industry. A study of the competitiveness of an industry across different regions of the world must compare the attractiveness of the regions to investors in the industry. It must look for indicators of attractiveness of the business environment specific to the industry, benchmarking regions on their relative performance on these indicators. The concept of a region's competitiveness for an industry used in this study most closely matches Storper's (1997) definition of location competitiveness, which is 'the ability of an (urban) economy to attract and maintain firms with stable or rising market shares in an activity while maintaining stable or increasing standards of living for those who participate in it'.

Investigating the competitiveness of industry in a region must address the ability of the region to compete with other regions in attracting investments for the industry.

3.0 Composition of the Competitiveness Indices

The guiding concept for development of the forest products industry competitiveness indices is Porter's Diamond (1990), which provides a framework of assessing the business environment quality. The diamond, so called because of its graphical presentation, consists of four interrelated dimensions of the business environment:

i) the factor conditions,

ii) the context for firm strategy and rivalry,

iii) the local demand conditions, and

iv) the presence of related and supporting industries.

Factor Conditions cover natural endowments, human resources, capital availability, physical infrastructure, as well as administrative, information, and scientific and technological infrastructure. ***Context for Firm Strategy and Rivalry***

describes local rules and incentives that encourage investment and productivity. It also encompasses openness to foreign and local competition. ***Local Demand Conditions*** refer to presence of demanding and sophisticated local customers and needs which imply challenging quality, safety and environmental standards. The presence of ***Related and Supporting Industries*** focuses on local presence of capable suppliers and supporting industries and the phenomenon of clusters (geographic concentration of firms and their related and supporting industries).

Two important ideas were also incorporated in the development of the competitiveness index for this study. The first relates to Buckley's (1998) definition of competitiveness as a comprehensive outcome of competitiveness potential, management process, and competitiveness performance. For example, sustainable timber availability is a competitiveness indicator identified under the factor conditions categories of Porter's Diamond (1990), which corresponds to the competitiveness potential category of Buckley *et al.* (1998). Corresponding to this indicator, quality of forest management and markets were identified as indicators of competitiveness management process and cost of timber was identified as an indicator of competitiveness performance. The second idea is related to the concept of 'supranational' clusters and the relevance of external environment encountered by firms in the course of international trade. This idea was incorporated by according equal weight to industry interaction with its external environment, domestic and international.

The global competitiveness index for forest products industry, developed for this study, comprises of seven categories of competitiveness indicators:

1) Factor conditions,
2) Technology,
3) Management systems,
4) Markets,
5) Related and supporting industries,
6) Government and public policies, and
7) Firm strategies.

Each category forms a sub-index that is made up of multiple competitiveness indicators. ***Factor Conditions*** cover the cost and availability of five factors – capital, energy, labour, timber, and transport infrastructure. ***Technology*** covers public and private investments in technology, R & D, and training. ***Management Systems*** cover public and private investments in management training and the adoption of management innovations. ***Markets*** cover growth rates and quality of demand in domestic and export markets, investments in marketing and product innovation, and quality of financial and equipment markets. ***Related and Supporting Industries*** cover quality of industry interaction with material and equipment suppliers, R & D service providers, trade associations and their geographic proximity (clusters). ***Government and Public Policies*** cover national forest policy and management systems, competition policy, policy on foreign

direct investment, environmental policy, government incentives for industry, taxation rates, bureaucratic red-tape, protection of intellectual property rights, regulated product standards, and existence of conflicts with traditionally forest dependent communities. ***Firm Strategies*** cover the focus and horizon of strategic plans adopted by firms.

4.0 Data Collection

Data for the index was generated by means of an executive survey. The survey questionnaire consisted of three parts:

a) Respondent opinion of industry competitiveness,

b) Respondent opinion of the quality of business environment of their industry in their country/region, and

c) Respondent opinion of relative importance of the seven categories of competitiveness indicators.

The first section asked respondents to contribute their definition of industry competitiveness, indentify and explain the most attractive investment destinations for their industry and to comment on the recent performance and expected future prospects of their industry, in their country/region. This section was included to identify omissions and bias in the adopted study methodology. The second section of the survey required respondents to record their opinion on the indicators of the business environment for their industry in their country/region on a discrete seven-point scale ranging from 1 (unfavourable) to 7 (favourable). The final section of the survey required respondents to assign weights to the seven competitiveness indicator categories.

4.1 Data Description

The softwood lumber and wood pulp sectors of the forest products industry were covered by the study[3]. The survey was administered over six countries/regions that were identified as the principal market participants in the selected forest products industry sectors. These included Brazil, Canada, Chile, China, Europe and the USA. The surveys were mailed to industry executives and experts, and responses were collected, from October 2007 to March 2008. A total of 167 valid survey responses were received. Figures 2 and 3 describe the distribution of valid survey responses by industry sector and country/region. The larger sample size of the softwood lumber industry corresponds to the larger population of independent, often small scale, business units in this sector. Similarly, the smaller sample size for wood pulp industry is accounted for by the smaller population of independent, mostly large scale, business units (Figure 3 depicts survey response distribution by firm size).

[3] The Oriented Strand Board (OSB) industry was also surveyed. However, owing to the small population of independent OSB manufacturing units and statistically insufficient survey response, the global competitiveness of the OSB industry is not reported in this study.

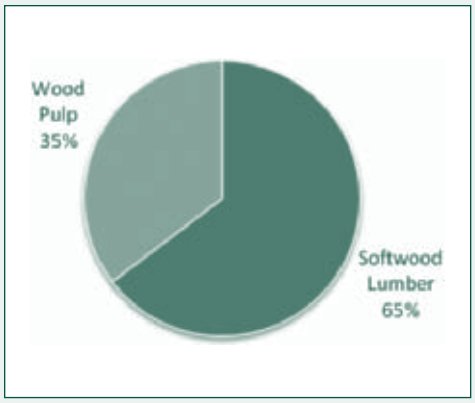

Figure 1. Survey response distribution by industry sector

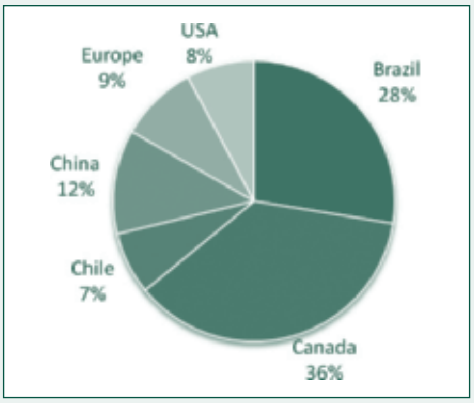

Figure 2. Survey response distribution by country/region

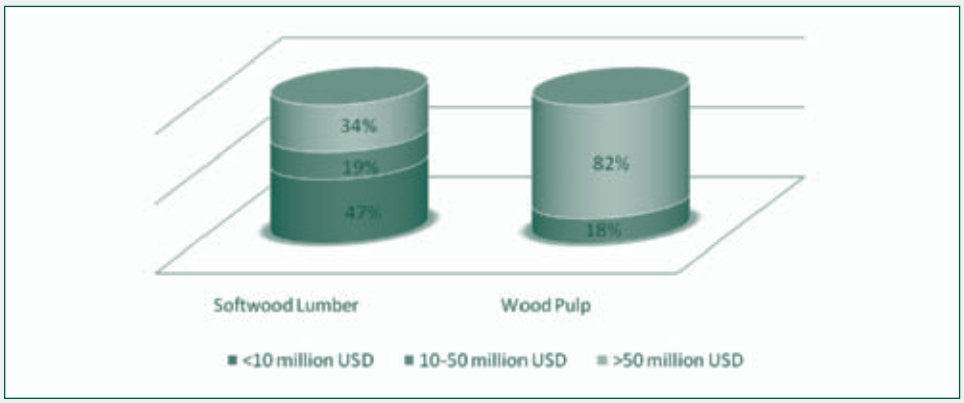

Figure 3. Survey response distribution (percentage) by annual firm sales (US$)

4.2 Data Analysis

The index was constructed in several stages. Indicator scores for a region were calculated as a simple average of respondent scores. From these average indicator scores the seven sub-indices were constructed by combining the corresponding indicator scores with equal weights. These sub-indices were combined with equal weights to create the global competitiveness index. Equal weights were used at all levels due to the absence of a theoretical basis for assigning weights. Inadequate data for a time series or cross-section analysis ruled out the use of analysis for determination of empirical weights. In the absence of a theoretical or empirical basis for ranking the relative importance of the seven categories, survey respondent assigned weights were considered. Approximately 50% of survey respondents chose to assign equal weights. This outcome provides reason to believe that the loss of accuracy from using equal weights, while inevitable, nevertheless produces useful results.

Amongst respondents that chose to assign unequal weights, the averaged weights display significantly higher values for the 'Factor conditions' and 'Markets' categories, while significantly lower values were assigned to 'Management systems' and 'Related and supporting industries' categories (Table 1).

Table 1. Average (percentage) weights assigned by respondents to competitiveness indicator categories

		Competitiveness Indicator Categories						
		Factor Conditions	Technology	Management Systems	Markets	Related and Supporting Industries	Government and Public Policies	Firm strategies
		Assigned Weights (%)						
Average 'not-equal' responses	Total	18	15	9	21	7	15	16
	Softwood Lumber	15	14	9	23	7	16	16
	Wood Pulp	21	15	8	17	7	14	16
Average all responses	Total	16	14	12	17	11	15	15
	Softwood Lumber	19	14	10	21	8	14	15
	Wood Pulp	15	14	12	18	11	15	15

Assignment of weights that differed significantly from an equal weighting scheme by a large number of respondents is an interesting result of the survey that could be the subject of future research. This study uses equal weights, which reflects the overall average survey response as much as insufficient knowledge about decision making by the investment community.

Part I

Global Competitiveness Index for Forest Product Industries

Survey results are presented in two parts. Part I presents the global competitiveness rankings while Part II presents competitiveness rankings for Canadian provinces. The competitiveness rankings and scores for the two forest product industry sectors, softwood lumber and wood pulp, are presented in increasing level of detail in two sections. Each section starts with a graphical presentation and discussion of the overall competitiveness index scores. In a following sub-section, the composition of overall competitiveness scores are explained and discussed. The sub-section presents the scores for the seven competitiveness sub-indices and an accompanying table presents the relative scores on each indicator of competitiveness for the seven sub-indices. To help interpret the relative scores on competitiveness indicators, a table lists the overall average score for each competitiveness indicator and the positive or negative (percentage) deviations of individual country/region scores from the overall average score. A concluding sub-section summarizes the results for the industry.

5.0 Global Competitiveness Index for the Softwood Lumber Industry

The global competitiveness index scores for the softwood lumber industry are presented in Figure 4. Europe leads the Index (Austria, Finland, Germany and Sweden are the countries in Europe covered by the softwood lumber industry survey). USA ranks second, followed by China in third position. Canada takes the fourth position, while Brazil and Chile rank fifth and sixth, respectively.

