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ABSTRACT

This investigation assesses British Columbia’s secondary wood products industry, the forest products industries of New Zealand, Chile, and Brazil, and Brazil’s sugarcane-based ethanol and industrial plantation forest industries. More specifically, the dynamic and interrelated concepts of competitiveness and sustainability within the contexts of the BC secondary wood products sector and other competing regions are examined. Manufacturing and business competencies were used to inform the competitiveness construct, while the role that various sustainability issues (i.e. social and environmental) may play on firms’ future strategies was also assessed.

Key research questions considered were: What are key factors for the future competitiveness of the BC secondary wood products industry? How have southern hemisphere industries been able to successfully enter major export markets and what factors will impact their competitiveness in the future? Is there a potential relationship between sustainability and competitiveness in the forest sectors of the world? Qualitative methodologies of grounded theory and case studies were used to address these research questions.

Findings indicate that business-related strategies, as opposed to manufacturing strategies, are the most critical factors that firms must consider for their long-term competitiveness. In the BC secondary wood products sector, improvements in the quality of managerial and entrepreneurial capacity will be particularly important. In New Zealand, forest ownership fragmentation will likely play a role on the business-related strategies of firms, as raw material security may become an issue. Despite Chile’s well-known business orientation, external factors, such as rising input and shipping costs, will have to be taken into account to ensure future success. In Brazil, the need for improvements to the country’s environmental legal framework is considered a critical concern at this time. However, in the long run, business-oriented strategies will become more important to Brazilian firms. In all of the regions studied, participants agreed that the constructs of sustainability and competitiveness will become increasingly intertwined in the global forest sectors of the near future. Finally, a foundation is laid for the theoretical development of a framework for the competitive environment for post-industrial firms, which includes sustainability.
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To my wife Natalia
CO-AUTHORSHIP STATEMENT

This dissertation contains three manuscripts (Chapters 2 through 4). Manuscripts one and two were co-authored by Wellington Spetic and Dr. Robert Kozak, Professor at the Faculty of Forestry, University of British Columbia. Wellington Spetic solely authored manuscript three.

In manuscripts one and two, Dr. Robert Kozak’s collaboration included key contributions to the identification and design of both research projects, as well as in the preparation of the manuscripts. Research activities (e.g. fieldwork) and data analyses were performed by Wellington Spetic with the guidance of Dr. Robert Kozak.

In manuscript three, identification, design, data collection and analysis, and preparation were all performed by Wellington Spetic with the editorial assistance of Dr. Robert Kozak.
1. **INTRODUCTION**

This investigation assesses the critical factors necessary for improving the long-term competitiveness of the British Columbia secondary wood products industry. The role that sustainability issues plays on their business practices is examined as well. A comparative assessment of competitiveness and sustainability issues in other competing regions of the world is also provided. Specifically, the forest industries of New Zealand, Chile, and Brazil, as well as the sugarcane-based ethanol industry of Brazil, are investigated.

The existing literature suggests that value-addition in British Columbia's forest industry is woefully lacking (Kozak & Maness 2001; Jaakko Poyry 2001; Kozak et al. 2003; Schuetze 2005; DeLong et al 2007). BC’s secondary wood industries’ small- and medium-sized enterprises (SMEs) form a key component for the creation of a value-focused forest sector (Kozak & Maness 2005; Cohen & Kozak 2006), a concept that has been put forward by Kozak & Maness (2005). In essence, value-focused forestry can best be described as the ability to increase the economic value derived from forest resources, while maintaining or even enhancing ecological and social values. In other words, it is in line with the sustainability concept.

Interestingly, while BC's forest sector has been stagnating, forest industries from other regions of the world have been successfully gaining ground in international markets, thus intensifying competition. These include countries from the southern hemisphere – New Zealand, Chile, and Brazil – forest sectors that have only been marginally investigated in the literature compared to Europe and North America.

Besides examining British Columbia's secondary wood products industry, this study combines assessments of the forest products industries of other international competing regions, namely New Zealand, Chile, and Brazil. This study also uses the case of investments in southern Brazil's “green” sugarcane-based ethanol and industrial plantation forest industries to gain insight into the potential relationship between competitiveness and sustainability.
What are key factors for the future competitiveness of the BC’s secondary wood products industry? How have these southern hemisphere industries been able to successfully enter major export markets and what factors will impact their competitiveness in the future? Is there a potential relationship between sustainability and competitiveness in the forest sectors of the world? These are some of the major questions (and gaps in the literature) that this qualitative study addresses.

1.1. Competitiveness

Before further discussions of competitiveness, it is necessary to recognize that a number of fundamental changes have occurred in the competing environment of firms in the last two decades. Nahm and Vonderembse (2002) suggest that manufacturing and business contexts in which firms now operate have shifted from an industrial stage, with slower rates of change and more national markets, to a post-industrial stage, with faster rates of change, increased global competition, and higher levels of technology. More specifically, this shift from traditional to today’s competition context includes: 1) static to dynamic rates of change; 2) stable to volatile environments; 3) mass production to responsive and customized production contexts; 4) enterprise-specific to network industry structures; 5) transformation of physical assets to information and knowledge; and 6) top-down to two-way path strategic processes (Brown & Blackmon 2005). As a result of this breadth of activities, competitiveness is a dynamic concept with varying definitions. The terminology referring to competitiveness differs depending on who the advocates are. Some empirical studies differ widely in the way that they define and measure competitiveness (Krugman 1994; Hoff et al. 1997; Garelli 2006). At the firm level, the literature associates competitiveness with financial performance, technical efficiency, productivity, qualitative capacity of management (Morone & Testa 2005), strategic planning, organizational behaviour, and marketing (Gluck et al. 1980; Kantrow 1980; Bourgeois III & Brodwin 1984; Ulrich 1987; Anonymous 1988; Gatignon et al. 1989; Karakaya & Stahl 1992; Banker & Khosla 1995; Pelham & Wilson 1996; Bititci et al. 2003; Rijamampianina et al. 2003; Sussan & Johnson 2003). Porter (1980; 1985), on the other hand, associates competitiveness with firms’
abilities to create competitive advantages\textsuperscript{1}; that is, firms’ chosen strategies to compete in and deal with industry structures and external factors (i.e. government policy).

In today’s dynamic competing environments and global marketplaces, competitiveness is created by firms’ abilities to align business and manufacturing strategies (Brown & Blackmon 2005). The alignment of such strategies is central to Brown and Blackmon’s (2005) concept of strategic resonance. Strategic resonance combines market-led and resource-driven views to “…prevent the firm from being excellent in the wrong things…[and]…from chasing after businesses and markets in which it cannot hope to compete. The strategy process becomes ongoing and changing, adapting to ensure that customer requirements and organization-wide capabilities continue to resonate” (Brown and Blackmon 2005, p. 800). A more updated definition, however, draws upon the integration of concepts from economics and management with other social and environmental aspects into guiding principles that drive the prosperity of an enterprise. In other words, competitiveness refers to how firms manage the totality of their competencies to achieve prosperity (Robinson 2004; Garelli 2006).

Additionally, manufacturing and business strategies deal with internal and controllable sources of changes along the value chain to enhance competitiveness of organizations. However, factors external to firms’ value chain and, therefore, outside of firms’ control also play a key role in competitiveness (Swamidass & Newell 1987). External and uncontrollable factors, such as input and demand conditions, the natural environment, business culture, and government fiscal, monetary, and trade policies, are sources of uncertainty to the competing environment of firms (Porter 1985; Swamidass & Newell 1987; Martin & Porter 2000).

For the purpose of this investigation, the term competitiveness will be defined as the abilities of firms’ to identify manufacturing and business strategies and deal with external factors to profitably deliver products and services to their customers.

\textsuperscript{1} In the business-related literature, competitive advantage revolves around firms’ strategic decisions to occupy a more advantageous market position against competitors (Brown and Blackmon 2005).
1.2. Sustainability and Sustainable Development

This thesis uses the term ‘sustainability’ throughout. That being the case, the distinction between ‘sustainability’ and the equally common ‘sustainable development’ must be made. One of the most widely used definitions of sustainable development was put forth in the 1987’s Brundtland Commission of the United Nations, which stated that “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987). Economists have normally adopted non-declining consumption per capita, utility, or well-being as indicators of sustainable development (Pearce 1998). On the other hand, proponents of the term sustainability argue that sustainable development, given its managerial and incremental approach used in the Brundtland report (WCED 1987), ameliorated but not challenged, continued economic growth (Robinson 2004). Robinson (2004, p. 374) argues that sustainability is not only the ability of humans to continue to live within environmental constraints, but is “…integrative…goes beyond technical fixes, [and] incorporates a recognition of the social construction of sustainable development…” The term sustainability has gained momentum within academia and non-governmental organizations, while the term sustainable development seems to be favoured by the private sector and governments (Mebratu 1998; Robinson 2004). Therefore, in this study, the term sustainability will be used in place of sustainable development\footnote{For a comprehensive review, as well as debate on whether the two terms can be used interchangeably, see Mebratu (1998).}, and specifically refers to the reconciliation of economic, environmental, and social demands accruing to the business practices of firms.

In the business-related literature, the concept of sustainability often manifests itself in the forms of the triple-bottom line (Elkington 1994; Adam et al. 2004) and corporate social responsibility (van Marrewijk 2003). The central arguments underpinning the triple-bottom line concept revolve around firms’ abilities to demonstrate the financial dimension of businesses (i.e. economic sustainability), as well as greater accountability, transparency, and contributions to societal well-being (i.e. social and environmental sustainability) (Henriques & Richardson 2004; Wexler 2009). Once a
tool to incorporate sustainability into the core business activities of firms (for a review, see Arnold 2008), the idea of corporate social responsibility has increasingly become a necessary component of firms’ competing strategies (Galbreath 2009).

1.3. The Role of Sustainability in Competitiveness

A significant field of study on the interrelationships between competitiveness and sustainability has emerged in the last two decades. Yet, the literature indicates that there is no single universally adopted and practised methodology for measuring competitiveness, sustainability issues, and the relationship between the two. Several recent works have attempted to conceptualize and to empirically measure the impact of sustainability issues on firms’ competitiveness (Miles & Covin 2000; Talbot et al. 2001; Lee & Ball 2003; Madsen & Ulhøi 2003; Rennings et al. 2003; Thorpe & Prakash-Mani 2003; Wagner & Schaltegger 2003; Welch et al. 2003; Wuestenhagen 2003; Rao & Holt 2005). For SMEs, in particular, improved sustainability practices have benefited businesses by creating first-mover, market access (Wagner & Schaltegger 2003), and reputational advantages (Miles & Covin 2000). Although SMEs tend to be more reactive to sustainability issues (Schaper 2002), some dimensions of sustainability, such as environmental performances and initiatives, governance and management, stakeholder and community engagement, and improvements in environmental processes, products, and services, were found to positively impact the competitiveness of SMEs (Lefebvre et al. 2000; Hitchens et al. 2003; Thorpe & Prakash-Mani 2003).

In general, authors have developed their own methodologies for defining and measuring competitiveness, sustainability, and their interrelationships. Whilst this lack of standardization in definitions and measurements may hinder the ability to easily draw from existing studies, it offers opportunities to distinctively address these issues in the context of British Columbia’s secondary wood products industry and other producing regions of the world.

1.4. The Studied Regions

Competitiveness, sustainability, and their interrelationships were assessed from the perspectives of different producing regions of the world: the secondary wood products industry of...
British Columbia; the plantation forest industries of New Zealand, Chile, and Brazil; and the sugarcane-based ethanol industry of Brazil. Firms operating in the four studied regions share some commonalities and dissimilarities. First, these sectors are under a great deal of scrutiny for their use of natural resources industries, where ethical issues (e.g. deforestation, land rights) are often raised\(^3\). A diversity of views, including primary and secondary segments with varying industry structure, manufacturing and business strategies, and external factors, allows for a rich comparative analysis to emerge. Third, the role of different business cultures and institutional settings in the context of developed and developing countries can be addressed. Finally, an assessment of Brazil’s sugarcane ethanol industry allow for lessons to emerge for wood products manufacturers facing many of the same opportunities and challenges related to sustainability and competitiveness.

Despite being overshadowed by the tradition and dominance of the primary commodity sector (i.e. lumber, pulp and paper) and the challenges posed by increasingly global competition, BC’s secondary wood products industry is slowly, but profitably, evolving (Stennes et al. 2005; Statistics Canada 2009). The secondary wood products industry transforms primary wood products into higher-value wood products with greater degrees of differentiation (Kozak & Maness 2001; Wilson et al. 2001), such as millwork, windows and doors, cabinetry, prefabricated homes and buildings, and furniture. Over the last decade, trends in manufacturing shipments of BC’s primary and secondary wood products industries have moved in opposing directions. Some of the secondary wood industry segments that have enjoyed growth over this period include engineered building products, prefabricated houses, kitchen cabinets, and wood household furniture (Statistics Canada 2009). Opportunities from globalization, advances in information and communications technologies, and changes in ownership and management have contributed to a transition from small, craft-oriented businesses to more technological and internationally-focused firms (Schuetze 2005).

\(^3\) New Zealand, perhaps, being the exception; issues revolving around native forest and industrial forest plantations have generally been positively dealt with (Barnes & Hayter 2005).
In terms of size and value-creation, however, BC’s secondary wood products industry is comparatively smaller and lags behind other competing regions, such as Ontario, Quebec, the United States Great Lakes, Scandinavia, and Germany (Jaakko Poyry 2001). Traditionally, less than 10% of BC’s total wood products sales have come from secondary wood products, compared to 60% in Ontario and 86% in Germany, for example (Jaakko Poyry 2001, Statistic Canada 2009). BC’s secondary wood producers are a great distance from large markets in the United States and compete with existing capacity there for these customers. Also, access to basic inputs, like skilled labour and raw materials, have been commonly cited in the literature as endemic obstacles for the BC secondary wood products industry (Kozak & Maness 2001; Wilson et al. 2001; Kozak et al. 2003; Schuetze 2005; Cohen & Kozak 2006; DeLong et al 2007).

Interestingly, other relatively small secondary wood products sectors have recently also gained a share of BC’s major markets (e.g. the United States). The secondary wood products industries of countries like China, Vietnam, Australia, New Zealand, Chile, and Brazil, despite operating under different institutional, cultural, and industrial context, have successfully been able to enter global markets (Bowyer 2004). Yet the secondary wood products industries of these countries, when compared to more advanced competing regions in the secondary sector, such as Ontario, Quebec, the US Great Lakes states, Scandinavia, and Germany, have been generally understudied. Despite being further away from major markets like the United States, the (secondary) forest product industries of these comparatively understudied regions have been able to develop and implement manufacturing and business strategies that are customer-oriented and export-driven (Sedjo 2001; Cubbage et al. 2007). What lessons can be learned from firms operating in these countries that might be useful for BC’s secondary wood products manufacturers? Although any of these secondary wood products industries would make an appealing case to assess export- and customer-oriented manufacturing and business strategies, due to time and budget constraints, only three were selected – New Zealand, Chile, and Brazil.
Compared to BC (or even to North America), rates of return on investments in forest product industries have been considerably higher in the three selected countries (i.e. Brazil, Chile, and New Zealand). While rates of return of 10% or less are common in North American forest industries, rates of return of more than 20% can be achieved in these three regions (Sedjo 2001; Cubbage et al. 2007). For this reason, an increasing share of the world capital invested in forest products industries has been directed to these southern hemisphere producers since the 1990s. Largely built on fast-growing and high-yield forest plantations, the forest industries of these three countries have also been investing heavily in processing capacities and making great advances in strategic business development (Cossalter and Pye-Smith, 2003).

In 2008, New Zealand’s forestry sector accounted for 3.8% of the country’s GDP (New Zealand Ministry of Agriculture and Forestry 2008). New Zealand’s forest products industries developed based on successful monocultures of radiata pine (*Pinus radiata*) and exports of logs, sawn lumber, and pulp, mainly to Australia, Japan, China, and the United States. Today, industrial forest plantations total almost 2 million hectares and, in 2007, exports of forest products accounted for 8% (approximately CDN$ 2.5 billion) of New Zealand’s total exports. New Zealand’s secondary wood industry generally consists of small- and medium-sized enterprises manufacturing wood building components, wood furniture manufacturing, and prefabricated housing (Delcourt & Wilson 1998; New Zealand Ministry of Agriculture and Forestry 2008).

Firms in Chile’s forest sector have seen tremendous success in export markets as well. Led by a strong pulp and paper segment, the sector has diversified its export markets, trade partners, and added value to its products by developing a viable secondary wood products industry. Chile’s top export markets for forest products are the United States, China, Mexico, and Japan (Infor 2008). The secondary wood industry in Chile includes manufacturers of remanufactured wood products, furniture and components, mouldings, cut stock, and blanks (Paredes 2005; Infor 2008). Today, industrial forest plantations exceed 2 million hectares – mostly radiata pine (65%) and *Eucalyptus* species (25%) – and the forest sector accounts for 2.8% of the country’s GDP (Infor 2008). Chile’s open economy led to the forest sector importing and building its capacity in harvesting and manufacturing
technologies. At the same time, firms have recognized the importance of developing and maintaining export markets as an alternative to the smaller domestic market (Paredes 2005). In 2007, with over CDN$ 4 billion in exports, the forest product industries accounted for approximately 6% of Chile’s total exports (Infor 2007).

Although a forest industry based on native species (e.g. northern Amazonian regions) does exist in Brazil, this study only assesses the industry that is built on industrial forest plantations, predominately in the central and southern regions of the country. Most of Brazil’s industrial forest plantations, unlike in New Zealand and Chile, comprise a higher proportion of Eucalyptus (65%) than pine species (28%). In the past decade, the (plantation) forest product industry has contributed, on average, about 3% of Brazil’s GDP (SBS 2008). The sector has been traditionally focused on domestic markets, but since early 2000s, Brazil’s exports of (plantation) forest products have steadily risen (Abraf 2008). More stable macro- and microeconomic conditions (i.e. monetary policies) have facilitated firms’ access to foreign manufacturing technologies and provided opportunities for Brazilian wood producers to increasingly capture market share in the United States and Western Europe, for example (Bowyer 2004). Today, Brazil’s industrial forest plantations total 5.6 million hectares and, in 2007, the industry’s total exports reached CDN$ 6.5 billion or 3.8% of the country’s exports (Abraf 2008).

Brazil’s sugarcane-based ethanol industry was also investigated in this study. This industry has recently caught the attention of the international community for its alleged environmental friendliness; it is thought not contribute to the global energy and food price conundrum, unlike ethanol produced from grains (i.e. corn) (Macedo 2005; Mathews 2007; UNHCR 2008; Abramovay 2008). With promises of being highly competitive and financially attractive, the industry has received tremendous amounts of national and international investment. Between 2005 and 2008, over 200 new projects were announced (Mathews 2007; Faveret Filho et al. 2008; Unica 2009). BNDES, a Brazilian investment bank, has invested over US$ 4.5 billion in the sector in 2008. Today, foreign investors participate at some level in 23% of the industry’s total processing capacity (Siamig 2009). On the other hand, and similar to Brazil’s industrial forest plantation sectors, there have been
increasing concerns about the real environmental and social impact of the ethanol industry (Unica 2009). For instance, the industry’s expansion and procurement of arable land may increase the opportunity cost of land, shift other agricultural activities, and increase pressures on deforestation (Abramovay 2008). Also, crop burning and manual harvesting are two traditional practices of the industry that have been strongly condemned by the local populations (Faveret Filho et al. 2008; Unica 2009). In fact, some firms have been accused of providing slave-like working conditions to manual harvesters (Rodriguez & Diniz 2006). Because this natural resource sector is thought of as sustainable, competitive, and responsive to environmental and social impacts, it forms a compelling case for the study of the interrelationships of competitiveness and sustainability, and can potentially provide valuable lessons for the forest products sector.

1.5. Research Questions

This investigation aims to gain insights about future perspectives on competitiveness and sustainability. In particular, how do these relate to the future success of British Columbia’s secondary wood products industry, compared to the southern hemisphere forest (plantation) industries of New Zealand, Chile, and Brazil? To delve further into the particularities of relationships between competitiveness and sustainability, Brazil’s “green” sugarcane-based bioethanol industry was also assessed. Hence, this investigation is divided into three phases (each presented as a separate Chapter) with specific research questions addressed in each phase.

In phase one, critical themes for British Columbia’s secondary wood products industry to be successful in the future were considered with the following specific research questions:

1) What are the key manufacturing and business issues that will drive the future success of the secondary wood products industry in BC?
2) What external factors are critical for the long-term competitiveness of the industry?
3) What is the role of sustainability on the future strategies of this sector?

In phase two, perspectives on the forest industries of New Zealand, Chile, and Brazil were examined and the following specific research questions were considered:
1) What are the key manufacturing and business issues that will drive the future success of forest products firms in New Zealand, Chile, and Brazil?

2) What external factors are critical for their long-term competitiveness?

3) What is the role of sustainability on future competitiveness for firms in these three regions?

Phase three addresses future perspectives on Brazil’s forest (plantation) industry, and also considers its sugarcane-based ethanol industry. Specific research questions include:

1) What is the perceived outlook for Brazil’s sugarcane-based ethanol and forest plantation sectors?

2) What are the critical factors for their long-term competitiveness?

3) What is the role of sustainability for the future competitiveness of these types of businesses?

1.6. Methods

This study was mostly inductive and, in order to address the aforementioned research questions, a qualitative research design was used. More specifically, grounded theory (Glaser & Strauss 1967) and case study (Yin 2003) methodologies served, to a great extent, as the basis for data analysis.

Qualitative research schools of thought are most appropriate for the discovery, exploration and deeper investigations of new areas, and where only non-numeric information is available (Miles & Huberman 1994). Qualitative designs are also used to seek identification, discovery of regularities, categorization, and exploration of connections of phenomena (Tesch 1990). Building theory from textual information or data is central to qualitative design techniques, such as grounded theory (Glaser & Strauss 1967; Bazeley 2007). Case studies are particularly useful for specific descriptions, clarifications, and reconstructions of situations (Ragin & Becker 1992; Flick 1990, 2006).

Two major sources of data were used in this study: existing literature and theories; and field data. Field data consisted of (in-person) expert interviews, observations, and field notes. Field data was collected according to Miles and Huberman’s (1994) three sequential procedures of defining the unit of analysis, sampling, and instrumentation. The units of analysis, or the focus of data collection
for this study, were the aforementioned industries in British Columbia, New Zealand, Chile, and Brazil. Sampling in qualitative research designs often draws from small and purposive, rather than large and random, samples of people for in-depth and contextual investigation (Kuzel 1999; Carter & Dresner 2001). Therefore, participants for (expert) interviews in each studied region were selected according to their potential contribution to the study's research questions. For each studied industry, an a priori list of potential informants was prepared with the assistance of a supervisory research committee at the University of British Columbia and/or non-participating specialists in the studied regions. Informants that were interviewed first were asked to indicate other experts specializing in the themes under study. This procedure entails data analysis after each interview and follows the basics of snowballing and gradual sampling techniques (Kuzel 1992; Flick 2006). Following the procedures of grounded theory, questions were complemented or modified as gradual sampling continued and as relevant themes emerged. The final sample generally included participants from both the a priori list and recommended participants from other interviewees. In each studied region, the final sample consisted of experts from different groups of stakeholders representing firm owners, manufacturing and business specialists, research and development institutions, the three levels of government (federal, provincial/state, and municipal), academia, and upper level business managers. The major instrument for data collection in this study was the semi-structured interview. Semi-structured interviews are commonly recommended for collecting data from experts (Miles & Huberman 1994; Bansal & Roth 2000; Carter & Dresner 2001; Flick 2006). Advantages of semi-structured instruments include better focusing, avoidance of data overload, and comparability between cases, thus enhancing internal validity (Weller & Romney 1988; Miles & Huberman 1994).

Data analysis was performed with computer software (Nvivo 8) and included data from interview transcripts, field notes, and other relevant documents collected during fieldwork. Strauss’s (1987) and Bazeley’s (2007) coding techniques were used for data analysis. Codes represent relevant ideas and concepts emerging from the text. First, open codes are created and, as the analysis progresses, these can be dropped, merged, or moved into higher-level categories to form parent codes. The interconnections of higher-level categories described by these parent codes move
text to theory, and are the basis of most qualitative designs, including grounded theory (Strauss 1987; Bazeley 2007).

In Brazil (phase three), a case study was also performed with a Brazilian sugarcane-based ethanol company to complement the field data collected from expert interviews and observations. Four major sources of data were used in the case study: a focused interview with the company president; existing documentation; direct observation of activities; and a within-case self-administered survey (Hanna 2000; Yin 2003). Quantitative data analysis from the survey results of the case study was performed using computer software (SPSS) and included simple descriptive statistics, such as means and proportions.

1.7. Structure of the Dissertation

This dissertation is divided into five Chapters, including this introductory section (Chapter 1). In Chapter 2, a study on future perspectives for British Columbia’s secondary wood products industry is presented. The study addresses long-term competitiveness of the industry by focusing on the critical factors, as perceived by participants, for manufacturing and strategic development. Sustainability and its potential integration into firms’ core business strategies are also assessed.

Chapter 3 extends these topics of discussion to the forest industries of New Zealand, Chile, and Brazil. Although Chapter 3 follows the general topics of interest of Chapter 2, adjustments were made to more appropriately reflect the particularities of each country’s forest sector (i.e. industry structure and size of firms).

Chapter 4 focuses on the forest products and sugarcane-based industries of southern Brazil. Unlike Chapter 3, the assessment of Brazil forest product industry is specifically concentrated on a model predominant in this part of the country, the industrial forest plantation. The future outlook for the sugarcane-based ethanol industry is also addressed in Chapter 4, with a focus on the critical issues for the industry’s future competitiveness and sustainability. In addition to the general procedures utilized for data collection in the first two studies, a case study is also used here.
Chapter 5 discusses the major findings of the three studies, brings together common themes and relevant issues, and expands on implications pertinent to the dissertation's research questions.
1.8. References


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2. TOWARDS A VALUE-FOCUSED FOREST SECTOR IN BRITISH COLUMBIA: FUTURE STRATEGIES AND SUSTAINABILITY ISSUES FOR THE SECONDARY WOOD INDUSTRY

2.1. Introduction

Since the 1990’s, British Columbia’s (BC) secondary wood products industry has been slowly, but profitably, evolving. Opportunities from globalization, advances in information and communications technologies, and generational and capability changes in ownership and management have been cited as major drivers (Schuetze 2005). There is, however, room for improvement. In fact, the literature indicates that value-addition in BC’s wood products industries is critically lacking (Jaakko Poyry 2001; Kozak & Maness 2001; Cohen & Kozak 2006; Schultz & Gorley 2006; DeLong et al. 2007). Further investment in and development of the secondary wood products industry could not only have economic, but also social and environmental, benefits to the province. Historically, structural wood uses have dominated demand for commodity softwood lumber in North America, with British Columbia being a top supplier of such products. Conversely, BC’s secondary or value-added wood products manufacturers have yet to achieve the success of their upstream relatives.

In general, secondary wood industries transform primary products into higher degrees of differentiation and finishing, exhibit higher rates of employment per volume of raw material, and lower rates of use for raw materials (Jaakko Poyry 2001; Kozak & Maness 2001; Wilson et al. 2001; Schuetze 2005; Cohen & Kozak 2006). BC’s secondary wood segments are smaller and lag behind the industry leaders in other national and international producing regions, such as Ontario, Quebec, the United States Great Lakes states, Scandinavia, and Germany (Jaakko Poyry 2001; Wilson et al. 2001; Kozak & Maness 2005).


This study uses a qualitative research design to induct from field data and existing literature. Based on the results, a set of recommendations necessary to achieve a successful secondary wood industry in the long run - thus contributing to a value-focused forest sector in BC - is presented.

2.2. Background

There is a pressing need for the British Columbia forest sector to shift its strategy from a volume-based to more of a value-focused approach (Kozak & Maness 2005). The idea of a value-focused forest sector can be best described as the ability to increase the economic value derived from the province’s forest resources, while maintaining or even enhancing ecological and social values. In line with the sustainability concept, a value-focused forest sector also takes into account further notions like: manufacturing commodity products only when appropriate; higher value commodities manufactured by more flexible mills; secondary wood products; non-timber forest products; and ecosystem services (Kozak & Maness 2005). BC’s secondary wood industries, a key component for a value-focused forest sector, trail other producing regions (e.g. Eastern Canada, United States Great Lakes, and Scandinavia) in the development and alignment of manufacturing and business strategies (Jaakko Poyry 2001; Kozak & Maness 2001; Kozak et al. 2003; Schuetze 2005; DeLong et al. 2007).

The alignment and synchronization of manufacturing and business strategies are critical factors in determining firms’ abilities to stay competitive in today's dynamic and global marketplace. From Skinner’s (1969; 1974; 1985) “manufacturing mission” to Brown and Blackmon’s (2005) more recent “strategic resonance”, frameworks and terminologies have evolved during the last decades to reflect changes in manufacturing and business strategies (Figure 2.1).

Manufacturing strategy determines how firms’ resources are best allocated and transformed, and how manufacturing processes contribute to overall performance (Hill 1980; Hayes & Wheelwright 1984; Ward & Duray 2000). Manufacturing strategy involves the best combination of internal competencies that make up the operation’s functions (Amoako-Gyampah & Acquaah 2008), such as cost, flexibility, dependability, innovativeness, quality of products and processes (Corbett & Vassenhove 1993), and human resources (Youndt et al. 1996). Conceptually, manufacturing strategy...
is also often associated with the resource-based theory of the firm (Brown & Blackmon 2005; Paiva et al. 2008).

In contrast, business strategy is market- and customer-oriented and deals with competition capabilities. Business strategy relates to the literature on marketing (e.g. marketing mix) (Corbett & Vassenhove 1993), competitive advantage (Porter 1980, 1985), and the market-based theory of the firm (Brown & Blackmon 2005). Business strategy is more relative and in line with competitiveness; that is, firms’ abilities to continuously and profitably deliver products and services which customers value more than their competitors’ (IMD 2005).

![Figure 2.1. The relationship between manufacturing and business strategies (Corbett & Vassenhove 1993; Ward & Duray 2000; Brown & Blackmon 2005; Paiva et al. 2008).](image)

Skinner’s (1969) contribution to the literature influenced the dominant view of competition (until the late 1980’s) that manufacturing was at the core of a firm success. Manufacturing was then sovereign and firms would outperform competitors by being as efficient as possible in all internal competencies. Manufacturing drove business strategy. In the last decade, this relationship has reversed and a number of fundamental changes have occurred to inform today’s competition context, namely: 1) static to dynamic rates of change; 2) stable to volatile environments; 3) mass production to responsive and customized production contexts; 4) enterprise-specific to network industry structures;
5) transformation of physical assets to information and knowledge; and 6) top-down to two-way path strategic processes (Brown & Blackmon 2005).