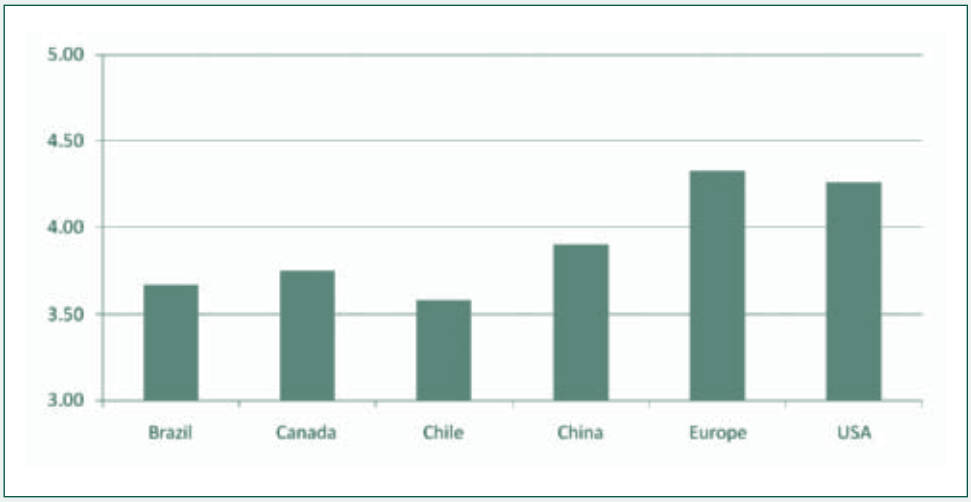

Figure 4. Softwood Lumber Industry Global Competitiveness Index scores

5.1 The Softwood Lumber Industry Global Competitiveness Sub-indices

Factor Conditions:

China leads the *Factor Conditions* sub-index, followed by USA, Europe, Chile, Canada and Brazil, in that order (Figure 5). The dominance of China in factor conditions is explained by the favourable cost of timber, labour, transportation, and capital (Table 2). USA performs best in timber availability, transport infrastructure and its cost, and capital access and its cost but lags in cost of timber. Europe scores well in capital access and its cost, labour availability and transport infrastructure but scores poorly on timber availability and its cost. Chile performs moderately well in cost and availability of labour, transport and capital but suffers from energy and timber cost and their availability. **Canada scores above average for timber and energy availability but is hurt by high labour costs and inadequate access to capital.** Brazil performs worst in labour, capital and transport infrastructure availability and cost of capital and transportation.

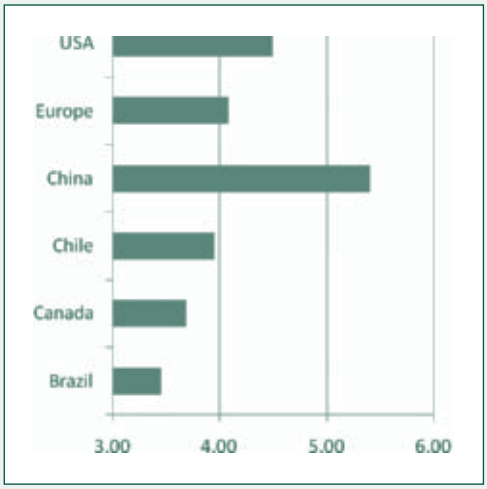

Figure 5. Global Softwood Lumber Industry Factor Conditions sub-index scores

Technology:

USA and Europe lead the *Technology* sub-index (Figure 6). USA performs strongly on all indictors in this category (Table 2), while Europe lags in patents filed and purchased. **Canada ranks third, scoring well for public infrastructure for technology R & D and moderately on other indicators of technology.** China ranks fourth, also scoring well on public infrastructure for technology R & D and on patents filed and purchased. Brazil and Chile rank fifth and sixth, respectively, scoring poorly on all technology indicators.

Figure 6. Global Softwood Lumber Industry Technology sub-index scores

Management Systems:

USA ranks first on the *Management Systems* sub-index (Figure 7) scoring high on all indicators in this category (Table 2). Europe ranks second, lagging in investment on management and service innovation. **Canada ranks third, getting moderate scores on most indicators.** China ranks fourth, scoring high on service innovation investment but poorly on investment in management innovation and quality of management in industry. Brazil ranks fifth with low scores on public infrastructure for management R & D and quality of management in industry. Chile ranks last with low scores on most indicators.

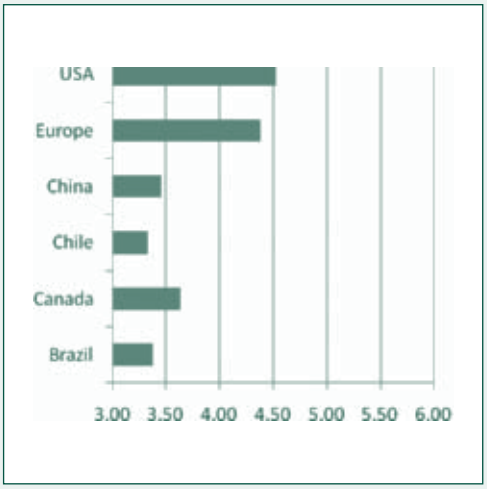

Figure 7. Global Softwood Lumber Industry Management Systems sub-index scores

Markets:

Europe ranks first in the *Markets* sub-index (Figure 8), out-scoring the competition on absence of trade disputes, quality consciousness of domestic customers, quality of machinery and equipment market and adoption of 'chain of custody' for forest certification (Table 2). However, it lags in domestic and export market growth rates. China ranks second, performing exceptionally well in growth rate of domestic market and scoring well on quality consciousness of customers in export markets. It also scores high on marketing innovation and absence of trade disputes while lagging in branding, financial market sophistication and adoption of chain of custody for forest certification. Brazil ranks third, getting moderate scores on most indicators. USA and Chile rank fourth. USA scores low on domestic market growth rate, and focus on marketing innovation. Chile gets low scores on most indicators. **Canada ranks last, suffering significantly from trade disputes and barriers, and scoring low on most other indicators.**

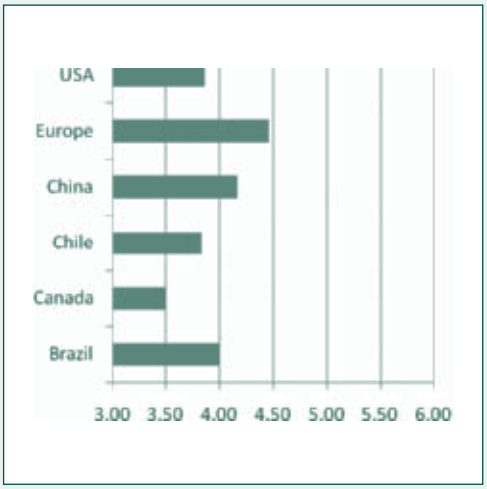

Figure 8. Global Softwood Lumber Industry Markets sub-index scores

Related and Supporting Industries:

USA and Europe lead the *Related and Supporting Industries* sub-index (Figure 9), scoring strongly on all indicators except the contribution of industry associations (Table 2). **Canada ranks third, scoring low on collaboration with material and machinery suppliers for innovation and presence of industry clusters.** Brazil, China and Chile rank fourth, fifth and sixth respectively, scoring low on all indicators.

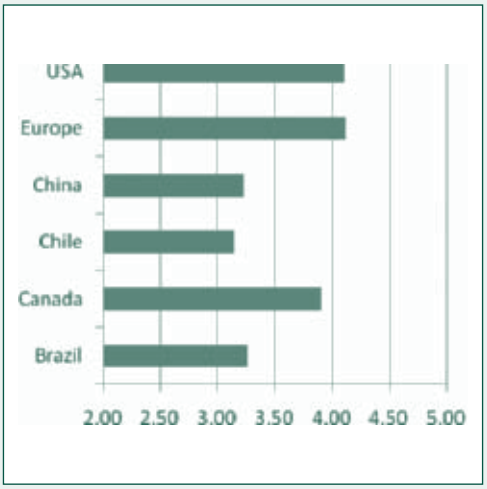

Figure 9. Global Softwood Lumber Industry Related and Supporting Industries sub-index scores

Government and Public Policies:

Europe leads the *Government and Public Policies* sub-index (Figure 10). It outscores rivals in absence of bureaucratic red-tape, national forest policy support for industry, free trade policy, protection of intellectual property rights, absence of conflicts with traditional forest dependent communities, quality and enforcement of forest management legislation, and public image of the industry (Table 2). USA ranks second, leading the scores in private investment in timber production, export promotion assistance for industry, tax incentives for capital investments, corporate and personal taxation rates, policy on foreign direct investment, and product quality standards. Chile ranks third with high scores for national forest policy support, efficiency gain from organization of forest ownership and timber sales, as well as public image of forestry, but lags in capital investment incentives, protection of intellectual property rights, and product quality standards. **Canada ranks fourth with high scores on export promotion assistance, tax incentives on R & D and capital investments but low scores on private investment in timber production**

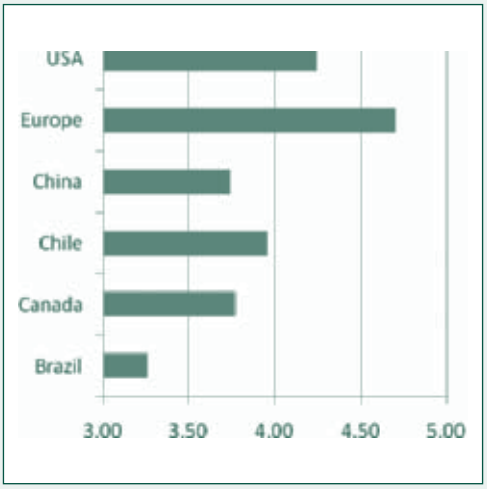

Figure 10. Global Softwood Lumber Industry Government and Public Policies sub-index scores

and conflicts with traditionally forest dependent communities. China ranks fifth with high national forest policy support for industry, low taxation rates, positive public image of the industry and private investment in timber production. Brazil ranks last with low scores on all indicators except private investment in timber production.

Firm Strategies:

Brazil ranks first in the *Firm Strategies sub-index* (Figure 11), leading the scores in all indicators (Table 2). USA ranks second with low strategic focus on product innovation and environmental issues. Europe ranks third, scoring high on length of planning horizon and moderate scores on all other indicators. **Canada ranks fourth with moderate, less than average scores.** Chile and China rank fifth and sixth respectively, with very low to moderate scores on most indicators.

Figure 11. Global Softwood Lumber Industry Firm Strategies sub-index scores

5.2 Summary

Europe and USA rank high in the global softwood lumber industry competitiveness rankings.

Europe and USA rank high in the softwood lumber industry competitiveness rankings, reflecting their leading position on a majority of indicators. Abundant domestic timber supplies, strong domestic markets for softwood lumber, sophisticated and demanding customers for high quality products, investment in technology and management innovation, open markets that foster a highly competitive environment and favourable government and public policies, all contribute to a conducive business environment.

China lags behind the leaders despite dominating the competition in factor conditions and the strength of its domestic market. While sustainable access to adequate timber supplies remains a concern, the low quality of technology and management systems, as well as a lack of strategic focus on these factors, points to investment opportunities in raising customer product quality consciousness. Government policies can contribute by attending to the low environmental standards and providing investment incentives for industry.