In today’s global production systems and markets, manufacturing competencies must be carefully aligned with market requirements. A well-defined business strategy will guide the corresponding manufacturing strategy needed to produce the best products for the market selected to compete in. The literature offers a number of theoretical and empirical studies highlighting the importance of a clear and efficient relationship between a firm’s manufacturing and business strategies (Ward et al. 1996, 2007; Williams et al. 1995; Sun & Hong 2002; Chang et al. 2003; Bell et al. 2004). Corbett and Vassenhove (1993) argue that there need not be a trade-off between the two strategies and that they are, in fact, two sides of the same coin. The authors also state that to develop a link of internal competencies with the competitiveness required in the market is to secure long-term survival. Terminologies, such as strategic fit (Miller 1992; Miles & Snow 1994) and strategic flexibility gained the preference of practitioners and researchers with the introduction of production initiatives like lean manufacturing (Warnecke & Hüser 1995), just-in-time (Schonberger 1982a, 1982b), flexible manufacturing (Goldhar & Jelinek 1985; Nemetz & Fry 1988), total quality management (Kanji 1990), mass customization (Pine 1993; Hart 1995), and supply chain management (Chen & Paulraj 2004). Recently, strategic resonance has been proposed as a more updated theoretical framework relating manufacturing and business strategies (Brown & Blackmon 2005). The authors propose that strategic resonance combines market-led and resource-driven views to “…prevent the firm from being excellent in the wrong things…[and]…from chasing after businesses and markets in which it cannot hope to compete. The strategy process becomes ongoing and changing, adapting to ensure that customer requirements and organization-wide capabilities continue to resonate” (Brown & Blackmon 2005, p. 800)

Theoretical frameworks describing linkages between manufacturing and business strategies do not explicitly control for industry size. The vast majority of British Columbia’s secondary wood industries are categorized as small or medium-sized enterprises (SMEs) (Cohen & Kozak 2006). In Canada, small enterprises are comprised of firms with less than one hundred employees, while
medium enterprises are those that have between one hundred and five hundred employees (Strategis 2007). For SMEs, limitations of financial and human capital may hinder the implementation of sophisticated organizational strategies. On the other hand, management and ownership in the majority of SMEs consist of one or a few persons, which arguably, should allow for faster and more efficient linkages between manufacturing and business decisions.

Finally, manufacturing and business strategies deal with internal and controllable sources of changes along the value chain to enhance competitiveness of organizations. Manufacturing and business strategies are as effective as firms’ abilities to control their value chains. Conversely, external and uncontrollable factors that affect both manufacturing and business strategies of firms also play a critical role. These uncontrollable factors can be, but are not limited to, input and demand conditions, the natural environment, business culture, and government fiscal, monetary, and trade policies (Porter 1985; Martin & Porter 2000). This study considers the manufacturing, business, and external factors that are critical to the competitiveness of BC’s secondary wood industry.

2.2.1. Sustainability

With increasing calls for multi- and inter-disciplinary research, a significant field of study on the relationship of sustainability, competencies, and competitiveness has emerged in the last two decades. Interestingly though, little research on the forest products industry in British Columbia fully considers issues of sustainability (Sharma & Henriques 2005; Kozak 2005). Fundamentally, some of this research could include, for instance, understanding the level of knowledge of, the importance given to, and the adoption level of sustainability issues into the strategic decisions of the secondary wood manufacturing industry. Firms within different industry groups are incorporating sustainability issues into their business strategies and operations. Some benefits to companies incorporating sustainability issues include increased competitiveness, legitimacy, and ecological responsibility (Bansal & Roth 2000), access to potential new markets and to ethical investment funds, the ability to attract and retain top human resources, and the creation of non-tangible product values (Willard 2005; Environmental Finance 2006; Innovest 2006). Regarding industry size and structure, sustainability issues are looked at from a slightly different perspective by SMEs. SMEs operate in an
environment in which most of the issues related to sustainability are driven by business performance and regulation, where decision-making processes and free-market pressures can lead to a focus on profit maximization to the detriment of social and environmental practices. While cost reduction strategies are dominant among SMEs, business cases that emphasize the benefits of sustainable practices may serve to increase SMEs’ adoption of sustainability issues (Williamson et al. 2006). SMEs tend to be more reactive to sustainability issues, generally showing only small-scale and ad hoc changes in their business activities (Schaper 2002).

There is a growing interest on the part of practitioners and researchers regarding the role that sustainability will play in the current, so-called post-industrial era (Brearton et al. 2005). The manufacturing and business strategies literature has generally not included sustainability as a critical factor to be taken into account in strategic formulation. This study also addresses the perceived significance that sustainability issues will have for long-term strategies of BC’s secondary wood products industry.

2.3. Objectives

Aimed at contributing to achieving a value-focused forest sector in BC, the main objective of this study is to examine critical themes for British Columbia’s secondary wood industry to be successful in the future. The following research questions will be considered:

1) What are the key manufacturing and business issues that will drive the future success of the secondary wood products industry in BC?
2) What external factors are critical for the long-term competitiveness of the industry?
3) What is the role of sustainability on the future strategies of this sector?

2.4. Methods

The methodological approach used in this study is based largely on qualitative research schools of thought. Qualitative research is often put forth as the most appropriate set of processes for discovery, the exploration of new areas, the development of hypotheses and propositions, the
detailed understanding of processes or experiences, deeper investigations of the exact nature of issues, and where only non-numeric information is available (Miles & Huberman 1994; Bazeley 2007). Qualitative data are also useful for enhancing, validating, explaining, illuminating, or reinterpreting quantitative data (Miles & Huberman 1994). Grounded theory (Glaser & Strauss 1967) is a specific qualitative research technique that is used in this study. This technique falls under the broader category of discovery of regularities and identification, categorization, and exploration of connections (Tesch 1990). Despite methodological and conceptual particularities, the technique aims at building theory from textual information or data. It is inductive in nature. In this vein, this study drew on two major sources of data for analyses: desk research (i.e. existing literature and theories); and fieldwork (i.e. in-depth interviews). For the fieldwork, Miles and Huberman’s (1994) three sequential procedures of defining the unit of analysis, sampling, and instrumentation were considered and are presented next.

2.4.1. **Unit of Analysis**

The focus and bounding of data collection was delimited to BC’s secondary wood products manufacturing sector. As the conceptual unit of analysis, the size of BC’s secondary wood products manufacturing is comparatively smaller than other national and international producing regions, which facilitates the selection and the operationalization of the sampling phase.

2.4.2. **Sampling**

Qualitative research designs often draw from small and purposive, rather than large and random, samples of people for in-depth and contextual investigation (Kuzel 1999; Carter & Dresner 2001). In line with the concepts of analytic induction, a combination of two sampling criteria was used in this study.

Firstly, an *a priori determination* of the sample was created from a list of potential participants (Flick 2006). This is conceptually equivalent to statistical sampling in quantitative research designs insofar as there was previous knowledge of the target population. A list containing 23 potential
participants was developed by a research committee\textsuperscript{5} at the University of British Columbia. Participants were selected according to their potential contribution to the study’s objectives, their knowledge about, and expertise in, one or more aspects of BC’s secondary wood products industries. The sample frame was purposively formed by experts from different groups of stakeholders representing firm owners, manufacturing and business specialists, research and development institutions, and the three levels of government (federal, provincial, and municipal). Expert interviews were conducted, which are most suitable when there is some previous knowledge of the themes to be investigated, so that cases are not the focus so much as their representation of the group being studied (Flick 2006). Multiple cases were used to provide a better representation, a deeper investigation, and to reinforce validity (Miles & Huberman 1994; Carter & Dresner 2001; Yin 2003).

Secondly, theoretical sampling was used to the extent that the drawing of sample elements was also dependent on reaching theoretical saturation, or when no substantive additional data is found to further develop properties of the studied category (Glaser & Strauss 1967; Merkens 2004). Following the basics of the snowballing sampling technique and gradual sampling (Kuzel 1992; Flick 2006), the known informants were interviewed first, and then asked to indicate other specialists for the themes under study. This procedure entails data analysis after each interview. The final sample contained participants from both the \textit{a priori} list and from the recommendations of early interviewees. Theoretical saturation was reached at 11 interviews and the final representation of the population included one business owner, one operations and management executive, two research and development (R&D) specialists, two business and R&D consultants, two government (one federal and one provincial) representatives; one city mayor; and two product and process design and innovation specialists.

\textsuperscript{5} Faculty members that served as a supervisory committee and specialists in the study’s topics of interest.
2.4.3. **Instrumentation**

Semi-structured interviews were used for data collection. In qualitative research designs, semi-structured interviews are commonly used instruments for collecting data from experts (Miles & Huberman 1994; Bansal & Roth 2000; Carter & Dresner 2001; Flick 2006). A more structured instrument allows for better focusing, avoidance of data overload, and comparability between cases, thus enhancing internal validity (Weller and Romney 1988; Miles & Huberman 1994). After pretesting with non-participant experts, a final interview guide was developed. The interview guide was designed to address general and broad topics first, and then, to focus on specific topics about the study’s research questions. The interview guide (see Appendix 1) comprised two major themes. Theme 1 contained questions on three topics: general future perspectives of BC’s economy; general impressions of BC’s forestry sector in the long run; and competitiveness factors to ensure future success of BC’s secondary wood products industry. Theme 2 had questions about potential relationships between sustainability and the long-term strategies of BC’s secondary wood products industry, with a focus on SME’s. As a result of grounded theory procedures, questions were complemented or modified as gradual sampling continued and as relevant concepts and categories emerged.

Upon request, a copy of the topics and questions were made available to interviewees in advance. All participants formally agreed for the interviews to be digitally recorded and were given a copy of the consent forms. All recorded interviews were transcribed and, along with field notes and existing literature, formed the bulk of data for analysis.

2.4.4. **Data Analysis**

Data from fieldwork (i.e. interview transcripts and notes) and from secondary data were all combined for analysis. Data analyses were performed with the assistance of computer software (NVivo version 8). Transcripts, field notes, and existing literature formed one single file for the computer software. Transcripts and notes were analyzed through coding and additional documents were hyperlinked to these emerging codes in electronic formats (see Appendix 2).
As proposed by Strauss (1987), codes represent the data. The procedure consists of developing, with a first examination of the data, open codes, which represent relevant ideas and concepts emerging from the text. Open codes may represent ideas contained in a single word, a sentence, or an entire paragraph, as well as in the researchers’ own observations and field notes. After further inspection of all available data, open codes were dropped, merged, and moved into higher-level categories. New emerging categories formed parent codes. Lastly, theoretical relationships within and between items of parent codes were developed.

The interconnections of these higher-level categories (parent codes), which essentially move text to theory, are the foundation of this qualitative methodology (Bazeley 2007). Higher-level categories were allocated to parent codes representing the concepts associated with the study’s objectives. These, along with the existing literature, served as the grounding for the recommendations presented later.

2.5. Findings

Results from the analyses of manufacturing and business-related factors are presented first, followed by the results of the data analysis on the role of sustainability. Recurring and similar issues emerging from data were grouped under common themes, such that similarities were high within and low between themes. According to the terminology presented in Section 2, “manufacturing” in this study refers to the initial activities of firms’ value chains, such as input procurement and production operations. “Business” refers to the final activities of firms’ value chains, such as those associated with marketing.

2.5.1. Internal and External Manufacturing and Business Themes

In total, eight major themes emerged from this study: 1) management skills; 2) government policies; 3) labour; 4) raw materials; 5) target markets; 6) products; 7) stakeholders; 8) and other competencies. Ranked in descending order by coding frequencies, each theme will be discussed below.
Management skills emerged as the theme with the largest number of critical points gathered from the data analysis. Issues revolving around the need for business-oriented management skills and business-focused entrepreneurship were considered to be the most critical adjustments to be made for the achievement of a more successful secondary wood products sector. Not surprisingly, this is also directly related to Brown and Blackmon's (2005) concepts of strategic resonance presented earlier, where skillful management is constantly realigning manufacturing and business strategies. There was a belief among participants that broader business-related issues were far more important to success than manufacturing issues, and that management and entrepreneurs in BC’s secondary wood industry have not yet recognized this. Some of the criticisms within different aspects of management and entrepreneurship cited by participants included, but were not limited to: a lack of business orientation; risk aversion; entrepreneurs’ manufacturing-oriented backgrounds; and an inability to find and link in with the marketplace. Historical and cultural characteristics of Canadian managers and entrepreneurs have been cited as hindrances to change, innovation, and business-oriented decisions (Martin & Porter 2000). For example, one participant stated the following:

“…Canada has a huge problem with ‘cultural change’. We are a manufacturing society…which means that people are paid very good wages to work in manufacturing plants, good benefits and all that…so how do you get a society to understand that knowledge, knowledge of the marketplace, and that a different business model is required? When all of the examples that exist are almost in conflict with them…the reality is that we have a huge population that has a very good standard of living that is not based on knowledge.”

Moreover, in BC, many secondary wood products manufacturers evolved from (and with) a primary sector mindset. The primary commodity sector has unquestionably been the driving force of BC’s economy for decades, but the business of adding value to wood products in the secondary sector is simply different. Another participant shed some light on this argument by stating that:

“There are very few companies in BC’s secondary industry, in my view, that really understand the business they are in… a lot of entrepreneurs [managers] come out of the primary industry, so they come with certain historical background, training, and experience…they come with a bias to a particular model that is in conflict to what they really need to be doing. They believe that if they focus on manufacturing they can ultimately be successful. Being a good manufacturer is critical in all businesses. It is not the driver in this [secondary wood products] business.”
All levels of government policy can facilitate attracting business-oriented human capital and making the business environment more conducive to the success of the secondary industry. This is considered next.

_Government policy_ emerged as the second most critical theme in the data analysis. Most of the critical issues gathered under this related to government policies that could bring business-related benefits to the secondary industry. This theme presents something of a conundrum. First, policy reform is considered key for the future success of the secondary industry according to participants, and yet, it is nearly impossible for SMEs’ management to generate competitive advantage from it. Despite its evident importance, the uncertainty of the benefits from such policies compromises management strategic resonances for manufacturing and business activities. A lingering dependency on merely adequate business-oriented policies has historically been a critical competitive disadvantage to BC’s secondary wood industry, when compared to other producing regions of the world (Jaakko Poyry 2001). One informant said the following about potential business-oriented policies that could spur on current businesses and attract new skilled management and entrepreneurship:

“To create an environment of aggressive business acumen…policies in terms of developing technology, innovation, and product development costs write-offs…faster write-downs on technology so that they can try things…to get out there and be in a position to be innovative and create some competitiveness.”

Synergies between the primary and secondary industries, particularly in value chain activities such as distribution and access to markets, were cited by other participants and in the existing literature (Schultz & Gorley 2006) as a potential source of advantage to the secondary sector, exemplified in the following quote by a participant:

“Provincial government, on both forestry and economic development, can be instrumental…I think that developing linkages, business linkages and operating clusters between the primary and secondary sectors, will offer some opportunities. Those linkages have never been strong and there is tremendous mistrust between the two, and usually a battle over access to fibre, which seems to be pretty absurd, but it is deep-rooted.”
Government policies could be used to soften this historic antagonism between the primary and secondary sectors. Government policies were also cited as having great potential to facilitate strategic management decisions and entrepreneurship on variety of critical issues, including tax incentives and improvements to accessing raw materials and labour markets.

Labour was the third most discussed theme to emerge from the analysis. Critical issues under this theme specifically refer to labour as a manufacturing competence and, therefore, offering an attainable level of control for management. Access to skilled labour in BC was cited by some participants and in the literature (Stennes et al. 2005; Schultz & Gorley 2006; DeLong et al. 2007) as being an endemic hindrance to the secondary industry and something that government policy should address. Delving further into the analysis, it seems that the BC’s secondary industry usually has to compete with BC’s primary industries and with eastern secondary industries to attract skilled labour, particularly for their entry-level positions in management. Some participants noted that training and upgrading the quality of existing labour could be an alternative. Here, partnerships between firms and government through technological institutions and community colleges could alleviate costs for those already doing in-housing training and serve as an incentive for those firms not upgrading to improve the knowledge of their workforce. One firm’s manager made the following point:

“The training aspect is really hurting [the industry]...there is very little of it now...we have an industry that is unwilling to pay significant portions of the training cost; it is low on their priority list. What happens there is that if you don’t subsidize it heavily...then training will not happen. I mean, our firm is actually one of the few that will actually send people for training, but I know the vast majority never will.”