The long-standing softwood lumber trade dispute with USA, access to which market sustains its industry, is the key to the competitive position of Canada. Insufficient investment in technology and management innovation reduce competitiveness, even while they themselves may be the consequence of the trade

dispute. High factor costs, conflicts with traditionally forest dependent communities, marginal role of private investment in timber production and unfavourable public image of the industry further detract from Canada's competitiveness.

Brazil and Chile rank on the lower end of the softwood lumber industry competitiveness index with smaller industries, principally oriented to serving their comparatively small domestic markets. With relatively low overall competitiveness of the industry in these countries, increasing timber production may be a prerequisite for attracting investment and improving competitiveness.

Table 2. Percentage deviations from average global competitiveness indicator scores – Softwood Lumber Industry

Competitiveness Indicators	Average Score	Brazil	Canada	Chile	China	Europe	USA
		(% Deviation from average score)					
Category: Factor Conditions							
Timber availability	4.33	-5	13	-8	-10	-41	21
Timber cost	3.26	7	-6	-1	69	-39	-32
Technical manpower availability	4.01	-29	4	5	47	19	5
Technical manpower cost	3.85	15	-36	30	61	-19	-2
Managerial manpower availability	4.47	-11	-8	12	39	7	12
Managerial manpower cost	4.35	20	-27	2	42	-11	-6
Energy availability	5.04	-8	9	-54	9	19	14
Energy cost	3.65	-9	10	-24	12	0	0
Transport infrastructure adequacy	4.36	-31	2	15	13	17	48
Transport cost	3.29	-29	-8	15	67	-2	22
Capital accessibility	3.61	-31	-12	14	55	48	35
Capital cost	3.36	-52	3	3	58	34	39
Technology							
Public technology R & D infrastructure quality	3.74	-38	15	-29	12	43	31
Industry process technology quality	4.34	-14	3	18	-31	23	28
Industry process innovation investment	3.64	-10	9	-17	-26	25	16
Industry product innovation investment	3.52	-1	1	-31	-4	20	10
Industry technology training investment	3.58	-8	5	-38	0	30	12
Industry patents filed	2.19	-7	-4	-14	55	-24	16
Industry patents purchased	2.02	-9	0	-23	49	-23	18

Table 2 continued

Competitiveness Indicators	Average Score	Brazil	Canada	Chile	China	Europe	USA
		(% Deviation from average score)					
Management Systems							
Public management R & D infrastructure quality	3.52	-29	7	-5	2	45	28
Industry management technology quality	3.89	-12	5	3	-38	29	32
Industry investment in management innovation	3.48	4	-1	-4	-28	5	22
Industry investment in service innovation	3.76	-5	-5	-23	41	1	16
Industry investment in management training	3.59	4	-8	-13	-3	21	22
Markets							
Domestic market growth rate	3.18	11	1	1	76	1	
Domestic customer quality consciousness	3.24	1	3	-11	-1	37	-7
Export market growth rate	3.12	9	-5	-12	-23	-12	44
Export market customer quality consciousness	3.72	3	-11	1	53	-4	-16
Trade disputes and barriers	3.82	20	-51	43	41	51	28
Priority accorded to marketing innovation	4.02	25	-16	-17	37	-9	-25
Price versus customer marketing focus	3.80	7	-13	20	16	17	-21
Branding investment	3.09	-2	3	-21	-26	19	26
Financial market sophistication	4.73	-6	-1	10	-30	22	30
Machinery and equipment market quality	5.26	-11	3	-11	4	16	12
Adoption of 'chain of custody' for forest certification	4.20	3	3	-2	-40	51	-26
Related and Supporting Industries							
Collaboration with machinery and material suppliers for innovation	3.80	3	-4	-6	-5	11	8
Collaboration with R & D service providers for innovation	3.22	-29	20	-34	9	21	14
Role of trade associations	4.02	-3	11	-18	-28	5	-0
Presence of industry clusters	3.50	-15	4	4	-17	18	32

Table 2 continued

Competitiveness Indicators	Average Score	Brazil	Canada	Chile	China	Europe	USA
		(% Deviation from average score)					
Government and Public Policies							
National forest policy support	3.12	-27	3	21	18	46	-11
Contribution of domestic forest ownership and timber supply organization to efficiency	3.53	-6	-4	28	-9	-1	24
Export promotion assistance for industry	3.10	-29	14	15	3	-14	25
Taxation incentives for capital investments	2.82	-21	19	-19	3	-21	18
Taxation incentives for R & D investments	3.08	-35	33	-6	-12	8	-19
Policy support for free trade	5.02	-6	-3	11	4	24	-5
Maturity of competition policy	3.81	-17	-5	2	10	46	15
Corporate and personal taxation rates	2.90	-32	3	7	14	30	34
Protection of intellectual property rights	3.80	-16	3	-18	-0	47	17
Absence of conflicts with traditional forest dependent communities	3.56	-19	-12	6	-5	72	44
Private investment in timber production	4.29	14	-33	9	31	11	45
Quality of environmental legislation	4.48	-12	3	7	-17	22	19
Quality of forest management legislation	4.23	-8	-1	5	-12	29	12
Forest management legislation enforcement	4.72	-5	5	-5	-20	20	-2
Public image of forest products industry	3.44	-10	-10	39	22	42	-29
Adopted product quality standards	4.98	-4	2	-15	0	3	16
Policy on foreign direct investment	4.07	-17	4	-2	8	1	23
Firm Strategies							
Strategic planning horizon	4.05	12	-8	-29	11	13	2
Incorporation of emerging environmental issues in strategic planning	3.80	29	-8	-36	-32	11	-11
Incorporation of macroeconomic issues in strategic planning	4.90	12	-6	2	-10	-7	2
Strategic focus on technological innovation	4.76	22	-4	-7	-37	-9	5

Table 2 continued

Competitiveness Indicators	Average Score	Brazil	Canada	Chile	China	Europe	USA
		(% Deviation from average score)					
Firm Strategies continued							
Strategic focus on management innovation	4.52	22	-3	-21	-36	-2	2
Strategic focus on product innovation	4.66	19	-7	-24	-3	7	-14
Strategic focus on market innovation	4.92	20	-10	-14	2	-3	-9
Strategic focus on service innovation	4.79	15	-10	-5	-6	-7	15
Corporate ethical standards	5.62	10	-9	23	-22	1	9

6.0 Global Competitiveness Index for the Wood Pulp Industry

Chile leads the competition in the wood pulp industry Global Competitiveness Index scores (Figure 12). It is followed by Brazil and USA, while China, Europe and Canada rank fourth, fifth and sixth, respectively (Finland, Germany, Sweden and the Arkhangelsk region of Russia – bordering Europe – were covered by the survey of wood pulp industry in Europe).

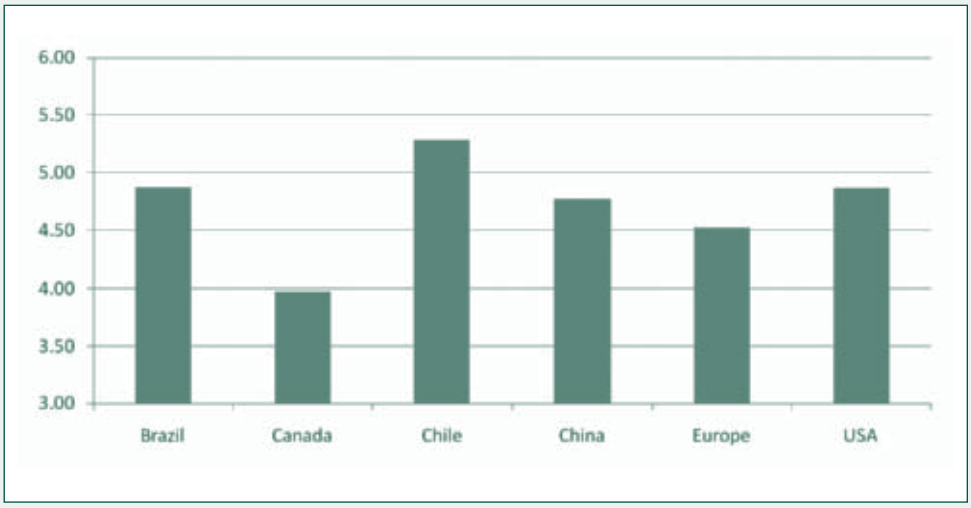

Figure 12. Wood Pulp Industry Global Competitiveness Index scores

6.1 The Wood Pulp Industry Global Competitiveness Sub-indices

Factor Conditions:

China leads the *Factor Conditions* sub-index (Figure 13), dominating the labour, energy, capital and transportation costs indicators while lagging in timber availability (Table 3). Chile ranks second, performing best in cost of technical manpower, and the availability of timber, transport infrastructure and capital and their cost. Chile lags in energy availability and its cost. Brazil and USA rank third. Brazil scores high on timber availability and the cost of timber and labour but suffers from capital and transport costs and infrastructure. USA leads in transport and capital costs and infrastructure but lags in timber, labour and energy costs. Europe ranks fifth, scoring well on transport infrastructure and capital costs but lagging in timber cost. **Canada ranks last with low scores in cost of timber, labour and transportation and average scores on most other indicators.**

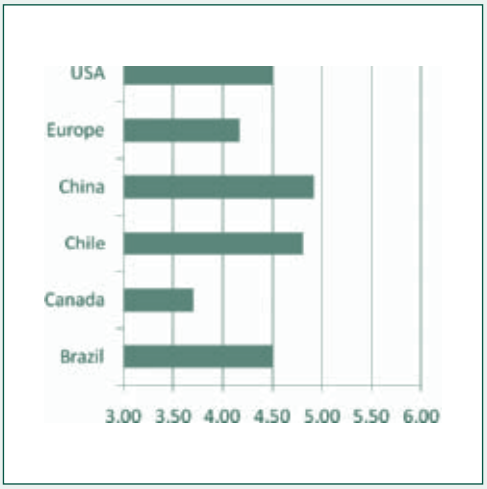

Figure 13. Global Wood Pulp Industry Factor Conditions sub-index scores

Technology:

China leads the *Technology* sub-index (Figure 14) and scores well on public R & D infrastructure, patents filed and purchased (Table 3). Chile follows with high quality of technology utilized, investment in process and product innovation and technology training of employees. Brazil ranks third with high scores on the same indictors as Chile but lags in public R & D infrastructure. USA ranks fourth with high scores on public R & D infrastructure, patents filed, quality of technology utilized and investment on product innovation. Europe ranks fifth, lagging in investment in process innovation and patents filed and purchased. **Canada ranks last with low scores on all indicators.**

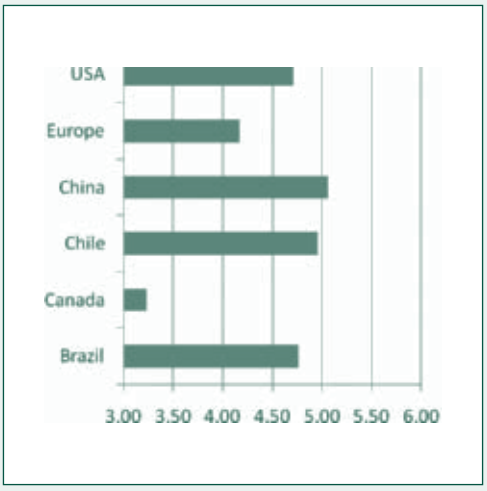

Figure 14. Global Wood Pulp Industry Technology sub-index scores

Management Systems:

Chile and China rank first and second, respectively, on *Management Systems* sub-index (Figure 15). They obtain high scores on all indicators in this category (Table 3). Brazil ranks third, lagging in public R & D infrastructure. USA ranks fourth, lagging in investment in service innovation and employee training. Europe ranks fifth, scoring high in employee training investment but lagging in service innovation investment. **Canada ranks last with low scores on all indicators in this category.**

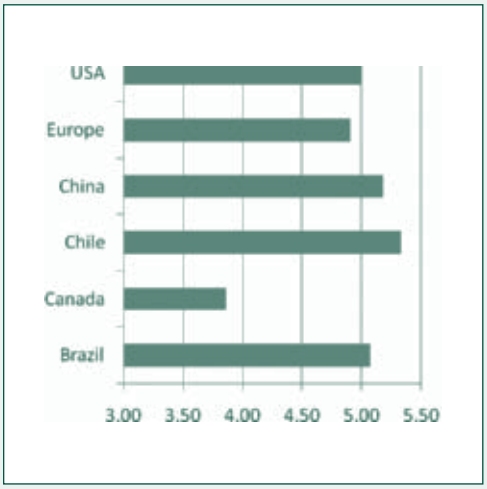

Figure 15. Global Wood Pulp Industry Management Systems sub-index scores

Markets:

Chile ranks first in the *Markets* sub-index (Figure 16), scoring well on domestic market growth rate, absence of trade barriers and disputes, customer focus of marketing, branding and marketing innovation investment, financial market sophistication and machinery and equipment market quality (Table 3). USA ranks second, with high scores on quality consciousness of domestic customers, export market growth rate, financial market sophistication, and machinery and equipment market quality. It lags in domestic market growth rate and adoption of 'chain of custody' for forest certification. Brazil ranks third with high domestic and export market growth rates, priority to marketing innovation and branding and adoption of 'chain of custody' for forest certification. Brazil lags in financial market sophistication and quality of machinery and equipment market. Europe ranks fourth with financial market sophistication and adoption of 'chain of custody' for forest certification but lags in domestic market growth rates and priority accorded to marketing innovation. China ranks fifth with exceptionally high growth rate of domestic market but gets low scores on domestic customer quality consciousness, export market growth rates, financial market sophistication and adoption of 'chain of custody' for forest certification. **Canada ranks last with low scores on domestic market growth rates and low focus on marketing innovation, customer focus of marketing and branding investment.**

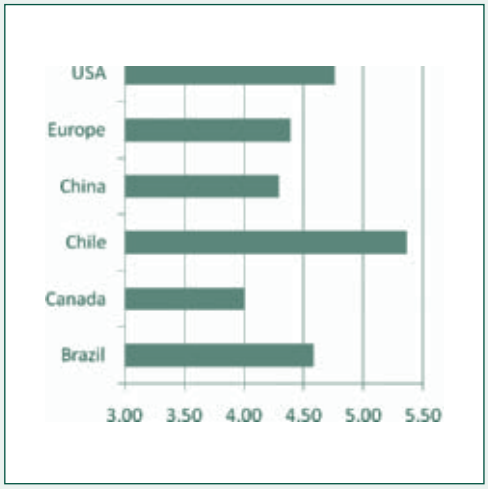

Figure 16. Global Wood Pulp Industry Markets sub-index scores

Related and Supporting Industries:

Chile leads the *Related and Supporting Industries* sub-index (Figure 17), scoring strongly on all indicators (Table 3). USA ranks second, lagging in collaboration for innovation with machinery and material providers and R & D service providers. Brazil ranks third, scoring low on presence of industry clusters. China ranks fourth with moderate scores on all indicators. **Canada ranks fifth with low scores on collaboration with machinery and equipment suppliers for innovation and presence of industry clusters.** Europe ranks last with low scores on collaboration with equipment and machinery suppliers and R & D service providers for innovation, as well as role of trade associations.

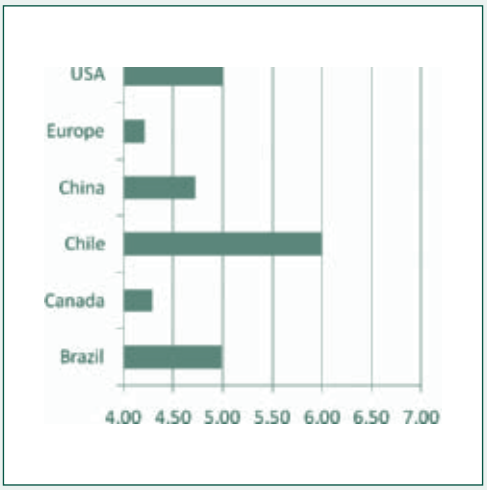

Figure 17. Global Wood Pulp Industry Related and Supporting Industries sub-index scores

Government and Public Policies:

Chile leads the *Government and Public Policies* sub-index (Figure 18), scoring well on all indicators except conflicts with traditionally forest dependent communities and quality of environmental regulation (Table 3). USA ranks second, lagging on tax incentives for R & D investment, public image of the industry and adopted product quality standards. Europe follows with low scores on national forest policy support and policy on foreign direct investment. China ranks fourth with low scores on export promotion assistance available to industry, tax incentives for R & D investments, and protection of intellectual property rights. Brazil ranks fifth with low scores on export promotion assistance, tax incentives on R & D investment, protection of intellectual property rights, corporate and personal taxation rates, and bureaucratic red-tape. **Canada ranks sixth with low scores for efficiency gain from structure of forest ownership and timber markets, private investment in timber production and public image of the industry.**

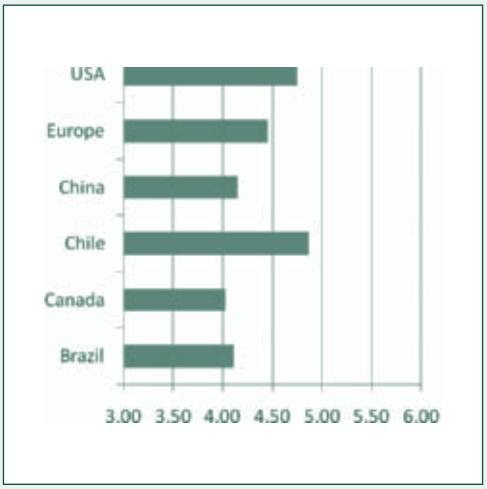

Figure 18. Global Wood Pulp Industry Government and Public Policies

Firm Strategies:

Brazil ranks first in the *Firm Strategies* sub-index (Figure 19), scoring strongly on all indicators (Table 3). Chile ranks second with low score on length of planning horizon and strategic focus on product innovation. Europe ranks third, scoring high on incorporation of environmental issues in strategic planning but low on strategic focus on product and market innovation. USA ranks fourth with low scores on planning horizon and strategic focus on product innovation. China ranks fifth with low scores on incorporation of environmental issues in strategic planning and corporate ethical standards. **Canada ranks sixth with low scores on all indicators.**

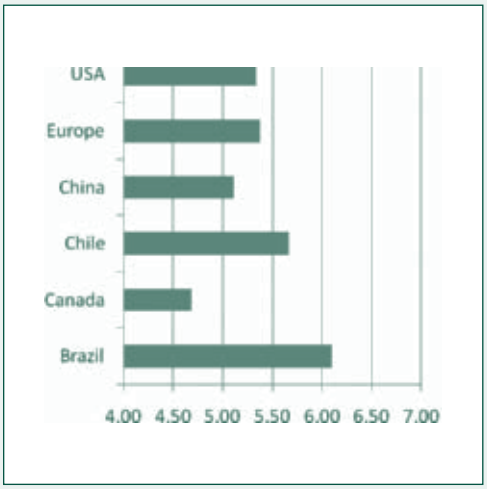

Figure 19. Global Wood Pulp Industry Firm Strategies sub-index scores

6.2 Summary

Chile's leading position in the wood pulp industry global competitiveness index is a result of sustainable, low cost timber supplies (investment in pulpwood plantations), investment in efficient technology and management systems as well as training and research facilities, investment in marketing to an expanding domestic and global market for its products, government incentives for investment and support for competition, and strategic focus of firms that reflects a healthy long-term outlook.

Brazil's wood pulp industry competitiveness mirrors that of Chile for the most part, falling behind in public infrastructure investment (transport network, research and training facilities), and government support for industry in the form of investment incentives. USA ranks second with Brazil despite high factor costs, making up with investment in technology and management systems, a strong market for exports and aided by support from government policies and investment incentives for industry.

China's wood pulp industry competitiveness is held back by inadequate timber supplies, which negates its factor cost advantage and strong domestic market.

Like USA, European and Canadian wood pulp industry competitiveness suffer from high factor costs. However, unlike USA, Europe's competitiveness also suffers from unsustainable timber supplies, low investment in innovation, and a weak export market. On the other hand, Canada's position at the bottom of the wood pulp industry competitiveness index is characterized by low investment in technology and management systems, weak domestic and export markets for its products, and absence of contribution from related and supporting industries.

Canada's low wood pulp industry competitiveness index is due to low investment in technology and management systems, weak domestic and export markets for its products, and absence of contribution from related and supporting industries.