Access to skilled labour is cited as having different impacts on firms depending on the degree of value addition. The furniture segment, for instance, suffers because it requires a more skilled workforce than the remanufacturing segment. Interestingly though, the management of some successful high value-added firms in BC seems to be able to attract and train their workforce to be in line with their business strategies.

Issues categorized under the theme raw materials emerged in fourth in the analysis. The raw materials theme shares some similarities with the labour theme, as they are the two manufacturing
competencies that present the greatest challenges to management for future success according to participants and the existing literature (Cohen & Kozak 2006). Raw materials, however, offer fewer options for management to internalize the challenges. The inherent characteristics of BC’s imperfect wood fibre markets and traditional preferences to attend to the needs of the primary industry mean that raw materials are constantly cited as a key deterrent to virtually all segments of the secondary industry, as stated by one informant:

“All secondary manufacturers complain about the supply side. There is a problem there for them. Our manufactures would have to have access to good quality and competitive wood fibre prices. That would be probably step number one...”

Security of raw materials for BC’s firms is almost entirely external to their value chains. Upon further analysis, and despite variation among participants, some opinions and examples from successful firms indicate a paradigm change occurring in the raw materials market. One participant punctually stated that:

“[The] secondary industry is about market focus and if your focus is getting wood then you are looking at the wrong direction.”

A business consultant added:

“Access to a new wood fibre basket that is international, not just local. I don’t think the local supply of wood is the biggest advantage to the secondary industry. I think that technology and design and business expertise to develop brand products is where the opportunities are.”

Two successful firms in the higher end of value addition observed that they have either diversified to international wood suppliers and/or secured long-term contracts with local wood suppliers that attend to their specific demands. The last point is an apparent example of Brown and Blackmon’s (2005) strategic resonance. In these cases, management aligned manufacturing with their business strategies and were able to internalize the challenges posed by raw material unavailability.
The theme *target markets* appeared next. This theme comprised critical issues about having a business strategy that reaches both local and international markets. Analysis showed that most of the challenges of having such a business strategy when it comes to target markets could be dealt with internally by management. The participation of other stakeholders (i.e. industry associations) and even government were cited as possibly having a role in assisting firms to find newer markets. However, upon further review of the data from the more successful firms, target markets can possibly be considered a controllable part of firms’ value chain. For example, some successful firms find newer markets by experimenting with customer-orientation and market-focused strategies in local markets. Then, when they find themselves higher up on the learning curve, they take the risk to venture more internationally. When asked to describe what a successful model for operating in BC’s secondary industry in the future would be, one interviewee recounted:

“Large components on export…so you are competing into high-end product lines, high-end niche markets, where you can get a decent margin to offset high costs and small markets for operating in BC.”

Another marketing specialist made the following comment when asked a similar question:

“Manufactures have to pay attention to what is needed in the market, to be more innovative, and to see how society is changing…they have to be more market savvy.”

*Products* is a theme that emerged with a collection of critical issues mainly involving, but not limited to, product innovation, development, and design. This theme has also been cited in previous assessments of the industry, and in this study, as being closely related to the *target markets* theme. Product development and customization are cited in the literature as part of business strategies and, therefore, a dimension of competitiveness (Corbett & Vassenhove 1993; Tollin 2002). Product development is also closely related to the theme of *management skills* discussed previously. Upon closer examination of the data, it seems that product development in a successful secondary firm in BC will in the future be devised in an almost opposite direction compared to today’s model. That is, future products will be designed and produced after a specific target market has been found, researched, and market-tested. The manufacturing competencies necessary to generate new
products will be set up accordingly. Here, once again, management strategic resonance will be fundamental to aligning business strategies, focusing on specific markets, and using appropriate manufacturing strategies for getting the new products to markets. Participants also advised that a lack of design and a disconnect with designers were crucial paradigm changes in product development required for the future secondary industry. As one product development consultant commented:

“Designers are trained to look at and to really understand the users. I don’t think that our manufacturers take that whole product development process. I think that they are little bit more superficial. They look at their competitor’s catalogue and say, ‘these products are selling well, we will make something like that’…they just simple knock it off, doing something very similar without really being original.”

A manager of a forward-thinking firm (according to participants) shed some light on this topic with the following remark:

“We operate on a higher end and customized product [market]…that people are willing to pay a premium for. That is where I see the future of BC. I mean, those companies that are making commodity products of any kind…taking low grade from the primary [industry] and upgrading it…pretty tough…the margins are awfully tight…I don’t hold much hope for the secondary side in the commodities business.”

**Stakeholders** was the next theme to emerge following **target markets and products**. In this study, critical points under the theme **stakeholders** related to the role of industry associations and research and development (R&D) institutions. As mentioned earlier, SMEs may have an advantage over larger companies when it comes to linking operations with management. SMEs usually have one or a few persons in charge of these activities under. On the other hand, many activities related to business strategies (e.g. developing target markets) are likely understaffed, underperformed, or even inexistent. Even a successful small business owner honed in on this issue:

“My focus is to keep the company going day after day. I don’t have the opportunity to think about what I can do globally when I am so focused on what I should be doing locally to keep everybody busy and going forward…I want to grow the company for the future, [but] I have to think of it in smaller increments…the bulk of the people in small businesses in BC are not going to think of it globally and they will be tied up in their own problems.”
In this context, stakeholders were cited as potentially having a key role in advancing the strategic business agendas of secondary wood products SMEs. In BC, the secondary sector is closer to industry associations and research institutions than to the provincial and federal governments. Industry associations are, in fact, said to play a mediator role between the secondary industry and policy makers in the government. Participants agreed that BC’s secondary industry associations and R&D institutions are on the right track in supporting all levels of manufacturing and business activities of firms. They also agree, nonetheless, that the supporting role of associations and institutions has to reach a higher level, particularly on business strategy fronts. Examples of these suggested roles emerging from the data included: identifying firms with the highest potential and progressive business strategies; encouraging these firms to cluster, exchange expertise, and jointly pitch their proposals and ideas; helping these firms to develop their target markets and products; and helping to create a role-model type of business that other firms and new entrants could follow.

The final theme that emerged from the analysis was named other competencies. This theme, in reality, could have been part of the first theme, management skills. Most of the issues classified under this theme dealt with incentives to access and attract capital, and to a lesser extent, with innovations in manufacturing technology and operations. Access to capital has often been mentioned in the literature as being a critical deterrent to BC secondary industry’s investments in manufacturing and business innovations (Stennes et al. 2005; Schultz & Gorley 2006; DeLong et al. 2007). Upon closer investigation though, data showed that management inability to take advantage of existing and available capital was considered to be a more tangible issue. Participants from leading firms cited the lack of financial expertise in firms’ management as a likely reason for the difficulties in accessing capital, rather than unavailability of capital itself. One manager noted the following:

“A lot of these guys frankly are not very skilled at presenting their stories to a banker; your average secondary manufacturer doesn’t sell themselves very well. Typically, they pledge their assets to the point that they cannot borrow any more money from the local government or banker. They don’t know they could finance due receivables, that there might be some private capital or some venture capital out there. The managing side started at the shop and wore every hat…they have to keep the company going, but you get to a certain size and you got to start bringing in professionals. There is a lot of R&D in the industry, but most don’t even understand the R&D tax credits. There is a huge hole in this industry in that regard…a lot of investors are actually interested in the manufacturing world. What you have to do is to help the manufacturers tell their story right…put together these angel [investment] forms…pitch it in a way that helps the investor.”
Not surprisingly, the literature indicates that management capabilities are top requirements for venture capital and angel investment providers (Mason & Stark 2004; Madill et al. 2005).

The major themes that emerged from reducing and grouping all of the data during the coding process are summarized in Figure 2.2. Themes were first ranked (denoted by the size of the circle) and then positioned in a two-dimensional space. Coding frequencies were used for the ranking, while the positioning was more conceptual. The horizontal dimension represents internal activities along firms’ value chains. The vertical dimension represents level of control and influence that can be exerted by the firm on the emerged themes. For example, themes placed on quadrant 3 were considered: a) to be related to business-oriented strategies that are focused on the customer end of the value chain; and b) to be controllable and able to be dealt with internally.
2.5.2. Sustainability

This study also gathered information regarding the future role of sustainability on SMEs operating in BC’s secondary wood industry in the future. When asked whether or not there was a business case to incorporate sustainability issues into SMEs’ strategies, participants responded favourably. A similar pattern was observed when participants were asked whether or not there existed a relationship between sustainable business practices and long-term competitiveness. Three major themes emerged as having the greatest potential for BC’s secondary industry. The first two themes revolved around “green” promotion; that is, the promotion of the “greenness” of the industry
itself and its products. The third theme reflected firms’ value chains as being a potential driver to SMEs’ (environmental) sustainability and competitiveness. The following passage exemplifies these opinions:

“I think if they [the secondary industry] do not look at it [sustainability], their survival is in peril. Fundamentally, I do not believe that you can conduct business in today’s world without being cognisant of the question of sustainability or environmental friendliness. I think it really comes down to the recognition that we are in an evolving [market] that does not change direction instantaneously.”

Another participant added the following:

“It is a very long and complex process to start greening manufacturing. It changes every day. As there is new information, what was really environmental yesterday, today is an environmental nightmare. It is an ongoing thing and it is complicated…I would definitely say that every manufacturer today should start stepping toward that. I think it is a challenge, but I think it is a necessity. I don’t think you are to be in business in five years if you are not moving in that direction.”

Table 2.1 illustrates the major points made regarding promoting the “greenness” of the industry and its products, and the importance of firms’ value chains on SMEs’ environmental sustainability.

Table 2.1. Participants’ considerations of three themes relating environmental sustainability and business strategies.

<table>
<thead>
<tr>
<th>Industry “greenness”</th>
<th>Product “greenness”</th>
<th>Value chain impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>“We need a strong association like [existing association] to lobby not only governments, but the world on our behalf. Unfortunately, it is made up of small business and those people don’t support it as much as they should, because they don’t understand the benefit of it. We are thinking too small.” –business owner.</td>
<td>“I think that we need to focus on niche markets and not on the mass consumer products anymore…there is still room for niche products, higher-end, specialty markets, ultra contemporary, or children furniture or eco-certified furniture. There is a growing market for products that are stamp certified.” –designer.</td>
<td>“We are seeing a major influence on the value chain. Architects have a real strong desire to get the LEED points. So we have been urging our new supplier to get FSC certified. I mean, there is no other way and we understand that they are going to proceed with that.” –operations and management executive.</td>
</tr>
<tr>
<td>“There is absolutely no way that the industry, particularly the solid wood sector, does not meet the criteria of renewability…a lighter footprint. So, you are in a privileged position.” –business and R&amp;D consultant.</td>
<td>“We have to do it with the green bandwagon. The North Americans are not going to pay for it, but the rest of the world is. We sell nothing but formaldehyde-free, green products to Japan…. So we can be on the leading edge today. We have to make sure that we are starting right now and then we can lead the rest of the world with formaldehyde-free green products.” –business owner.</td>
<td>“The Green building…it’s taken off, it’s going ballistic and if we don’t get on the bandwagon…In two years time, 50 percent of the [product] we provide will be FSC certified. We just finished putting a biomass heater and we will make sure that the glues we use are as environmentally friendly as they possibly can.” –operations and management executive.</td>
</tr>
</tbody>
</table>
“Is there a secondary industry infrastructure initiative that is supporting value-added products from a green sustainable perspective? There isn’t one that I know of. Can you do it as an individual company? Individual branding? Possibly, if you are big enough.” – business consultant.

“I think it is a huge opportunity to effectively promote secondary wood products along the line of green sustainability compared to the alternatives that are out there. It’s green wood products compared to other alternative products in the same value-added category, whether it is furniture or finisings or accessories or whatever.” – business and R&D consultant.

“There is a business case [to incorporate sustainability initiatives into SMEs’ strategies], but we have to go slowly with it… the smaller people like me… will not do it as readily as the big guys who have the dollars sitting with them.” – business owner

“You happen to have a product that fits most of the [renewability] criteria, you got to go with it. It may not be your prime feature, but it is one of the features, because as time goes by, it will become increasingly important and you need to practice for it when it is not as important.” – R&D specialist.

| Leadership in Energy and Environmental Design, a green building certification system. |
| Forest Stewardship Council, a forest and chain of custody certification scheme. |

### 2.6. Discussion and Conclusions

This study examined what the successful secondary wood industry in British Columbia will likely have to consider to ensure future success. Specifically, internal manufacturing and business competencies that likely will have the most influence on firms’ future strategies were uncovered. The role of external agents, such as government policies and stakeholders, were also taken into consideration. Finally, the importance of incorporating environmental sustainability into business strategies was addressed as well.

Manufacturing competencies have steadily improved in BC during the past decades, with great advances in R&D, particularly on processing technologies. Such advancements were diffused throughout the primary and secondary industries. Nevertheless, with limited or non-existent customer-oriented business strategies, several segments in the secondary industry were caught unprepared to compete against new entrants from an increasingly global business environment.

As can be seen from the third quadrant in Figure 2.2, advancements in the quality of business-related factors will be imperative for BC’s secondary industry of the future. Top drivers for such business-related strategies to evolve are management skills and progressive-minded entrepreneurs. The model for a successful secondary firm in the future is one of customer-orientation. Proximity, availability, and quality of fibre will not ensure advantage. A successful model will be one
that attracts talent by favourable business-related policies and incentives to open and operate a business in BC. It will be like any other high-end, highly technological, and knowledge-based business, but it happens to use wood as raw material. The few existing value-oriented secondary wood manufactures today in BC symbolize Brown and Blackmon’s (2005) strategic resonance concept; that is, management of successful firms are able to identify their target markets and tailor their manufacturing competencies accordingly. In the process, these managers are also able to internalize some of the traditional uncontrollable factors hindering business and manufacturing activities (e.g. business-oriented policies, resource-market supply). Conversely, ordinary firms excell in the wrong things, either by chasing after markets in which they cannot compete or by developing and maintaining products that are unwanted by or uncompetitive in the marketplace.

These considerations lead to the first set of recommendations for BC’s secondary wood industry. Current and new entrants will have to expand on managerial and entrepreneurial skills that are more business-oriented, as opposed to manufacturing-oriented. Managers and entrepreneurs should be able to:

a) develop product bundles that are compatible with their target markets by offering higher levels of customization and originality;

b) offset high costs of developing and maintaining the supply of a skilled workforce with higher returns from more business-oriented, customer-focused strategies;

c) learn from local markets and then expand into more demanding and profitable national and international markets;

d) diversify raw material markets or secure contractual relations with local suppliers; and

e) diversify access to capital and showcase their businesses to a host of investor types.

In the BC secondary wood products industry, SME management is generally too engaged in daily activities, that even the most entrepreneurial need help with advancing business strategies. For existing firms, government and specially industry associations will need to play a bigger role in jump-starting some SMEs to look at export markets. Successful cases could then encourage others to
follow suit. For new entrants, tax holidays and incentives in the capital market would likely be a valid option to attract and retain entrepreneurial talent.