Table 3. Percentage deviations from average global competitiveness indicator scores – Wood Pulp Industry							
Competitiveness Indicators	**Average Score**	**Brazil**	**Canada**	**Chile**	**China**	**Europe**	**USA**
		(% Deviation from average score)					
Category: Factor Conditions							
Timber availability	4.78	23	1	12	-29	-23	10
Timber cost	4.05	61	-29	32	4	-42	-44
Technical manpower availability	5.10	8	-14	-2	10	-2	23
Technical manpower cost	4.17	22	-33	44	42	-8	-34
Managerial manpower availability	5.34	1	-15	12	17	9	12
Managerial manpower cost	4.29	24	-34	-7	49	1	-42
Energy availability	4.90	-5	6	-39	-4	9	12
Energy cost	3.63	14	2	-36	13	-26	-31
Transport infrastructure adequacy	4.27	-39	0	48	8	29	46
Transport cost	3.30	-25	-16	51	51	-9	29
Capital accessibility	4.18	-8	-14	28	17	8	26
Capital cost	3.48	-28	-4	15	15	15	51
Technology							
Public technology R & D infrastructure quality	4.37	-10	-11	7	19	11	26
Industry process technology quality	4.76	27	-29	12	5	12	10
Industry process innovation investment	4.64	21	-20	22	10	-10	2
Industry product innovation investment	4.53	21	-21	10	10	-8	10
Industry technology training investment	4.75	14	-24	26	9	9	5
Industry patents filed	3.30	3	-38	41	51	-14	21
Industry patents purchased	3.27	6	-27	2	50	-18	7
Management Systems							
Public management R & D infrastructure quality	4.46	-10	-10	27	16	5	18
Industry management technology quality	4.98	10	-17	20	0	7	15
Industry investment in management innovation	4.63	15	-18	8	8	1	3
Industry investment in service innovation	4.54	17	-22	10	19	-4	-1
Industry investment in management training	4.77	10	-19	5	11	15	0

Table 3 continued

Competitiveness Indicators	Average Score	Brazil	Canada	Chile	China	Europe	USA
		(% Deviation from average score)					
Markets							
Domestic market growth rate	3.17	18	-46	47	74	-16	-21
Domestic customer quality consciousness	3.37	7	-7	9	-20	9	41
Export market growth rate	3.70	10	3	-1	-32	-8	53
Export market customer quality consciousness	4.27	2	-12	9	27	-11	-6
Trade disputes and barriers	5.13	-1	0	10	-8	5	10
Priority accorded to marketing innovation	4.66	21	-16	22	12	-21	-3
Price versus customer marketing focus	4.65	8	-12	29	3	8	-3
Branding investment	4.04	17	-17	73	-1	-1	-1
Financial market sophistication	4.68	-11	5	28	-27	14	39
Machinery and equipment market quality	5.02	-16	-1	33	4	6	25
Adoption of 'chain of custody' for forest certification	5.18	13	1	3	-27	16	-23
Related and Supporting Industries							
Collaboration with machinery and material suppliers for innovation	4.91	15	-9	22	-0	-12	-8
Collaboration with R & D service providers for innovation	5.16	10	-4	16	1	-13	-13
Role of trade associations	4.27	3	-3	40	-2	-26	29
Presence of industry clusters	4.32	-2	-17	39	7	12	27
Government and Public Policies							
National forest policy support	3.92	-8	-4	2	25	-11	2
Contribution of domestic forest ownership and timber supply organization to efficiency	3.98	15	-20	26	10	0	13
Export promotion assistance for industry	3.02	-10	-4	77	-11	5	16
Taxation incentives for capital investments	3.14	-2	-8	43	-8	11	27
Taxation incentives for R & D investments	3.64	-12	16	19	-18	-4	-11
Policy support for free trade	5.07	-6	2	12	-3	-1	8
Maturity of competition policy	4.33	-1	-8	8	-3	12	27
Corporate and personal taxation rates	3.37	-18	-7	29	13	4	34

Table 3 continued

Competitiveness Indicators	Average Score	Brazil	Canada	Chile	China	Europe	USA
		(% Deviation from average score)					
Government and Public Policies continued							
Bureaucratic red-tape	3.40	-12	-2	8	-3	37	-5
Protection of intellectual property rights	4.52	-15	3	33	-11	18	16
Conflicts with traditional forest dependent communities	3.83	1	0	-48	-14	13	50
Private investment in timber production	4.53	18	-33	25	12	18	32
Quality of environmental legislation	5.14	-4	4	-12	-7	4	12
Quality of forest management legislation	4.69	-3	-6	17	-2	14	17
Forest management legislation enforcement	5.19	-5	4	6	-9	6	11
Public image of forest products industry	3.81	8	-20	22	28	1	-15
Adopted product quality standards	5.92	4	0	7	0	-4	-11
Policy on foreign direct investment	4.45	-2	-8	35	15	-14	12
Firm Strategies							
Strategic planning horizon	4.91	28	-22	-25	10	9	-12
Incorporation of emerging environmental issues in strategic planning	5.26	15	-11	27	-20	14	8
Incorporation of macroeconomic issues in strategic planning	5.72	11	-8	11	-9	11	-1
Strategic focus on technological innovation	5.34	14	-13	12	-5	9	6
Strategic focus on management innovation	5.07	16	-20	25	5	2	12
Strategic focus on product innovation	5.02	20	-8	-7	6	-17	-20
Strategic focus on market innovation	5.09	13	-10	5	6	-12	-2
Strategic focus on service innovation	5.18	14	-10	3	0	-7	9
Corporate ethical standards	5.95	11	-4	12	-18	4	7

Part II

Competitiveness Index for Canadian Provinces

7.0 Canadian Province Data Description

Within Canada, the survey elicited provincial comparisons of Alberta, British Columbia (BC), Ontario and Quebec. Figures 20 and 21 depict the distribution by province of survey responses received from Canada.

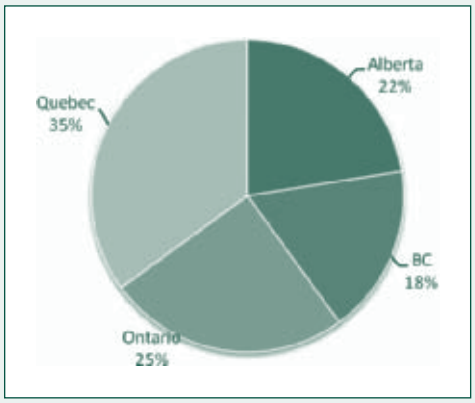

Figure 20. Softwood Lumber Industry survey response distribution by Canadian province

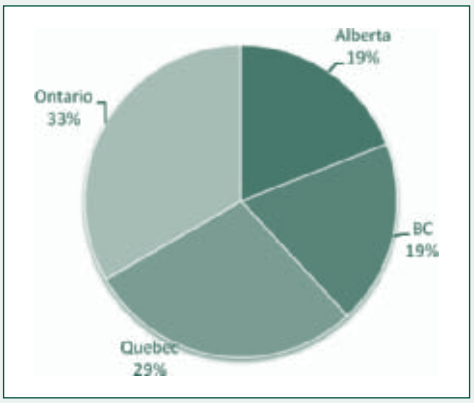

Figure 21. Wood Pulp Industry survey response distribution by Canadian province

8.0 Softwood Lumber Industry Competitiveness Index for Canadian Provinces

Figure 22 presents the softwood lumber industry competitiveness index scores for Canadian provinces. British Columbia (BC) leads the index. Quebec ranks second, closely followed by Ontario in third and Alberta in fourth position.

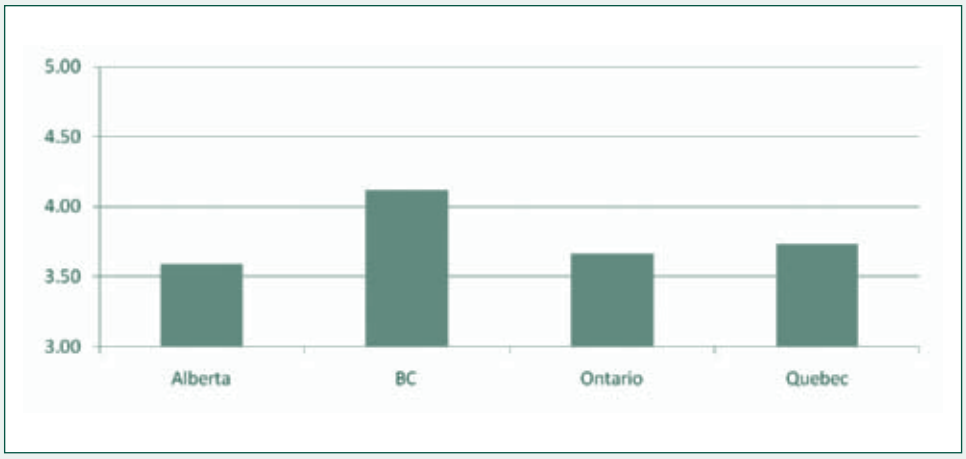

Figure 22. Softwood Lumber Industry competitiveness scores for Canadian provinces

8.1 Canadian Province Competitiveness Sub-indices for Softwood lumber Industry

Factor Conditions:

Quebec leads the *Factor Conditions* sub-index (Figure 23). It gets high scores for labour, energy, transport infrastructure and capital availability and their cost (Table 3). However, Quebec lags in timber availability and its cost. British Columbia follows in second place with high scores on energy cost and transport infrastructure but lower scores on labour, timber and capital availability. Alberta ranks third with high scores for timber availability and its cost but low scores for all other factors. Ontario ranks fourth, performing moderately well on labour cost and availability but poorly on all other factors.

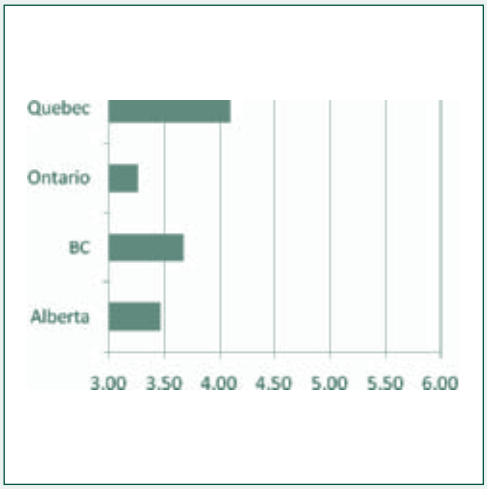

Figure 23. Provincial Softwood Lumber Industry Factor conditions sub-index scores

Technology:

British Columbia leads the *Technology* sub-index (Figure 24). It performs strongly on all indictors in this category (Table 3). Quebec ranks second with strong score for public R & D infrastructure and moderately high scores for industry investment in product and process innovations. Alberta ranks third with low scores for public R & D infrastructure and patents filed and purchased and moderate scores on other indicators. Ontario ranks fourth with low scores on all indicators except patents filed and purchased, where it gets moderate scores.

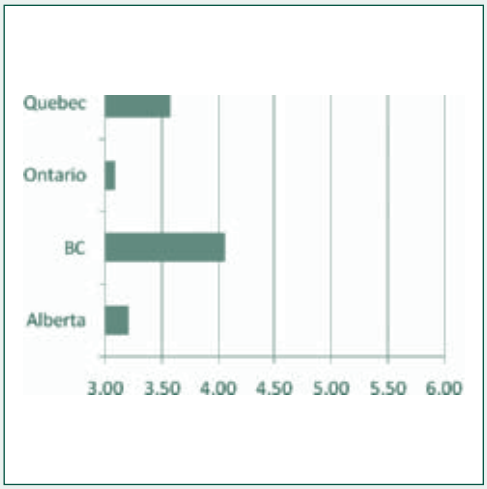

Figure 24. Provincial Softwood Lumber Industry Technology sub-index scores

Management Systems:

British Columbia ranks first on *Management Systems* sub-index (Figure 25). It scores highly on industry investment in management technology, innovation and training (Table 3). Alberta ranks second with moderately high scores in industry investment in management technology, innovation and training. Quebec ranks third with high scores for public R & D infrastructure but low scores for industry investment in management training. Ontario ranks fourth with low scores on public R & D infrastructure and industry investment in management technology and innovation.