BC’s government\(^6\) must still acknowledge the stronger political and economic influence of the primary industry and the fact that the commodity sector is rooted in tradition and has a more entrenched culture. For example, during data collection, eventual discussions about the competitive advantage of BC’s primary sector were commonly about the large and unorthodox role of government. These facts, coupled with BC’s generally undeveloped business conditions for secondary industries, are likely why the theme *government policy* ranked second in the analysis (Figure 2.2, quadrant 2). Structurally, the secondary wood industry has greater potential to be less dependent on the government. It follows then that the second set of recommendations for external stakeholders would be that:

a) industry associations and R&D institutions focus on improving business strategies of SMEs by helping in the development of target markets, products, and collaborative strategies; and

b) governments can be instrumental in removing barriers to skilled labour by offering public-private partnerships in training and upgrading labour.

With regards to sustainability, there seems to be a tendency in the industry and among other stakeholders, including the participants of this study, to refer to environmental issues a proxy for sustainability. In the literature, studies on the environmental sustainability of SMEs, both quantitative and qualitative, are also common (Talbot et al. 2001). Some of these studies have shown positive relationships between environmental sustainability and SME performance (Lefebvre et al. 2000, 2003; Rao & Holt 2005; Roy & Thérin 2007), while others have not (Clement & Hansen 2002; Hitchens et al. 2003).

\(^6\) It is worth noting the significant role placed on governments. This is likely related to the enormous influence, as the primary owner of the resource, that the government has had in the development of BC’s primary industry.
At a point in time where environmental sustainability will likely need to be addressed by most industrial sectors, wood products industries are at an advantageous position as far as environmental footprints are concerned. Due to the natural and renewable characteristics of wood as a raw material and advances in manufacturing technologies, secondary wood industries and their products are ahead of substitutes on the environmental sustainability agenda. In BC, however, these comparative advantages must still be capitalized on. Concepts, such as ‘green buildings’ and ‘healthy housing’, should be the major drivers for a variety of secondary wood products companies (from low- to high-value added) to incorporate environmental sustainability into their strategies. Although some SMEs may be able tackle sustainability issues on their own, the majority should engage as part of value chains of larger companies and firms selling to more environmentally conscious (niche) markets. The final two recommendations state that environmental sustainability should be incorporated into firms’ business strategies, which in turn, could help firms to:

a) promote the comparative advantage of wood products and wood industries against competing substitutes; and

b) focus on more demanding and environmentally conscious target markets, both locally and abroad.

One successful firm in this study exemplifies the benefits of targeting the right markets by selling to both environmentally conscious and “regular” markets locally and abroad. This, according to the owner, helps in economic downturns, where premiums for environmentally friendly products may diminish.

The existing literature indicates that the secondary wood industry in British Columbia is smaller and lags behind other competing regions in terms of value-creation (Jaakko Poyry 2001; Wilson 2001; Kozak & Maness 2001; DeLong 2007). These studies also point out that the industry has faced constant challenges to access basic inputs, like raw materials and labour. Access to these inputs was also found in this study to still be a hindrance to most firms. However, results from this study suggest that management and entrepreneurship are likely more critical factors. This is confirmed by examples of existing successful firms and their ability to overcome most of these
challenges by aligning manufacturing competencies with their business strategies. Management of these forward-thinking firms has also recognised the role of sustainability issues to their firms’ future strategies. As such, this study suggests that sustainability should be incorporated into firms’ core business strategies in the future.

Ultimately, and as a contribution to the existing body of knowledge, this study indicates that the ability to attract forward-thinking and entrepreneurial managerial capacity is perhaps the most critical factor for the future of BC’s secondary wood industry. Skilful management is required to increase firms’ competitiveness with strategic thinking that internalizes external obstacles and integrates issues of sustainability.

2.7. Advancement of Knowledge and Study Limitations

The existing literature on British Columbia’s secondary wood products industry is very much based on quantitative methodologies research designs. This inductive study contributes to the scientific study of BC’s secondary wood products industry by expanding on existing issues and offering new themes for future quantification. This study also draws from other functional fields of research, such as manufacturing and business strategies, to distinctively contribute to the theory and research surrounding BC’s secondary wood products industry. Finally, this study contributes to theoretical developments of the literature on interrelationships between sustainability and competitiveness.

In terms of limitations, this study was cross-sectional. Business conditions at the time of the data collection may have influenced participants’ attitudes (Zikmund 1997). Secondly, this study focused on the case of British Columbia only. The benchmarking of other producing regions in Canada and abroad is recommended. Finally, the motivation for this study included predictions of an unknown business scenario at a future point in time. Therefore, this study should serve only as guidance for further research on the recommendations put forward.
2.8. References


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3. FUTURE STRATEGIES AND SUSTAINABILITY ISSUES FOR THE FOREST PRODUCTS INDUSTRIES OF NEW ZEALAND, CHILE, AND BRAZIL

3.1. Introduction

In the past two decades, some southern hemisphere countries – New Zealand, Chile, and Brazil – have experienced tremendous inflows of capital and expertise to fuel newer models for their forest products industries. These models are primarily based on forest monocultures of exotic species and have gained momentum with promises of higher returns on investments. These three wood processing regions, coupled with existing incentives from local governments and capital markets, have seen their structural and non-structural wood industries thrive to become successful global players.

The successes in New Zealand, Chile, and Brazil share some commonalities. First and foremost, each country took advantage of the low input costs and high productivity of plantation forests to continuously invest in manufacturing technologies and to develop business-oriented strategies. Once regarded as lower cost and lower quality producers, southern hemisphere wood industries today are a competitive force in the markets of North America, Europe, and Japan. However, as these industries mature, input costs rise, and global competition intensifies, their once comparative advantages are beginning to diminish (Smith 2008). That being the case, the alignment of their firms’ manufacturing and business strategies becomes critical to ensure future successes (Brown & Blackmon 2005). Firms’ abilities to deal with external and uncontrollable factors (i.e. government policies and macroeconomic factors) will also impact their competitive advantages (Porter 1985). With the downward tendencies of commodity prices and market entry of newer and even lower cost producers in international markets (e.g. China, Vietnam), the southern hemisphere forest industries are already beginning to find themselves out of step in this rapidly changing competitive environment.

“A version of this chapter will be submitted for publication. Spetic, W. and Kozak, R. Future Strategies and Sustainability Issues for the Forest Products Industries of New Zealand, Chile, and Brazil.”
Concurrently, most industrial sectors worldwide are being influenced by the role that sustainability is having on the way firms operate and compete. Concepts like the triple-bottom line and corporate social responsibility are rapidly being incorporated by businesses, as means to achieve and demonstrate economic, social, and environmental sustainability with greater accountability, transparency, and contributions to public well-being (Henriques & Richardson 2004; Arnold 2008; Wexler 2009; Galbreath 2009). For example, forest products companies selling into global forest products markets today must incorporate environmental sustainability into their core business strategies (Rametsteiner & Simula 2003; Sharma & Henriques 2005; Vidal & Kozak 2008).

This study examines the manufacturing and business strategies of New Zealand’s, Chile’s, and Brazil’s forest products industries, with a focus on future perspectives and the role of external factors. Viewpoints pertaining to sustainability issues and their potential relationship with firm competitiveness are also assessed. The paper revolves around three research questions:

1) What are the key manufacturing and business issues that will drive the future success of forest products firms in New Zealand, Chile, and Brazil?

2) What external factors are critical for their long-term competitiveness?

3) What is the role of sustainability on future competitiveness for firms in these three regions?

To address these questions, a qualitative research design was used to induct from field data and existing literature.

3.2. Background

Since the early 1990’s, an increasing share of the world’s production of forest products has shifted to the southern hemisphere. Countries, such as New Zealand, Chile, and Brazil, have received a high proportion of global capital for fast-growing and high-yield forest plantations and the expansion of processing capacities (Cossalter and Pye-Smith, 2003). Investors worldwide have been attracted by the promise of higher rates of return compared to investments in the North American and European forest industries (Cubbage et al. 2005, 2007).
3.2.1. *Industrial Forest Plantations in New Zealand, Chile, and Brazil*

The area covered with industrial forest plantations in New Zealand totals 1.8 million ha. Almost 90% of these forests are planted with radiata pine (*Pinus radiata*). The forestry sector accounts for 3.8% of the country’s GDP (New Zealand Ministry of Agriculture and Forestry 2008; Statistics New Zealand, 2008). New Zealand’s forest products industry is mainly focussed on export markets in Australia, China, and the United States. In 2007, exports from New Zealand’s forest products industries totalled NZ$ 3.2 billion\(^8\), or 8% of the country’s total exports. There have been many recent developments in New Zealand’s secondary wood industry, built upon a successful softwood log and sawn lumber export orientation. Companies in the secondary wood sector in New Zealand are generally small and medium-sized enterprises manufacturing wood building components, wood furniture, and prefabricated housing (Delcourt & Wilson 1998; New Zealand Ministry of Agriculture and Forestry 2008). Recently, a partnership between the government and the private sector was created with the objective of promoting New Zealand’s secondary wood products in Shanghai, China (New Zealand Pine Exporting Companies 2007).

Chile’s industrial forest plantations total 2.2 million ha, 65% radiata pine and 25% *Eucalyptus* species. Chile’s forest products industries have also been developed with a focus on export markets in the United States, China, Mexico, and Japan (Infor 2008). The forestry sector currently accounts for 2.8% of Chile’s GDP. In 2007, forest products exports totalled approximately US$ 4 billion, or about 6% of the country’s exports (Infor 2007). Chile has diversified its export markets, trade partners, and products by developing a secondary wood products industry. This segment includes manufacturers of remanufactured wood products, furniture and components, mouldings, cut stock, and blanks (Paredes 2005; Infor 2008). The Chilean wood industry will continue to rely heavily on its commercial plantations as logging of native forests has become increasingly difficult, due mainly to rising accessibility costs and environmental requirements (Morales 2003; Paredes 2005; Infor 2007).

\(^8\) Approximately C$ 2.5 billion at the end of 2007.
Brazil’s industrial forest plantations are predominately distributed in the central and southern regions, with a forest sector built on native species occurring in the Northern Amazonian states. In 2008, Brazil’s industrial forest plantations totalled 5.6 million ha, with *Eucalyptus* species comprising approximately 65% of the total and tropical and subtropical pine (*Pinus*) species accounting for just over 28%. In 2007, total exports of (plantation) forest products reached US$ 6.1 billion or 3.8% of the country’s exports (Abraf 2008). Historically, plantation forest products have contributed to about 3% of Brazil’s GDP (SBS 2008). Overall, Brazil’s exports and domestic consumption of plantation forest products have steadily been on the rise since 2001 (Abraf 2008). Globalization and high investments in manufacturing technologies have provided opportunities for Brazilian wood producers to increasingly capture market share in the United States, China, and Western Europe (Bowyer 2004).

In their developmental stages, industrial forest plantation in these three countries all took advantage of some type of incentive, policies for low and stable tariffs, and/or subsidies, which in turn, have attracted global silvicultural and manufacturing investment (Whiteman 2003; Cossalter & Pye-Smith, 2003; Bull et al. 2006). Depending on the method of silvicultural management, site quality, and species, rates of return for industrial forest plantation’s can vary from 13% to 23% in these three countries (Sedjo 2001; Cubbage et al. 2005).

These higher returns, coupled with secure fibre supplies, have made imports of European and North American harvesting, transporting, and processing technologies more feasible. As such, (plantation) forest industries in these three countries have been evolving along very similar competitive trajectories by focusing on export markets (i.e. New Zealand and Chile), relying on lower capital and production costs, investing in processing technologies and value-added products, and exerting a high degree of control along the entire value chain (Delcourt & Wilson 1998; Morales 2003 Hashiramoto et al. 2004; Cubbage et al. 2005; Bull & Ferguson 2006; Bull et al. 2006). A higher degree of control over value chain activities is known to generate sources of competitive advantage (Porter 1985), and to facilitate the alignment of manufacturing and business strategies (Williams et al. 1995; Ward et al. 1996, 2007; Sun & Hong 2002; Chang et al. 2003; Bell et al. 2004).
3.2.2. Manufacturing Strategies, Business Strategies, and Sustainability

Manufacturing is a critical component of any business, but recent literature has indicated that successful firms likely also have well-defined business strategies driving manufacturing to produce the optimal mix of products and services for the market being served. The literature commonly distinguishes between firms’ manufacturing and business strategies as respectively dealing with internal competencies and external (market) requirements (Skinner 1969; Corbett & Vassenhove 1993; Porter 1980, 1985; Brown & Blackmon 2005). Competitiveness in today’s global market is dependent on the strategic resonance of value chain activities, from manufacturing inputs to customer service (Brown & Blackmon 2005). Manufacturing and business strategies are controllable factors for management, and can be revised or changed at will. Firms that often rely on uncontrollable factors, such as the natural environment, business culture, and legislated fiscal, monetary, and trade policies may see their competitive advantage deteriorate over time (Porter 1985; Martin & Porter 2000).

Manufacturing strategy attempts to find the best combination of internal competencies, including raw materials, human resources (Youndt et al. 1996), flexibility, dependability, innovativeness, and quality of products and processes (Corbett & Vassenhove 1993), to be employed at different stages of production (Amoako-Gyampah & Acquaah 2008). Beyond optimum allocations and transformations of internal competencies and resources, manufacturing strategies must also contribute to overall performance (Hill 1980; Hayes and Wheelwright 1984; Ward & Duray 2000); that is, be in line with business strategies. Business strategy relates to the literature on marketing and competitiveness, as firms find and sell products and services to customers who value their offerings more than their competitors’ (Corbett & Vassenhove 1993; Hoff et al. 1997; IMD 2005).

From Skinner’s (1969) work the “manufacturing mission” of firms to the emergence of globalization, a number of fundamental changes have reshaped the competing environment for firms. 

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9 Brown and Blackmon (2005, p. 800) define strategic resonance as being the alignment of a firm’s “manufacturing strategy with business-level strategy to support strategic flexibility through integrating market-led and resource-driven approaches.”
Brown and Blackmon (2005) characterized this evolution as moving from static to dynamic rates of change, stable to volatile environments, mass production to responsive and customized production, enterprise-specific structures to network industry structures with more of a focus on information and knowledge generation and dissemination, and top-down to strategic resonances approaches. Meanwhile, the business case for sustainability (e.g. incorporating environmental and social issues into core business strategies) has continuously gained momentum within almost all economic sectors (see Arnold 2008 for a review). In forestry, ideas of sustainable management, forest certification, corporate responsibility, and bioeconomies are now becoming mainstream (Duchesne & Wetzel 2003; Tikina & Innes 2008; Vidal & Kozak 2008).

Sustainability issues are clearly becoming increasingly important and, as a result, are very much under the scope of researchers and practitioners. In the private sector, potential benefits for firms considering incorporating sustainability into their operations and business strategies include access to markets, access to value chains (as suppliers) of other firms, the ability to attract and retain top human resources, the creation of non-tangible product value, access to new forms of capital like ethical investment funds (Willard 2005; Environmental Finance 2006; Innovest 2006), social and environmental legitimacy, and reputational value (Bansal & Roth 2000). The literature is rife with a number of studies attempting to conceptualize and empirically measure the impact of sustainability issues on firms’ competitiveness (Miles & Covin 2000; Talbot et al. 2001; Lee & Ball 2003; Madsen & Ulhøi 2003; Rennings et al. 2003; Thorpe & Prakash-Mani 2003; Wagner & Schaltegger 2003; Welch et al. 2003; Wuestenhagen 2003; Rao & Holt 2005). Sustainability issues, like environmental performances and initiatives, governance and management, stakeholder and community engagement, and environmental improvement of production, are cited as having positive impacts on firms’ competitiveness, costs, innovativeness, organizational learning (Lefebvre et al. 2000; Hitchens et al. 2003; Thorpe & Prakash-Mani 2003), first-mover and market-access advantages (Wagner & Schaltegger 2003), and reputational advantage (Miles & Covin 2000). In a study with stakeholders of the British Columbia secondary wood products industry, participants positively agreed with the idea of firms incorporating sustainability issues into their strategies (See Chapter 2).
As the competing environment for forest products firms intensifies, global firms find themselves under greater scrutiny to comply with sustainable thinking along the entire value chain. However, the literature shows that there is no single universally adopted and practised methodology for measuring competitiveness, sustainability issues, and the relationship between the two. In addition, the majority of studies addressing these linkages are focused on developed countries. Therefore, this study will examine these linkages in the context of the southern hemisphere wood industries of New Zealand, Chile, and Brazil.