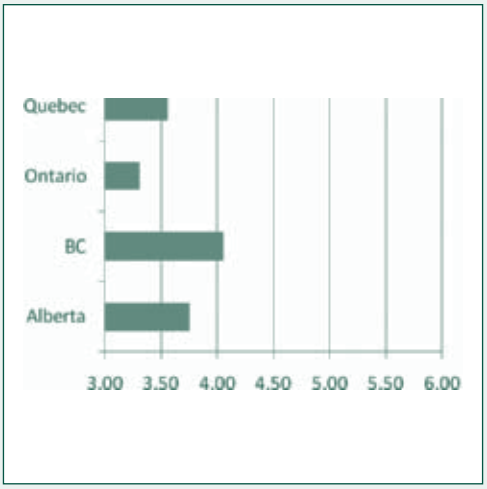

Figure 25. Provincial Softwood Lumber Industry Management Systems sub-index scores

Markets:

British Columbia ranks first in the *Markets* sub-index (Figure 26), scoring high on marketing innovation, customer focus, branding and adoption of 'chain of custody' for forest certification of timber (Table 3). Ontario ranks second with moderately high scores on marketing focus, branding and sophistication of financial markets. Alberta follows at third, lagging in domestic and export market growth rates and customer focus. Quebec ranks fourth with moderately low scores on most indicators.

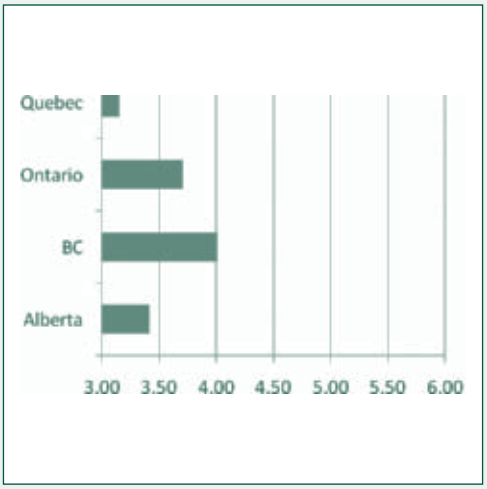

Figure 26. Provincial Softwood Lumber Industry Markets sub-index scores

Related and Supporting Industries:

British Columbia leads the *Related and Supporting Industries* sub-index (Figures 27). It scores well on all indictors in this category (Table 3). Quebec ranks second, lagging in collaboration with machinery and material suppliers for innovation. Ontario ranks third with moderately low scores on all indicators. Alberta ranks fourth with high score for collaboration with machinery and material suppliers for innovation but low scores on other indicators.

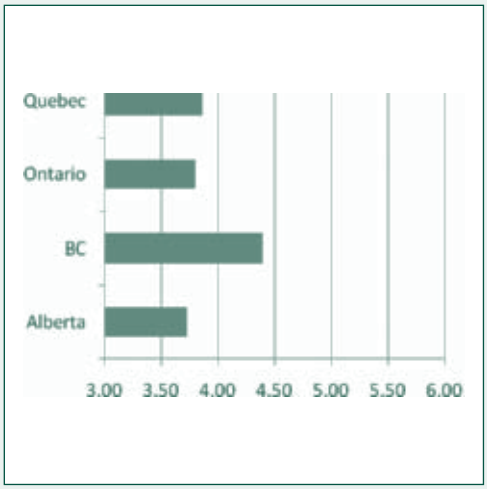

Figure 27. Provincial Softwood Lumber Industry Related and Supporting Industries sub-index scores

Government and Public Policies:

Ontario leads the *Government and Public Policies* sub-index (Figure 28). It leads the scores for quality of environmental legislation and forest management legislation and its enforcement (Table 3). British Columbia ranks second with high scores for maturity of competition policy, public image of industry, and adopted product quality standards. Alberta ranks third, leading in low taxation rates, absence of bureaucratic red-tape, protection of intellectual property and absence of conflicts with traditionally forest dependent communities. Quebec ranks fourth and gets a high score for private investment in timber production but moderately low scores on all other indicators.

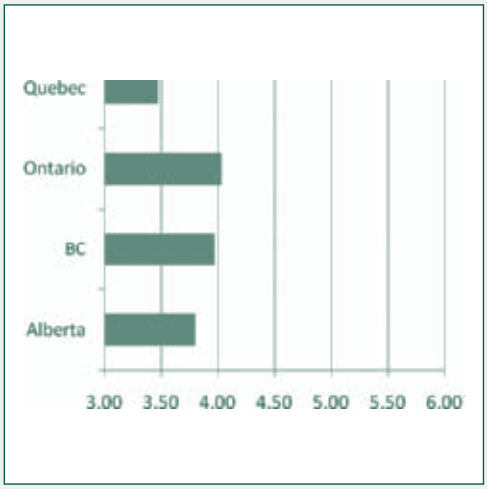

Figure 28. Provincial Softwood Lumber Industry Government and Public Policies sub-index scores

Firm Strategies:

British Columbia ranks first in the *Firm Strategies* sub-index (Figure 29), leading the scores on incorporation of environmental and macroeconomic issues in strategy and focus on technology, market and service innovation (Table 3). Ontario ranks second with high strategic focus on product, market and service innovation. Quebec ranks third, scoring high on length of planning horizon and moderate scores on all other indicators. Alberta ranks fourth with low scores on all indicators in this category.

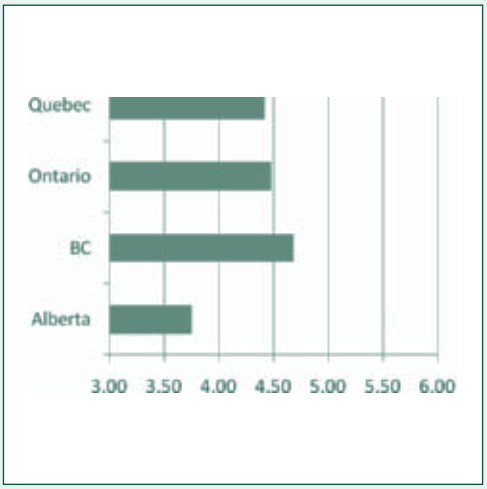

Figure 29. Provincial Softwood Lumber Industry Firm Strategies sub-index scores

8.2 Summary

The sources of British Columbia's softwood lumber industry competitiveness are investments in technology and market systems, investment in marketing innovation, support from related and supporting industries, policy and investment incentive support from the provincial government and the strategic focus of its firms. Quebec leads in factor conditions but lags in investment in technology and marketing systems, marketing investment, government policy support for competition, high taxation and bureaucratic red-tape, and unfavourable public image of industry. Ontario's competitiveness largely mirrors that of Quebec's, differing in its poor factor conditions but making this up in marketing focus of industry and government policy support. Alberta's industry has access to low cost and sustainable timber supply but other factors are neither abundant nor cheap. Alberta also lags on most other indicators of competitiveness.

Table 4. Percentage deviations from average Canadian province competitiveness indicator scores – Softwood Lumber Industry

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Category: Factor Conditions					
Timber availability	4.87	23	-15	-6	-3
Timber cost	3.57	60	3	-16	-22
Technical manpower availability	4.18	-20	-11	3	16
Technical manpower cost	3.12	-22	-9	1	15
Managerial manpower availability	4.10	-2	-20	10	5
Managerial manpower cost	3.49	-14	-19	0	15
Energy availability	5.50	-11	4	-9	12
Energy cost	3.97	-42	26	-43	35
Transport infrastructure adequacy	4.45	-8	9	-15	11
Transport cost	3.20	-20	-11	-10	21
Capital accessibility	3.18	-2	-19	-9	17
Capital cost	3.57	12	-7	-16	6
Technology					
Public technology R & D infrastructure quality	4.30	-15	3	-14	18
Industry process technology quality	4.45	5	16	-10	-4
Industry process innovation investment	3.95	1	16	-16	3
Industry product innovation investment	3.58	-10	24	-19	8
Industry technology training investment	3.77	0	17	-12	-1
Industry patents filed	2.11	-26	36	7	-5
Industry patents purchased	2.03	-23	27	5	-1
Management Systems					
Public management R & D infrastructure quality	3.77	-3	-1	-20	16
Industry management technology quality	4.08	9	9	-10	-4
Industry investment in management innovation	3.46	9	16	-20	-1
Industry investment in service innovation	3.56	-3	20	3	-10
Industry investment in management training	3.31	4	17	4	-14

Table 4 continued

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Markets					
Domestic market growth rate	2.78	-12	3	-6	11
Domestic customer quality consciousness	3.33	10	-5	2	-5
Export market growth rate	2.98	-22	6	4	8
Export market customer quality consciousness	3.30	1	8	-12	4
Trade disputes and barriers	1.88	-23	22	23	-12
Priority accorded to marketing innovation	3.38	-5	31	1	-13
Price versus customer marketing focus	3.30	-12	34	12	-18
Branding investment	3.18	8	39	20	-39
Financial market sophistication	4.68	16	-5	18	-21
Machinery and equipment market quality	5.44	-2	10	-2	-3
Adoption of 'chain of custody' for forest certification	4.33	-8	26	11	-16
Related and Supporting Industries					
Collaboration with machinery and material suppliers for innovation	3.66	25	2	-1	-16
Collaboration with R & D service providers for innovation	3.85	-5	15	-2	-3
Role of trade associations	4.48	-13	12	-4	5
Presence of industry clusters	3.65	-24	21	-4	8
Government and Public Policies					
National forest policy support	3.23	-7	2	-0	4
Contribution of domestic forest ownership and timber supply organization to efficiency	3.38	2	-3	-5	4
Export promotion assistance for industry	3.55	10	9	-1	-9
Taxation incentives for capital investments	3.35	-4	2	7	-4
Taxation incentives for R & D investments	4.08	-2	5	-7	3
Policy support for free trade	4.85	-15	18	28	-19
Maturity of competition policy	3.63	10	18	-0	-15
Corporate and personal taxation rates	2.98	20	-9	4	-11

Table 4 continued

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Government and Public Policies continued					
Bureaucratic red-tape	2.78	20	-12	12	-15
Protection of intellectual property rights	3.92	30	-20	5	-13
Absence of conflicts with traditional forest dependent communities	3.13	17	-18	6	-6
Private investment in timber production	2.88	-30	9	-17	27
Quality of environmental legislation	4.60	-1	-1	17	-11
Quality of forest management legislation	4.18	-15	6	25	-11
Forest management legislation enforcement	4.98	-6	12	13	-11
Public image of forest products industry	3.10	4	38	3	-24
Adopted product quality standards	5.08	3	13	-4	-6
Policy on foreign direct investment	4.21	-8	12	19	-14
Firm Strategies					
Strategic planning horizon	3.73	-11	-0	-3	9
Incorporation of emerging environmental issues in strategic planning	3.50	-2	6	9	-8
Incorporation of macroeconomic issues in strategic planning	4.60	-23	18	-7	10
Strategic focus on technological innovation	4.55	-22	13	3	5
Strategic focus on management innovation	4.40	-9	7	-5	6
Strategic focus on product innovation	4.33	-10	6	11	-4
Strategic focus on market innovation	4.45	-23	16	12	-2
Strategic focus on service innovation	4.30	-28	10	9	6
Corporate ethical standards	5.13	6	-2	1	-4

9.0 Wood Pulp Industry Competitiveness Index for Canadian Provinces

Quebec leads the Canadian provinces in the wood pulp industry Competitiveness Index scores (Figure 30). Alberta ranks second, while British Columbia ranks third and Ontario ranks fourth.