3.3. Methods

A qualitative methodological approach was used to address the study’s research questions. Common qualitative research techniques include grounded theory (Glaser & Strauss 1967) and analytic induction (Johnson 1998). These are described as useful for the discovery of regularities, and the identification, categorization, and exploration of connections (Tesch 1990). The process of discovery and developing hypotheses and recommendations are central to qualitative methods (Miles & Huberman 1994). Bazeley (2007) recommends the use of qualitative methodologies when a detailed understanding of processes and a deeper investigation of the nature of phenomena are being sought. This study followed the general procedures of grounded theory to develop associations from data or textual information. Analytic induction procedures were used to a lesser extent. It relied on two sources of data: existing literature and fieldwork (i.e. in-depth interviews). Sequential fieldwork procedures (sample space, sampling instrument, and data collection) were followed, as suggested by Miles & Huberman (1994), and are presented next.

3.3.1. Sample Space

Miles & Huberman (1994) define sample space as the unit of analysis in which the focus and bounding of data collection are delimited. Stakeholders from New Zealand, Chile, and Brazil plantation forest industries were selected as the sample space for this study. Participants represented stakeholders from the private sector, government, and academia. Despite the geographical range of the units of analyses, operationalization and observation is better facilitated by in-person visits with all participants. As such, this study used in-depth expert interviews.
3.3.2. Sampling Instrument

With expert interviews, participants are not the focus so much as their proficiency about the themes being investigated (Flick 2006). Expert interviews were performed using semi-structured interview guides that served as the main instrument for data collection, with observations noted whenever appropriate. Semi-structured instruments are suitable for expert interviews (Miles & Huberman 1994; Bansal & Roth 2000; Carter & Dresner 2001; Flick 2006), and allow for the avoidance of data overload and comparability between cases, thus enhancing internal validity (Weller and Romney 1988; Miles & Huberman 1994).

A final interview guide was designed following the general themes used in Chapter 2 (see Appendix 1). For each country, pretesting of the interview questions was performed with non-participating experts. The interview guide first introduced broader topics (e.g. general impressions of the country’s future economy), and then focused on the topics related to the study’s research questions (Seidman 1998). Research questions were addressed in three major themes: opinions and perspectives about the long-run manufacturing and business strategies of each country's forest sectors; key competitiveness factors to ensure future success of each country’s forest sectors; and the future role of sustainability issues on the competitiveness of each country’s forest sectors. Initial contact letters and interview questions were drafted in English, Spanish, and Portuguese and, before each visit, a copy of the questions was made available to all interviewees. Upon consent, interviews were digitally recorded. When consent was not given, field notes were taken.

3.3.3. Data Collection

Fieldwork for data collection in all three countries took place between March and May of 2008. Theoretical saturation and, therefore, the final sample size was achieved with 21 interviews\textsuperscript{10} (nine in New Zealand, six in Chile, and six in Brazil) “Sampling and integrating further material is finished when the theoretical saturation of a category or group of cases has been reached (i.e.\textsuperscript{10})

\textsuperscript{10} Most interviews were knowledgeable, not only about their own country’s forest industry, but also about the other two studied countries as well.
nothing new emerges any more)” (Flick 2006, p.127). Small and purposive samples of experts for in-depth and contextual investigations are common in qualitative research (Kuzel 1999; Carter & Dresner 2001; Merkens 2004). The final sample consisted of participants from an initial list\(^\text{11}\) of potential participants (Flick 2006) and from information obtained from these individuals on other knowledgeable participants. The latter is line with gradual sampling or snowballing techniques, where initial informants indicate other specialists knowledgeable about the study’s research questions (Kuzel 1999; Flick 2006). For the three countries, the final sample comprised experts from different groups of stakeholders representing firm owners, business consultants, research and development institutions, academia, and upper management in various business interests. For each country, data analysis was carried out in aggregate form to maintain the participants’ anonymity.

3.3.4. Data Analysis

Data analysis of interview transcripts, observation notes, and existing documents and literature were performed using computer software, NVivo version 8. Data analysis was performed with coding techniques as proposed by Strauss (1987) (see Appendix 2). Codes represent the ideas and concepts emerging from the text. First, open codes are created. As the investigation continues, open codes may be dropped, merged, or moved into higher-level coding hierarchies to form parent codes. Theoretical relationships within and the between items of parent codes essentially form the basis of generating theory from text (Bazeley 2007). In this study, higher-level categories were allocated to parent codes representing the concepts contained within the research questions. These higher-level categories or parent codes, couple with existing literature, served as the grounding for the discussion and conclusions of this study.

\(^\text{11}\) An a priori list of participants in each country was developed with the assistance of one knowledgeable, non-participating stakeholder in each country’s forest sector.
3.4. Findings

Results from the data analysis for each of the three countries – New Zealand, Chile, and Brazil – are presented next. For each country, emergent themes are presented in accordance with the study’s research questions.

3.4.1. New Zealand

New Zealand’s forest sectors seem to be at a very distinct juncture in time, with a number of significant changes occurring in all stages of firms’ value chains. With regards to manufacturing competencies, supply security of raw materials was the first theme to emerge from the analysis. Discussions around this theme revolved mostly around uncertainties and risks of future investments in New Zealand’s processing capacity, given the recent fragmentation in the ownership structure of industrial plantation forests. This is exemplified in the following passage by a business consultant:

“In terms of wood supply and operations, the forest ownership in New Zealand has become increasingly fragmented. Companies have all sold their forests off to pension funds and long-term holders. It does actually make it quite difficult for anyone coming in to secure wood supply, because so many different parties, all with differing interests, own it. What we’ll probably need to see is, maybe, regional consolidation of ownership…if we want to encourage processing, we have to encourage the owners to work together on putting that wood out there, in a more coordinated way, so people coming in to invest in processing infrastructure actually do have some greater confidence. I think that’s one of the challenges that will occur over the next fifteen or twenty years.”

As mentioned by the participant above, ownership of large proportions of industrial forest plantations in New Zealand have been transferred to long-term holders, mostly Timber Investment Management Organizations (TIMOs). In fact, the data analysis revealed that a theme could be formed with critical points made by participants about the impacts of TIMOs on the future competitiveness of New Zealand’s forest industries. Besides implications to the security of raw material supplies, points were raised about TIMO’s impacts on manufacturing and the fact that their presence does not necessarily signal future investments in processing, products, or market development. One industry specialist made the following observation:

“The small owners are still quite big to be major suppliers to the individual mills, because the individual mills aren’t that big. The difference with TIMOs is that they are unwilling to invest in market or product developments. They’re interested in maintaining an active market where the prices are stable. They want a diversified portfolio of assets. Forestry is an active market. They’re looking at it as long as their returns from forestry aren’t in sync with their other asset base, which gives them the diversification they need.”
Participants also noted that, as institutional investors, TIMOs have tax advantages for market entry, which usually help them in outbidding other buyers.

A number of widely discussed themes related to business issues emerged in this analysis: place, product, and promotion (in line with marketing terminologies), as well as management skills and entrepreneurship.

The theme place (or distribution) was informed by discussions about the need for New Zealand’s firms to exert higher control over down-stream supply chain actors. This argument was cited across different groups of stakeholders, including firm owners. One of these owners commented that they have been reasonably successful at finding niche markets for their products in the United States by forming consortiums. This model consists of competing firms joining forces to find and serve potential target markets. According to this firm owner, such consortiums have helped the producers, as a group, to achieve scale, access to markets, and distribution services, due primarily to exerting greater control over their downstream supply chains. Owners’ general views about the need for higher control of supply chain activities is exemplified in the passage below:

“New Zealand’s firms need to set up relationships with other companies in North America or Asia…proper alliances, commercial ventures, and provide the pull for their products. I think a key factor is to have a greater influence on the market through ownership or joint ventures of distribution or retail outlets. We’ve got to be able to control that distribution right through the supply chain to the market.”

Product appeared next in the analysis. This theme contained critical points about the need to develop total products¹² (Zikmund 1997) aimed at international markets. Participants agreed that, with increasingly global competition and the commoditization of certain segments, advancements in services to attend to end-consumers’ intangible preferences are key for avoiding price-based competition. A pulp & paper manager stated that:

¹² In marketing terminologies, the total product concept considers not only the actual and tangible product being purchased, but also items beyond the physical product, like service components and intangibles (Zikmund 1997).
“Everybody’s quality is the same, but we try to differentiate ourselves when selling in China based upon service. Service is the single biggest differentiation. Whether that be faster shipping, keeping stock up there, having our own office up there, or understanding our customers better. You cannot just make a product and then give it to an agent. You can’t ask them to get rid of it or sell it for you.”

Participants also cited that efforts towards developing products with greater levels of customization could offer some premiums in international niche markets. A frequently cited example of a New Zealand firm that is successfully operating internationally with a differentiated product was a producer of prefabricated houses.

The theme promotion summarized participants’ opinions on two major issues. First, participants cited the need for New Zealand’s firms to continuously promote the properties of radiata pine as an equivalent substitute to other species (particularly customers in the United States who are used to North American species). This is illustrated in following observation made by an industry specialist regarding a radiata pine product destined for the United States housing market.

“You have to go up there and market them, continue to improve them, and offer customers, builders, and architects more sophisticated solutions and more flexibility around how they’ll perform. How you can work with different materials, what colours you can use on them…a more systematic approach. If you load a boat here and ship it to the northwest coast of the US…you might sell some, but the chances that you’ll still be doing that in ten years time is diminishing, unless you get out there and do something more creative.”

Second, promotional efforts around branding were cited as potential business strategies for the near future. Participants suggested that “imaging” could be used as a tool for consumer awareness, particularly playing on New Zealand’s perceived attributes of quality and “greenness”. One participant from a research and development institution stated:

“Branding is going to be hugely important to us as we move forward. The Chinese, and a lot of people, are very intrigued by New Zealand. We’re seen as friendly people, clean and green, and they all want to come here. We’ve got to build around our brand and our image and create the products they want, differentiating around brand, image, and very high quality. We’re FSC certified in all our products now, we just need to continue on that sustainable image.”

13 Forest Stewardship Council.
Management skills and entrepreneurship emerged as the final business-related theme. Critical points here were mainly reflected firms’ needs to grow beyond regional markets and to bring in professional expertise. On this latter point, participants agreed that many owners lack the entrepreneurial strength to delegate part of the management functions and, ultimately, to venture into larger markets.

A number of themes related to external factors that could affect the future of the New Zealand forest sector as a whole also emerged during data analysis. These themes revolved around future implications that stakeholders, transportation costs, land use, and new forest products and services, could have in New Zealand’s forest sectors.

The involvement of stakeholders, such as industry associations and government, were commonly cited by participants as being instrumental for the development of future strategies for New Zealand’s smaller forest products firms. Stakeholders could play a part in the future strategies of firms by providing greater cohesion between forest owners and manufacturers. These arguments were exemplified in the opinion of the following firm manager:

“We have to find a way of being a little bit more cohesive… I had a couple Ministers say to me that they didn’t know who to listen to in the industry. So the forest owners sort of hated each other, but they all hated the wood processors, and the wood processors couldn’t agree with any of the big saw mills, the smaller saw mills, the pulp and paper…whereas with agriculture, it’s very collective. They are able to sell their message and get their desires from the government, whether that’s trade access to other countries, research funds, or appreciation allowances, or something. Part of the issue is probably the ownership…in New Zealand, [the forest sector] is much more internationally owned.”

According to participants, transportation costs\textsuperscript{14} stemming from high global demand for shipping freights will likely squeeze the margins of New Zealand’s forest products exporters even further. As it stands, New Zealand’s geographic distance to export markets and its dependence on log exports – a low-margin commodity – are already major contributors to lower margins. High

\textsuperscript{14} As this study is being written, freight rates have decreased somewhat due to the global financial crisis. In the long run, however, these arguments may still be considered valid once markets recover.
domestic transportation costs were also mentioned. These points are illustrated in the following passages:

“It’s likely that shipping costs will remain high. China has tied up shipping worldwide. We’re located on the bottom end of the world and freight costs to New Zealand have gone up threefold.”

“[The] New Zealand forest industry is currently not well positioned for growth outside Australasia.”

“Our roads are pretty narrow and they tend to be hilly. Trucking costs are quite high per unit of distance.”

The theme land use emerged with participants agreeing that it is likely that assessments, evaluation, and monitoring of environmental footprints will all have a role in land-based activities in the near future. Informants pointed out that New Zealand is a strong advocate of environmental sustainability at the international level. Some noted that the dairy industry would likely have to account for their emissions and land-use impacts in the long-term and that this could have major implications for industrial forest plantations which may become more attractive when compared to other competing land uses. Changes to land-use policies are currently under discussion in New Zealand, as stated by following participants:

“Dairy farmers are making very good money. They are actually able to buy forests, clear them, and convert them into dairy land. There is an actual deforestation occurring right now because the real costs of environmental impacts have not been brought to bear. By 2013, the farming sector will have to account for emissions, and that will be a huge turn around for them.”

“I think over time, some of those costs of other land uses that are borne by the community, like cleaning up waterways, dealing with nutrients in lakes and rivers, and climate change issues, are actually going to come back to the activity on the land.”

The theme new forest products and services emerged from the data and is associated with potential new uses of wood fibre, forest ecosystem services, and the potential for synergies with the tourism industry. New uses for wood fibre includes biomaterials as a potential opportunity for New Zealand’s forest sector. Participants commented on the possibility of adding more value to forests by increasing value-added and high-tech uses of wood fibre. In particular, the use of wood fibre as a substitute to petrochemical raw materials was emphasized. Participants generally agreed that tourism could be a leading industry in New Zealand in the near future, and that it could create opportunities in
the forests through recreation and ecotourism services. Other benefits deriving from forest ecosystem services, like clean water, carbon sequestration, and soil stability, were also cited. The following passages illustrate these results:

“The reasons for doing forestry will be more diverse than what we’ve got today. We’re looking to the day when a lot of materials traditionally supplied from the petrochemical industry will have to come from plants, and predominately, we hope, forest fibre.”

“I think that we will start to react to non-timber markets. Suddenly forestry has got this value of how much carbon it sequesters…issues of biodiversity, clean water, and soil stability…also, I think that forestry can provide a lot of what the tourist is looking for with little cost to productivity. We need to alter little in terms of our production process in forests because of the low inputs, and accommodate this green market that’s out there now.”

The final stage of data analyses dealt with the role, as perceived by participants, that sustainability would have on firms’ competitiveness in the future. When asked about the incorporation of sustainability into firms’ core business strategies and, therefore, the relationship between sustainability and competitiveness, the majority of participants answered positively. In general, participants in New Zealand appeared to associate sustainability with environmental issues more than social issues. The first theme that emerged from the analysis of the interrelationships of sustainability and competitiveness in New Zealand’s forest products firms was around gains in production efficiencies. Points made about the industry’s movement towards energy auto-sufficiency and even becoming energy sellers, for example, were recurrent. Firms’ interests in management tools, such as life cycle management or life cycle accounting, was cited as an example of the recognition of both economic and environmental benefits. “Tools that were born out of the green revolution suddenly are now becoming everyday tools being used in companies to improve their business processes,” said one participant from a research institution. New Zealand’s advanced industrial plantation forest management and widespread adoption of forest certification schemes (i.e. Forest Stewardship Council) were cited as still being potentially advantageous to firms in the near future. The theme that emerged from these points related to increases in the sophistication of certification processes and their impacts on value chains. That is, participants agreed that certification processes will continually evolve and that New Zealand’s position at the forefront internationally could bring some first-mover
advantages. For value chains, participants mentioned that, increasingly, market access would be contingent on chain of custody certification, thus driving demand for certified wood. Another theme was formed with points made about opportunities for promoting the industry and its products. The comparative environmental friendliness of wood was mentioned as a potential promotional strategy for the forest industry. Also, New Zealand’s reputation as being sustainable, clean, and green was cited as a potential source of advantage in certain, more sophisticated markets. Finally, one social dimension of sustainability emerged as a theme, the rights of indigenous people to the land. One industry consultant stated:

“I don’t know what they’re [TIMOs] going to do when they realize they can’t harvest the wood they want to harvest because there’s no market. Will they just sell up? They may just sell to whomever. Or will they engage more actively in the industry? A lot of the land that TIMOs own will eventually go back to Maori ownership, once they have harvested their current crop. The Maoris will be long-term owners and they don’t have to generate returns on asset values. They just have an association with the land. They’ll be quite happy just to have the trees growing at low returns. Many have shown an interest in planting native forests on it.”

3.4.2. Chile

Results from the data on the Chilean forest products industry are presented here and generally speak to the factors that have brought the industry to its current position globally: strong integration and control of value chains on the part of its firms.

The theme raw materials emerged as a critical manufacturing competency for the future success of the industry. Supplies of industrial plantation wood, according to participants, will increasingly become an issue, particularly to the structural wood segment, which has also been affected by lower demand for structural products (i.e. in the United States housing sector). Participants also mentioned the buying power of the pulp segment as contributing to the higher costs of raw materials and noted that a gap in the availability of economically harvestable volumes will be reached in approximately 10 years.

Labour emerged as a second theme within manufacturing competencies. Critical issues around labour were less frequent and regarded as not as important as raw materials by participants.
One point worth noting, however, is that there seems to be an overall agreement among participants that labour costs in the near future will increase. A commonly cited rationale for this was the constant need for more qualified labour at all levels to maintain competitiveness in value-added wood products markets.

As far as business strategies are concerned, participants agreed that Chilean firms would have to maintain or improve control over their downstream value chains. Knowledge about customers and control of distribution channels were two major themes that emerged from discussions on future business strategies. These are seen in the following passages:

“We have learned, as an exporting economy, to really value the understanding of the customer...to seek markets and to set up a supply chain that delivers, 15,000 kilometres away, what a client wants.”

“I think that the opportunities are in specifically knowing where our customers are, what they want, and delivering to them those products that we have demonstrated to be efficient in...Obviously, along comes another critical issue which is one of product development. For example, we are already doing some market testing in the countries of Oceania...who would've thought?”

Informants also noted that overall improvements to the current model – as opposed to major strategic breakthroughs – would be the likely path for the industry in the next decade. “The industry’s vertical integration has worked well for us, allowing for fast turn-around in forest/wood quality management, product development, and marketing activities”, said one upper management informant.

Themes on external factors likely to impact the industry in the future also emerged. For instance, transportation costs was as a recurrent critical issue for Chile’s forest products industry. Participants agreed that the costs of shipping freights would have a greater role on firms’ future strategies. Upon a closer examination of the data, Chilean companies seemed to respond better than New Zealand’s to the effects of increasing global shipping costs. It appears that Chilean firms’ active participation and control of downstream value chains will likely contribute to better long-term shipping contracts and lower transaction costs. Creativity will also have to be used to a large extent, as stated by one manager:
“Just about 80% of our final markets are far…I think that freight cost will keep rising due to oil prices and low supply of vessels. These costs have increased between 10 to 15% from one year to another. That’s more than the average of the world inflation. We have been able to minimize some of these costs by taking advantage of some returning ships that leave Chile empty or at lower rates to cross the Pacific.”

Another factor external to the firm that emerged from the data indicated potentially greater participation of Chilean producers in other South American regions. Some participants agreed that the industrial organization of Chile’s forest sectors is stabilizing (i.e. little change in the number and size of players), thus facilitating regional integration in countries like Brazil, Uruguay, and Argentina. One manager illustrated this point:

“As an option to further develop the industry, we have to start looking at opportunities elsewhere in South America. In Chile, the theme ‘forest industry’ is somewhat saturated. There won’t be major investments. Perhaps, on small plants or on renovations of existing firms. Further developments of the industry could be on new frontiers in northern Argentina, Uruguay, and central and southern Brazil…Particularly, to bring Chilean business expertise on product and international market developments to the industries of these regions.”

Two major themes emerged from the analysis regarding the role of sustainability issues on the future of Chile’s forest products industry. First, and unlike in New Zealand, social aspects of sustainability precede environmental ones in importance according to the majority of participants. Despite some recognized positive externalities derived from the industry, a number of participants recounted the need for larger forest products firms to move forward on issues of local community development and stronger integration with local small- and medium-sized enterprises. Participants mentioned that the industry structure (i.e. vertical integration) precludes some key stakeholders (i.e. small forest owners) and hinders local development, particularly in those communities dependent on firms’ upstream value chain activities. The high concentration of the forest industry in certain geographic regions of the country was also mentioned as a deterrent to further local development of communities. The implied rationale was based on the industry’s monopsonistic power, being practically the only regional employer and resource buyer. All levels of government, according to participants, should ensure that social and environmental benefits from the industry are seen in local communities.
Forest certification emerged as the second theme. However, it is perceived as having failed to advance sustainability issues for local communities. That said, participants agreed on the market access benefits that forest certification could provide in the future (especially if it was more inclusive of social dimensions). Currently, said some participants, firms can still be successful in export markets without forest or chain of custody certifications depending on the final markets in question. Many of the points made above were taken into account by a participant from academia:

“I think that certification norms are inefficient to local development. They cover sustainability issues on plantation forest practices and chain of custody, but negate social themes. International markets vary…some are very restrictive, like Europe, and some not so much, like China. So I don’t see much change in the short term for higher environmental requirements imposed by clients. I believe it will improve…but it is going to be a slow process, especially in the Asian market, where such requirements are rare today. Instead, local governments should take the lead.”

3.4.3. Brazil

Results from the data analysis on the future of Brazil’s forest plantation industries showed that external factors would likely play a more significant role than internal ones. One major theme and several sub-items emerged related to external factors, namely the legal framework for industrial forest plantations. Brazil’s environmental legislation was cited as being outdated and deficient when it comes to forest plantations. Participants noted that there are clear distinctions between the economic activities of industrial plantation forests and those of native forests in Brazil. Thus, the legislation pertaining to each activity should neither be the same nor be under one governmental regulator (i.e. the Ministry of Environment). Instead, it was suggested that the legal framework for industrial plantation forests should be more in line with those of agribusiness activities. Specific environmental legislation for industrial plantation forest activities is lacking and the situation is not improving, according to some interviewees. In particular, transaction costs due to increased bureaucracy, raw material security risks, and concerns about investments in the sector were cited as unresolved issues. These concerns are shared between individual owners of land and plantation forests and vertically integrated firms. The director of a wood products manufacturer noted the following:

“I think that the factors that can impact the industry's competitiveness in the future are those external to the firm, especially the need for adjustments of the legal framework of plantation forests. The current forest
legislation is ambitious, but difficult to implement...it was penned in the sixties and, therefore, to another reality. There are a number of revisions already in Congress, and the next 3 to 5 years will be key. For me, a plantation forest is a type of agriculture...yet less impacting to the soil and with longer rotations, But it is treated under almost the same framework as a native forest. So, debureaucratization and modernization of the legislation balancing conservation and development are critical.”

Participants also indicated that all levels of stakeholders fear increases in litigation in the near future. For instance, participants referred to a current legislation on land-use that imposes certain percentages of the area of a property be set aside for conservation or preservation. It varies from 20% in southern regions to up to 80% in the Amazonian states. Such legislation, said some participants, is almost arbitrary, spreads ambiguity, and completely disregards socio-economic and environmental aspects of land-use like site suitability for forest plantations, geochemical characteristics, and sustainable forest management. A forest industry consultant noted that:

“Such mechanisms of command and control used in Brazil are very archaic...they generate a ripple effect of inefficiencies of regulatory agencies and encourage system-wide corruption. These are crucial factors that the investor has to consider...they impact future access to the resource and even property rights.”

Social pressure is another theme that emerged as an external factor impacting Brazilian firms. Points made about this theme were less common, yet were considered to be critical by some participants, as exemplified by one manager:

“We have access to the latest manufacturing technology. Forest productivity can be maintained or even improved with continuous research, and internal demand will still be the driver for the business. So, external factors, I think, will be more important in the near future. For example, there is a risk to large industrial forest plantation owners from potential uprisings in land invasion activities. Brazil’s nonexistent or blurry legislation about agrarian reform contributed to some social movements to select eucalyptus as another latifundia, despite covering less than 1% of the total agricultural land, far less than cattle raising or soybean activities, for instance.”

Finally, future investments in transportation infrastructure, such as railroads and ports, were also cited as being critical, as Brazil’s dependence on high-cost truck transportation threatens to squeeze industry margins even further.
A business-related theme that emerged from the analysis dealt with strategies adopted by Brazil’s forest products export industries. Data analysis on this theme indicated that price-competition strategies seem to dominate forest products exporters. It was mentioned that, since Brazilian forest products firms have traditionally focused on domestic markets, and exported only during periods of highly favourable exchange rates, most firms have not developed strategies to compete internationally. Firms’ low production costs, due mainly to low-cost inputs and the very high productivity of forest plantations, have allowed them to engage in low-price strategies to increase international market shares. In this vein, participants cited the need for management to develop more sophisticated international business strategies that do not hinge on favourable exchange rates. Taking the moulding and millwork segments as an example, one forest industry consultant made this observation:

“Twenty years ago Brazil’s participation in the US imports of softwood moulding was about 1%. Today, it is over 30% at the expense of Mexico and Canada’s shares, for example…but if you look at the price of Brazilian mouldings in the US market…they’ve fallen dramatically. At the same time, Chile’s participation is also around 30%, but they have been able to get better premiums. These are distinct strategies, and for Brazilian firms, quite risky, as their margins continue to shrink.”

For Brazil too, results showed that there seems to be a unanimous support regarding the potential linkages between sustainable behaviour and firm competitiveness. Examples were given from Brazil’s larger forest products industries, such as the pulp and paper and structural panel sectors. Higher overall efficiencies, particularly by minimizing the transaction costs of legal services, and internal cultural changes for all value chain activities, were cited as major benefits of incorporating sustainability issues into core business strategies. For commodity exporters, incorporating a sustainability philosophy is a license to operate in international markets, notably Europe. In Brazil, like Chile, social aspects of sustainability seem to be under greater scrutiny than environmental ones. Government failures in areas like education and health care are often internalized by the industry. These, in turn, have become part of large companies’ perceived social obligations. Some companies have to consider these perceived social obligations to develop their social sustainability agendas. That is not always the case for smaller and non-exporting segments. The following passages illustrate these points:
“I think that when it comes to sustainability issues, Brazilian companies benchmark quite high when compared to other producing regions of the world. These are large exporters with the financial resources to invest…what they don’t do well, however, is public relations…to work on their image. Smaller firms, producing mainly for the supply chain of other firms are all focused on internal markets…these just do enough to comply with the minimum requirements…It is slowly changing though, as these issues permeate throughout and across industries’ value chains.”

“In ten to fifteen years from now, you will not be in business if you don’t look at these issues. To most segments, sustainability will still be in the ‘costs’ account, but will have to be incorporated nonetheless.”

3.5. Discussion and Conclusions

This study assessed key stakeholders’ overall perspectives about the future competitiveness of the forest product industries in New Zealand, Chile, and Brazil. Table 3.1 summarizes the major findings by presenting the perceived critical issues for the future success of the forest products industries for each studied country.

| Table 3.1. Perceptions of key internal and external factors of future success and major sustainability issues for the forest sectors of New Zealand, Chile, and Brazil. |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| **External Factors**                            | **New Zealand**                                 | **Chile**                                       | **Brazil**                                      |
| - Transportation costs will remain critical.    | - Transportation costs will also remain critical, but more manageable. | - Overall need for more sophisticated legal frameworks on: |
| - Environmental footprint policies could play in favour if land-use impacts were to be accounted for. | - Opportunities for further expansion into other South American regions. | - environmental legislation to address particularities of different land-uses; |
| - New wood fibre uses and non-timber products and services will be key for value creation. | - Higher input costs as a result of: | - recognizing crucial distinctions between “production” and native forests activities. |
| - Raw material security will be key to attract investments in processing capacity. | - greater inter-segment competition for raw materials; | - Better internal transportation infrastructure is needed. |
| - Need to reduce uncertainties from forest ownership fragmentation (e.g. TIMOs). | . levelling-off of harvestable volumes; | - Maintain access to imported manufacturing technology to offset rising labour costs. |
| - Overall need for more sophisticated legal frameworks on: | . higher labour costs; | - Internal players should take advantage of recent success in domestic markets to venture into export markets. |
| **Internal Factors**                            | **Manufacturing**                               | **Customers**                                   |
| - More aggressive efforts to control downstream supply chains are needed. | - Should keep focusing on export markets. | - Current exporters should rethink competing on price strategies. |
| - Should continually promote radiata pine as total products. | - Maintenance or even improvements of know-how on supply chain integration, customer service, and product development needs to occur. | |
| - Should concentrate on regional markets (e.g. Australasia). | - Will maintain easy access to processing technology. | |
| - Collectively target more profitable niche markets in the US and Europe (e.g. consortiums). | | |

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As recipients of large international investments since the early 1990’s, the forest industries of these three regions have rapidly matured. In fact, the forest industries in New Zealand, Chile, and Brazil are global forces, sought after for higher returns on investments due to lower input costs, higher fibre productivity, and attractive internal financial markets. However, other macro- and microeconomic benefits have been eroded in the last decade and current economic conditions may make competition in the future more challenging. New Zealand’s and Chile’s forest sectors have historically been more dependent on export markets and could be at a greater risk, while Brazil’s strong domestic demand may provide options for export-oriented producers.

Of the three forest sectors studied, New Zealand’s seems to be changing most drastically. These changes are driven, in part, by a great deal of uncertainty on issues like forest ownership fragmentation, its impact on raw material availability, and consequently, future investments in processing capacities. As wood supply becomes an issue, raw materials as a manufacturing competence become an external and uncontrollable factor of production (see Chapter 2). If the traditional model persists, New Zealand’s forest industries will contribute less to the country’s standard of living. Firms will become increasingly dependent on management’s ability to internalize unfavourable external factors (Brawn & Blackmon 2005). A high reliance on external factors is known to be an unsafe strategy that compromises firm competitiveness in the long run (Porter 1985; Martin & Porter 2000). In the current model, it is likely that firms will either have to join forces to gain scale and control over downstream value chains or become smaller niche-oriented players, particularly in Australasian markets.

An alternative model, however, may provide opportunities for the forest sector in New Zealand; one that is largely based on the emerging discussions about climate change and the
concept of bioeconomies. With such a model, the forest sector would be more diverse, producing not only traditional wood products, but also being a wood fibre source for biomaterials. New Zealand’s functioning R&D institutions and practitioners are working towards recasting the forest sector as leaders in future markets for wood-based substitutes of petrochemicals, for example.