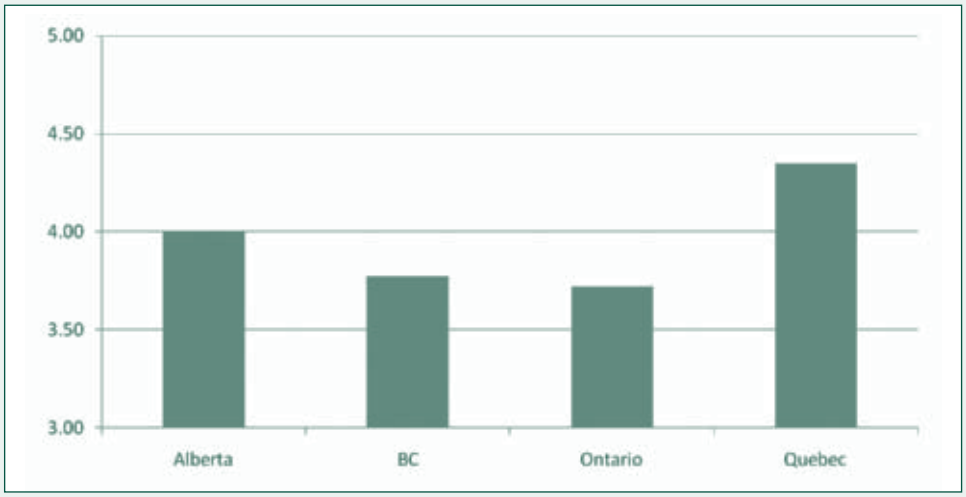

Figure 30. Wood Pulp Industry competitiveness scores for Canadian provinces

9.1 Canadian Province Competitiveness Sub-indices for Wood Pulp Industry

Factor Conditions:

Quebec leads the *Factor Conditions* sub-index (Figure 31), dominating the labour, energy, capital and transportation availability and costs indicators while lagging in timber cost (Table 4). British Columbia ranks second, performing best on timber and energy availability and cost as well as access to capital but lagging on labour and transportation cost. Alberta ranks a distant third with high scores for timber availability and cost as well as capital cost but gets low scores for labour, energy and transport infrastructure availability. Ontario is placed fourth with low scores on all indictors in this category.

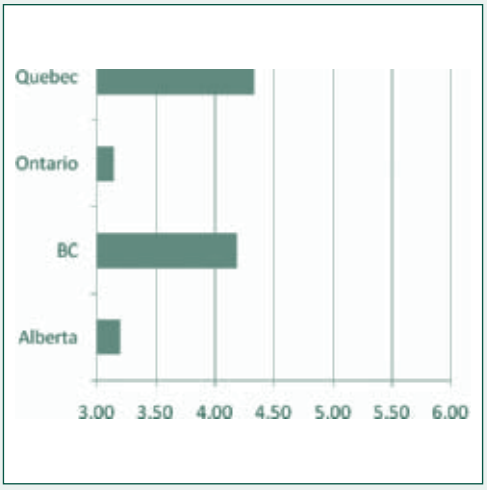

Figure 31. Provincial Wood Pulp Industry Factor Conditions sub-index scores

Technology:

Ontario leads the *Technology* sub-index (Figure 32) and scores well on public R & D infrastructure, and patents filed and purchased (Table 4). Alberta follows with high quality of technology utilized, investment in product innovation and technology training of employees. Quebec ranks third with high scores on public R & D infrastructure and patents purchased but lags in technology utilized. British Columbia ranks fourth with low scores on all indicators in this category.

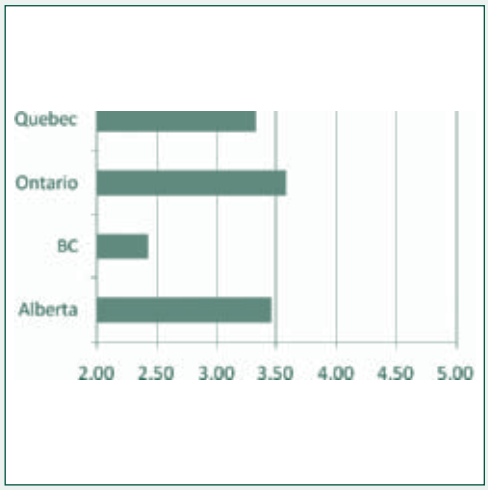

Figure 32. Provincial Wood Pulp Industry Technology sub-index scores

Management Systems:

Quebec leads the *Management Systems* sub-index (Figure 33) scoring well on all indicators in this category except investment in employee training (Table 4). Alberta ranks second with moderate scores on all indicators. British Columbia ranks third, with a high score for employee training but lagging in public R & D infrastructure and investment in service innovation. Ontario ranks fourth, scoring getting low scores on all indicators.

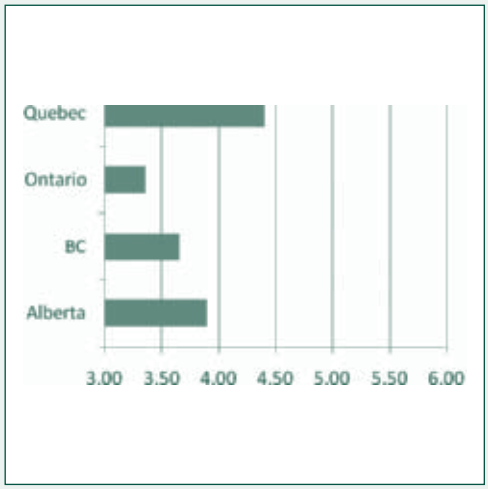

Figure 33. Provincial Wood Pulp Industry Management Systems sub-index scores

Markets:

Alberta ranks first in the *Markets* sub-index (Figure 34), scoring well on customer quality consciousness, marketing innovation, branding, financial market sophistication and adoption of 'chain of custody' for forest certification (Table 4). Quebec follows with high scores for customer focus and branding investment. Ontario ranks at third, with high score for domestic market growth rate and customer quality consciousness but moderately low scores for other indicators. British Columbia ranks fourth lagging in marketing focus, branding investment, customer quality consciousness and market growth rates.

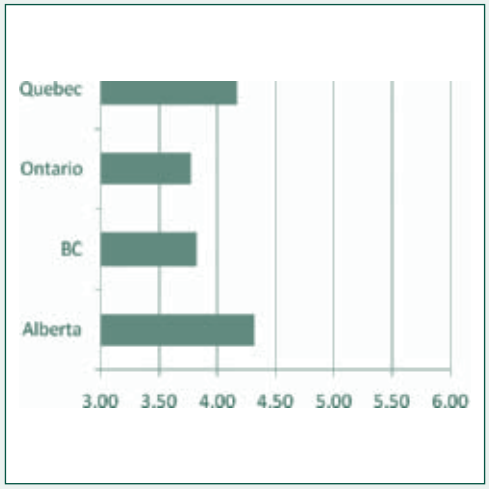

Figure 34. Provincial Wood Pulp Industry Markets sub-index scores

Related and Supporting Industries:

Quebec leads the *Related and Supporting Industries* sub-index (Figure 35), scoring strongly on all indicators (Table 4). Ontario ranks second, lagging in collaboration for innovation with machinery and material providers and R & D service providers. British Columbia ranks third, scoring low role of trade associations and presence of industry clusters. Alberta ranks fourth with low scores on most indicators.

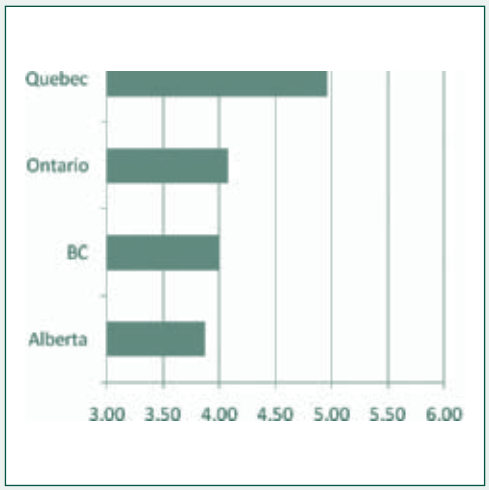

Figure 35. Provincial Wood Pulp Industry Related and Supporting Industries sub-index scores

Government and Public Policies:

Alberta leads the *Government and Public Policies* sub-index (Figure), scoring well on contribution of forest ownership and timber supply organization to efficiency, export promotion assistance, tax rates, protection of intellectual property, quality of environment and forest management legislation and their enforcement and product quality standards (Table 4). Quebec ranks second, with high scores on incentives for capital and R & D investments, absence of bureaucratic red-tape and absence of conflict with traditionally forest dependent communities. Ontario ranks third, with high scores for the absence of bureaucratic red-tape and public image of industry but lagging in contribution of forest ownership and timber sale organization to efficiency, conflicts with traditionally forest dependent communities and private investment in timber production. British Columbia ranks fourth with high scores on private investment in timber production and quality of forest management legislation but lagging in export promotion assistance and incentives for capital investments, conflicts with traditionally forest dependent communities and quality of environment legislation.

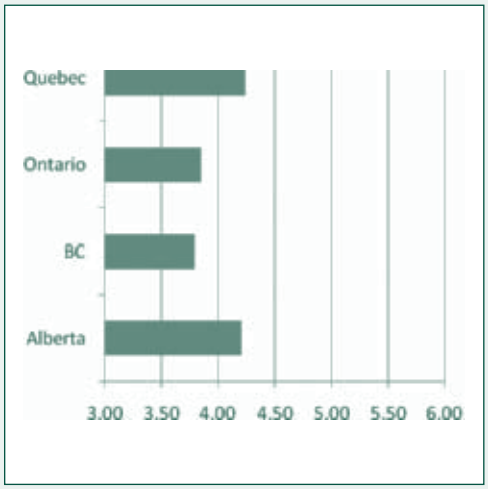

Figure 36. Provincial Wood Pulp Industry Government and Public Policies sub-index scores

Firm Strategies:

Alberta ranks first in the *Firm Strategies* sub-index (Figure 37), scoring well on most indicators (Table 4). Quebec ranks second with high scores on strategic focus on product, market, and service innovation as well as incorporation of environmental and macroeconomic issues in strategy. British Columbia ranks third, scoring high on planning horizon and corporate ethics but low on focus on management, product and market innovation. Ontario ranks fourth with low scores on all indicators.

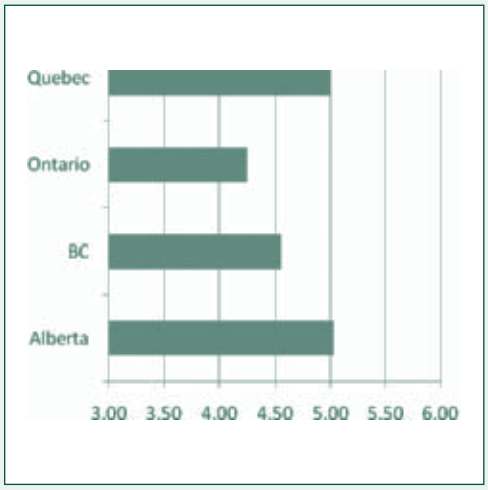

Figure 37. Provincial Wood Pulp Industry Firm Strategies sub-index scores

Quebec has the highest Wood Pulp Industry competitiveness index among the Canadian provinces.

9.2 Summary

Favourable factor conditions (except timber), investments in technical research infrastructure (public) and management systems, marketing investments, support from related and supporting industries, support from government policy and investment incentives and strategic focus of firms characterize the business environment for the wood pulp industry in Quebec, landing it the top position amongst Canadian provinces.

Alberta offers sustainable access to affordable timber but the availability and cost of other factors are unfavourable. Its industry has invested in technology and management systems as well as marketing. Government policy and legislation are supportive but investment incentives are lagging.

British Columbia offers sustainable access to affordable timber and energy. However, the competitiveness of its wood pulp industry suffers from poor investment in technology and management systems as well as marketing, while government incentives for investment are lagging.

Ontario lags in factor conditions but leads in investment in technology. Ontario also lags in investment in management systems and marketing and suffers from inadequate government support in the form of investment incentives and policy. Its firms also lack strategic focus.

Table 5. Percentage deviations from average Canadian province competitiveness indicator scores – Wood Pulp Industry

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Category: Factor Conditions					
Timber availability	4.8	30	14	-20	-6
Timber cost	3.7	10	37	-13	-18
Technical manpower availability	4.4	-37	-3	-2	29
Technical manpower cost	3.5	-15	-15	2	18
Managerial manpower availability	4.6	-12	-1	-1	10
Managerial manpower cost	3.8	6	6	-21	10
Energy availability	5.2	-33	20	-23	35
Energy cost	3.8	-47	78	-47	27
Transport infrastructure adequacy	4.3	-24	-1	-17	36
Transport cost	3.1	-3	-11	-3	13
Capital accessibility	3.6	-2	19	-16	7
Capital cost	3.7	16	-4	-18	10

Table 5 continued

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Technology					
Public technology R & D infrastructure quality	3.90	-10	-55	13	28
Industry process technology quality	3.38	40	-11	1	-21
Industry process innovation investment	3.71	1	-6	8	-6
Industry product innovation investment	3.57	12	-23	0	7
Industry technology training investment	3.63	10	-4	-6	1
Industry patents filed	2.06	-15	-27	58	-11
Industry patents purchased	2.39	5	-58	26	19
Management Systems					
Public management R & D infrastructure quality	4.00	-6	-31	-15	38
Industry management technology quality	4.16	8	-4	-18	12
Industry investment in management innovation	3.79	-1	6	-21	14
Industry investment in service innovation	3.53	6	-22	2	9
Industry investment in management training	3.84	-2	24	-12	-5
Markets					
Domestic market growth rate	1.71	2	-27	33	-22
Domestic customer quality consciousness	3.14	27	-44	9	1
Export market growth rate	3.81	-15	5	1	5
Export market customer quality consciousness	3.76	6	-7	-1	2
Trade disputes and barriers	5.14	-13	12	-11	13
Priority accorded to marketing innovation	3.90	9	9	-9	-2
Price versus customer marketing focus	4.10	4	-21	-2	14
Branding investment	3.33	20	-40	-10	25
Financial market sophistication	4.90	27	7	-13	-8
Machinery and equipment market quality	4.95	-4	11	-8	4
Adoption of 'chain of custody' for forest certification	5.25	24	5	-21	2

Table 5 continued

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Related and Supporting Industries					
Collaboration with machinery and material suppliers for innovation	4.45	-16	12	-18	20
Collaboration with R & D service providers for innovation	4.95	1	-4	-9	11
Role of trade associations	4.15	-4	-16	8	4
Presence of industry clusters	3.60	-24	-24	2	30
Government and Public Policies					
National forest policy support	3.76	-20	-0	-1	15
Contribution of domestic forest ownership and timber supply organization to efficiency	3.19	18	10	-19	4
Export promotion assistance for industry	2.90	29	-31	3	-2
Taxation incentives for capital investments	2.90	-23	-31	13	20
Taxation incentives for R & D investments	4.24	-12	-6	-6	18
Policy support for free trade	5.19	11	-8	-12	12
Maturity of competition policy	4.00	-6	0	0	4
Corporate and personal taxation rates	3.14	11	-5	-5	1
Bureaucratic red-tape	3.33	-25	-10	11	10
Protection of intellectual property rights	4.67	34	-14	-4	-11
Absence of conflicts with traditional forest dependent communities	3.81	5	-34	-21	44
Private investment in timber production	3.05	-18	23	-30	31
Quality of environmental legislation	5.33	22	-20	-4	3
Quality of forest management legislation	4.43	13	13	-3	-13
Forest management legislation enforcement	5.38	21	7	-7	-10
Public image of forest products industry	3.05	-18	-10	31	-18
Adopted product quality standards	5.90	19	2	-10	-1
Policy on foreign direct investment	4.10	-15	4	2	6

Table 5 continued

Competitiveness Indicators	Average Score	Alberta	British Columbia	Ontario	Quebec
		(% Deviation from average score)			
Firm Strategies					
Strategic planning horizon	3.86	4	17	-4	-9
Incorporation of emerging environmental issues in strategic planning	4.67	7	2	-17	14
Incorporation of macroeconomic issues in strategic planning	5.29	9	-1	-16	14
Strategic focus on technological innovation	4.67	7	7	-5	-4
Strategic focus on management innovation	4.05	17	-20	-5	7
Strategic focus on product innovation	4.62	3	-19	-7	19
Strategic focus on market innovation	4.60	3	-24	-2	16
Strategic focus on service innovation	4.65	-3	2	-10	11
Corporate ethical standards	5.74	18	9	-13	-7

10. Conclusions

Globalization, characterized by increasing ease of movement of factors of production and commodities across nations, is changing the geographic focus of global forest product markets. The demand and supply forces unleashed by globalization are driving new investments in forest products industries away from traditional regions. As traditional forest product trading nations, like Canada, respond to the increasing competition for investment, it is important for stakeholders to have a comprehensive picture of the competitive environment. Global Competitiveness Index, developed in this report, serves this purpose by providing a measure of relative performance on a multitude of selected indicators, presenting the information in a simple format. Even though the data on competitiveness indices are based on the survey responses of industry executives and experts, which may be subject to common limitations related to survey data, the methodology of competitiveness indices is well established and sound for a broader and comprehensive picture of global competitiveness of forest industry. Hence, the values of the GCI of softwood lumber and wood pulp industry for six countries/regions and four provinces of Canada and their analyses presented in this report is highly useful for appropriate interventions by policy makers, industry executives, and other interest groups to improve the competitiveness of the respective forest industry.

Globalization is driving new investments in forest products industries away from traditional regions.

Global Competitiveness Index serves to provide a measure of relative performance and is useful to policy makers, industry executives, and other interest groups seeking to improve the competitiveness of the respective forest industry.

From a Canadian perspective, the two key results of this study are that Canada ranks fourth and sixth in the softwood lumber and the wood pulp sectors, respectively. Given the current situation of forest industry in Canada, these aggregate results may not be surprising. However, scores of specific components of sub-indices and their comparative values with respect to other countries provide many useful points for constructive intervention by various interest groups to improve the competitiveness of the Canadian forest industry.

In the case of the softwood lumber industry, Factor Conditions, Markets, Government and Public Policies, and Firm Strategies are four key aspects of competitiveness that need immediate attention of respective interest groups. Interestingly, on all the nine indicators of Firm Strategies sub-index, Canada's score is less than average score while Brazil's score is higher than average score. Hence, it seems that the Canadian softwood lumber firms need to critically examine their internal strategies, and Brazilian firms may have some thing to offer to the Canadian firms. In terms of the Factor Conditions sub-index, the competitiveness of the Canadian softwood lumber industry is jeopardized by high cost of trained technical and managerial manpower and accessibility of capital and not by timber cost or transportation cost. The high cost of trained manpower may be due to limited supply of manpower specifically trained for softwood lumber sector, and it may require attention of government agencies and educational institutions.

In the case of Market sub-index, the Canada/USA softwood lumber trade dispute is the biggest adverse factor, but the second biggest adverse factor is the lack of marketing innovations by industry. The resolution of the softwood lumber dispute will enhance the competitiveness of the Canadian softwood industry without any doubt, but given the history of the dispute the Canadian industry cannot wait for the resolution of the dispute and can improve its competitiveness by focusing on market innovations. Similarly, in the case of Government and Public Policies sub-index, lack of private investment in timber production is the biggest adverse factor, and it suggests the need of reforms in forest tenure system. Other adverse factors in this category include uncertainty due to Aboriginal issues and the negative public image of forest industry. These factors requite immediate intervention and resolution by governments and industry, respectively.

In the case of wood pulp industry, Canada is ranked last among six countries/regions. It is very alarming that Canada performs very poorly on all seven sub-indices of competitiveness index. Canada's scores are below average on 8 out of 12 indicators of Factor Conditions sub-index, 7 out of 11 indicators of Market sub-index, 9 out of 15 indicators of Government of Public Policies sub-index, and on all the indicators of Technology, Management Systems, Related and Supporting Industries, and Firm Strategies sub-indices. The wood pulp sector requires multi-dimensional interventions by all interest groups, specifically industry and government.

In terms of provincial competitiveness, different provinces may have a few things to offer other provinces to improve their competitiveness. With respect to the softwood lumber industry, scores on 10 out of 12 indicators of the Factor Conditions sub-index are above average for Quebec while Alberta's scores on 9 out of 12 indicators are below average. Hence, Alberta may find some strategies from Quebec's experience useful. Similarly, Alberta may find some useful Firm Strategies from British Columbia, Quebec may have something to learn from British Columbia on in terms of the Markets sub-index, and all other provinces may learn from British Columbia with regards to Technology dimension.

In the case of the wood pulp industry, the competitive positions of provinces are quite different than those for the softwood lumber industry. For example, British Columbia's scores on all seven indicators of the Technology sub-index for the wood pulp industry are below average while scoring above average for the softwood lumber industry. In terms of the wood pulp technology dimension, British Columbia may have something to learn from other provinces. In terms of Firm Strategies, Ontario can learn from experiences of Quebec and Alberta, and Quebec has lot to offer in terms of Factor Conditions.

This analysis of the global competitiveness of Canada and inter-provincial comparison of competitiveness will help provincial and federal policy makers design their policy interventions to enhance the global competitiveness of the softwood lumber and wood pulp industries of Canada. Similarly, many findings specifically related to the sub-indices can provide critical information to forest industry executives who want to increase their competitiveness. Other interest groups, such as environmental non-government organizations, educational institutions, and forest certification organizations, may also find the results useful to provide support to their efforts towards tenure reforms, tax reforms, forest certification, and forestry education, training, and research.

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