In the meantime, forests are becoming increasingly important in global climate change discussions. As accountability of environmental footprints for all land-uses becomes necessary, forestry in New Zealand should benefit. Better soil and water quality and reduced emissions are some issues that could give forestry a lower opportunity cost against other land-uses (e.g. the dairy industry) in New Zealand. Finally, with the perceived future growth of the tourism industry, non-timber services from forests could become an attractive option. Participants in this study consider that tourism will be a leading industry in New Zealand in the next decade, and that the once industry-oriented forest plantations could support other activities like ecotourism.

In Chile, a strong integration of value chains will continue to be the basis for future manufacturing strategies despite probable increases in input costs. Business-related strategies, especially those related to customer orientation, distribution expertise, and product development, will also help to maintain the industries’ current successes in the future. Chile’s relatively stable macro- and microeconomic conditions have meant that its forest industry is fairly immune to external factors, the exception perhaps being rising transportation costs and an over-reliance on the United States market for structural wood products. Unlike the pulp industry, Chile’s structural wood segments have historically adopted competing strategies that are based on value-added products. In order to maintain their margins, the structural wood segments likely will have to continually evolve their business-oriented strategies to offset higher input costs, mainly from skilled labour.

Structurally, expansions of Chile’s forest industry appear to have plateaued. In fact, further concentration is more likely than increases in the number of players, as economies of scale, particularly in the pulp sector, still exist. Forward and backward integrations are unlikely, as the larger players are already vertically integrated. However, opportunities for further participation in neighbouring countries appear to exist and Chile’s know-how (at all stages of the forestry value chain)
puts them in a favourable position for regional expansions. Northern Argentina, Uruguay, and some areas of Brazil still offer high-quality supplies of basic inputs (e.g. land and labour) and, very likely, incentives from revenue-seeking local governments.

Despite an overall positive attitude among the Chilean stakeholders in this study, discussions around the incorporation of sustainability issues into firms’ strategies were generally relegated to market-based requirements, such as certification schemes and environmental standards (e.g. ISO\textsuperscript{15} 14000). If international market requirements remain unchanged, it is likely that reactive “end-of-pipe” investments (Russo & Fouts 1997) will prevail in the forest sector in the near future. Meanwhile, non-industry stakeholders believe that antagonism will be elevated between the industry and local communities over social development issues. The market and political power that firms in so-called one-industry regions exert, will continually fuel such hostility, further exacerbating the social sustainability issues in the Chilean forest sector.

Brazil’s plantation forest industries seem to be enjoying the benefits of a growth surge. Supplies of land and labour are still abundant, as Brazil’s population and arable land availability are substantially greater than those of New Zealand and Chile. Internal capital markets have continuously supplied the sector with attractive financing options. Interestingly, discussions on future success of the sector seemed to revolve around forest plantations, rather than manufacturing and business issues. This is reflective of a country that is richly endowed with natural resources. As the results show, the sector considers external factors to be more crucial than internal ones to ensure future competitiveness. As long as the industry maintains its access to imported manufacturing technologies at competitive prices, the unmatched comparative advantages of Brazil’s climate and soil conditions to grow forests will keep the sector aloft. The profitability of plantation forests can also be enhanced with revisions to legal frameworks (Nascimento 2005), since environmental legislation pertaining to industrial forest plantations is considered a major hindrance for future investments, due mainly to increased bureaucracy and transaction costs.

\textsuperscript{15} International Organization for Standardization.
Some Brazilian stakeholders pointed out that vertically integrated firms in Brazil will not sell their forest assets to TIMOs, for example. It seems that some companies yield higher returns on land and forest holdings than in manufacturing. Firms that purchase the land and create their own plantations typically produce timber at costs well below market prices. All that said, investments in Brazil’s plantation forests by TIMOs are on the rise, particularly for smaller forested sites in the south.

Further evidence that plantation forests are at the core of the Brazilian sector’s success is the higher proportion of research and development directed at forest productivity, relative to product development and marketing, for instance. While the larger and wealthier pulp and paper segments will continue to compete in international commodity markets, the solid wood segment will still target the growing domestic market, and it is unlikely that low-cost strategies can continue for solid wood exporters. With soaring inflows of foreign investments in Brazil, exchange rates – a key incentive for most exporters – will continue to be unfavourable in the short-term. Differentiation strategies will be required for these exporters, meaning that they must gain expertise in customer research, product development, supply chain management, and service provision.

With regards to sustainability, advancements in the legal frameworks of environmental and labour issues could also contribute to more a sustainable behaviour of the Brazilian plantation forest industries. Today, as long as environmental requirements are not detrimental to business, the standard practice, especially among small- and medium-sized enterprises and forest owners, is to be reactive to regulations. Thus, addressing sustainability issues will continuously be seen as a cost by Brazilian firms. Less obstructive legislation could, perhaps, serve as an incentive for higher adoption of proactive and sustainable practices within the entire sector.

In summary, the forest industries of New Zealand and Chile are more dependent on export markets than Brazil’s. Consequently, business strategies, especially those related to supply chain management, will be critical for firms in New Zealand’s and Chile’s forest sectors in the future. With regards to controlling value chains, Chilean companies seem more prepared and can benefit the most. Brazil’s large domestic market may be the best opportunities for its firms in the short-term. However, Brazilian firms should also develop business strategies for competing internationally, in
particular, with business strategies that are based on differentiation, not price competition. The three forest sectors appear to incorporating the concept of sustainability into their business practices. New Zealand’s stronger focus on research and development may provide some first-mover advantages to its forest sector, in relation to the other two in question. That is, R&D efforts towards New Zealand’s industrial forest plantations seem to be proactively addressing the role of sustainability for the future of the sector. Conversely, Chile’s and Brazil’s forest sectors appear to be more reactive to the notion of incorporating sustainability into their firms’ business strategies. In these two forest sectors, advances in environmental sustainability, for example, are commonly equated to a mere compliance with market requirements (i.e. certification). However, it seems that social issues are more common in Chile’s and Brazil’s forest sectors, compared to New Zealand’s.

3.6. Advancement of Knowledge and Study Limitations

This study used an inductive approach and drew on different topics of research, such as manufacturing and business strategies and theoretical interrelationships between sustainability and competitiveness. Accordingly, this study contributes to future research that may be more quantitative in nature. The findings facilitate future investigations on the critical issues identified to ensure future success for the forest products industries of New Zealand, Chile, and Brazil. This study was cross-sectional and a major limitation may be that macro- and microeconomic conditions at the time of the study have influenced the data (Zikmund 1997). Also, inductive research designs preclude inferences and, therefore, these results should serve only as guidance for further research and managerial decision-making. Finally, and in particular for New Zealand, this study focused on industry stakeholders’ perceptions about future manufacturing and business strategies in the forest product industry. Opinions from the actual forest owners pertaining to forest ownership fragmentation and its impact to the industry, may differ from the ones presented here.
3.7. References


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4. FUTURE PERSPECTIVES ON BRAZIL’S INDUSTRIAL FOREST PLANTATION AND SUGARCANE-BASED ETHANOL INDUSTRIES

4.1. Introduction

In the last decade, Brazil has received an increasing share of the global capital for investment in its natural resource industries. National investments have escalated as well, due to expanding capital markets and government incentives. Industrial forest plantations and sugarcane-based ethanol are among the sectors that have received heavy investment. With Brazil’s recent overall macro- and microeconomic improvements, investors are now viewing the country as a lower-risk and longer-term alternative to other global natural resource industries. High availability and quality of land and skilled labour, governmental support, strong research and development, and favourable climate conditions are some of the key contributing factors for Brazil’s robust agribusinesses. For instance, Brazil’s plantation forest segments have one of the lowest implementation costs and one of the highest growth rates in the world. Rates of return on investments in forest plantations in Brazil may reach up to 25% (Sedjo 2001; Cubbage et al. 2005). Likewise, Brazil’s burgeoning sugarcane-based ethanol industry has gained enormous momentum as a viable alternative to fossil fuels.

With global discussion of broader issues like global warming, human dependency on fossil fuels, deforestation, and bioeconomies on the rise, newer fields of study, such as understanding the interrelationships between competitiveness and sustainability, can be instrumental. Besides financial returns, another area of interest for the national and international investors involved in Brazil’s forest plantation and ethanol industries are the issues of environmental and social sustainability. These two industries are based on the cultivation of monocultures and are characterized by being an extensive type of agriculture. These industries are, therefore, under a great deal of scrutiny pertaining to ethical issues like their potential contributions to deforestation. Furthermore, as their supposed high degree of competitiveness is derived mostly from local resources, benefits (to communities and to the

16 "A version of this chapter will be submitted for publication. Spetic, W. Future Perspectives on Brazil’s Industrial Forest Plantation and Sugarcane-Based Ethanol Industries."

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environment) should arguably be seen throughout these industries' value chains. For these reasons, these two natural resources industries in Brazil may provide an opportunity for a deeper understanding of future strategies combining equitable financial benefits with greater social and environmental awareness.

This paper revolves around three research questions:

1) What is the perceived outlook for Brazil’s forest plantation and sugarcane-based ethanol sectors?
2) What are the critical factors for their long-term competitiveness? and
3) What is the role of sustainability for the future competitiveness of businesses in these sectors?

A qualitative research design was used to induct from field data and existing literature.

4.2. Background

By 2050, it is believed that emerging economies will account for as much as 50% of the world’s economic activities (Wilson & Purushothaman 2003) as foreign direct investment (FDI) in countries like Brazil, Russia, India, and China (BRIC) continues to grow (Nunnenkamp 2004; Cheng et al. 2007; UNCTAD 2007). In Brazil, the level of foreign direct investment has successively reached historic highs in the past five years (UNCTAD 2009). Brazil’s remarkably stable macro- and micro economic situation has contributed to the expansion of the internal capital market, thus, lowering borrowing costs. A large proportion of these overall investments has been directed toward resource-based industries, such as plantation forests (Consufor 2009b) and sugarcane-based ethanol (Abramovay 2008; SOBEET 2009). This recent growth in investments in industrial forestry and biofuels may present new challenges to all levels of stakeholders and, importantly, offer unique opportunities to examine the seemingly conflicting issues of sustainability and competitiveness.

4.2.1. Sustainability and Competitiveness

With increasing calls for multi- and inter-disciplinary research, a significant field of study on the relationship between sustainability and competitiveness has emerged in the last two decades
In the last twenty years, and with the advent of globalization, the competing environment for firms has expanded, investments have moved beyond the Europe, North America, Japan triad, and a number of fundamental changes have impacted firms’ overall competitiveness. Brown and Blackmon (2005) describe that firms today face more dynamic rates of change in more volatile competing environments; mass production is being replaced by responsive and customized production contexts; network industry structures increasingly play a greater role in the generation and dissemination of information and knowledge; and organization structures are moving from top-down approaches to more of a two-way strategic resonance. Meanwhile, the business case for incorporating sustainability (e.g. environmental and social issues) into firms’ strategies has continuously gained momentum within almost all economic sectors. The vice president of a well known North American manufacturing and business research institution stated: “Fundamentally, I do not believe that you can conduct a business in today’s world without being cognisant of the question of sustainability or environmental friendliness. I think that if you do not look at it, your survival is in peril” (Anonymous 2007, personal communication, December 12, 2007). On a broader scale, KPMG’s survey of 22 countries (including the Global Fortune 250 and the 100 largest companies by revenue) indicated that the majority of firms have gone beyond simply reporting on sustainability and are now publishing a corporate social responsibility strategies with defined objectives (Bartels 2008). Ideas related to the sustainable management of resources, corporate responsibility, and bioeconomies are becoming mainstream in industries such as forestry and bioenergy (Mathews 2007; Vidal & Kozak 2008).

Proponents of the term sustainability have argued that sustainable development, given the managerial and incremental approaches stressed in the Brundtland report (WCED 1987), “ameliorated but not challenged, continued economic growth” (Robinson 2004, p. 370). Economists
have normally adopted non-declining consumption per capita, utility, or well-being as indicators of sustainable development (Pearce 1998). Conversely, Robinson (2004, p. 369) argues that sustainability not only refers to the ability of humans to continue to live within environmental constraints, but is “…integrative, action-oriented, goes beyond technical fixes, incorporates a recognition of the social construction of sustainable development, and engages local communities in new ways”. Increasingly, multinational corporations and small and medium enterprises (SMEs) within different industrial sectors will likely be incorporating sustainability issues into their core business strategies and operations (Clement & Hansen 2002; Oppenheim et al. 2007). Competitiveness, legitimacy, ecological responsibility, greater overall efficiencies, and access to markets have been discussed in the literature as motivators for companies to engage in sustainability matters (Miles & Covin 2000; Bansal & Roth 2000; Wagner & Schaltegger 2003). In Latin America (e.g. Brazil and Chile), the social dimension of sustainability is seen as a critical issue for the future competitiveness of resource-based industries, such as forestry (see Chapter 3). Despite firms internalizing some government failures (e.g. education and health care), there have been rising social concerns from local communities against the latifundia and the monopsonist aspects of resource-based industries in these countries (Morales 2003; Abramovay 2008). Periods of high economic development that lack strong legal frameworks on social and environmental policies are potentially followed by periods of resource exhaustion and social stasis in communities having one or few resource-based and extractive industries (Freudenburg 1992).

### 4.2.2. The Case of Brazil

At the time of this study, world markets were in a global financial crisis. Brazil, an important player in global trade, was also affected by the downturn, but was one of last to see slowdowns and one of the first to reemerge. The financial crisis lasted only two quarters in Brazil (Pastore 2009) and “Brazil has been affected the least among the BRIC countries, went through the crisis extremely well, and could grow at a 5% rate in the coming years” (O’Neill 2009 “n.p.”). Sound pre-crisis macroeconomic conditions, a lower dependence on the United States sub-prime lending markets, and a diversification of trade partners have lessened the impacts of the global financial crisis on Brazil.
(Pastore 2009). Meanwhile, Brazil’s robust agribusiness sectors have kept the country’s exports aloft. In the past two decades, Brazil has solidified its global position as a major agribusiness powerhouse. Climate and soil conditions, strong investment in research and development of crops and land productivity, and increasing availability of credit for agricultural goods have helped Brazil to become a leading producer and exporter in meeting the rising global demand for food and other commodities (Abbey et al. 2006; Kumar & Siddy 2009). For instance, Brazil leads the world or is among the top three exporters of pulp (short fibre), soybeans, corn, coffee, sugar, fruit juices, beef, poultry, leather, cotton, and sugarcane-based ethanol (Abbey et al. 2006; Bracelpa 2009). In early 2008, Standard & Poor’s upgraded Brazil to investment grade, increasing its sovereign debt rating to BBB- (Kumar & Siddy 2009). By the end of 2008, FDI in Brazil had reached US$ 44 billion, up 10 billion from 2007 (UNCTAD 2009).

Along with Brazil’s growth in agribusiness may come potential conflicts between sustainability issues and the sectors’ competitiveness. For instance, foreign procurement of arable land in Brazil has been growing rapidly. In 2008, approximately 34 thousand properties, totalling approximately 4 million hectares, were acquired (or leased) in Brazil by international investors (Saldanha 2009). Moreover, there seems to be a growing interest in the industrial forest plantation and sugarcane-based ethanol industries regarding ethical and sustainability issues, like global energy consumption, deforestation, and the food price conundrum (Bull et al. 2006; UNHCR 2008). These two resource-based sectors of the Brazilian economy are central to this study and further consideration of each is presented next.

### 4.2.3. Industrial Forest Plantations

There is a clear distinction in the industrial structure and value chain activities of industrial forest plantations compared to the traditional forest sector. Most notably, industrial forest plantations occur mostly in southern and central Brazil using *Eucalyptus* and tropical pine (*Pinus*) species, while the traditional forest sector uses native species from the northern Amazonian states. This study focuses on the former.
At the end of 2008, Brazil’s industrial forest plantations reached 6.1 million hectares (65% eucalyptus and 28% pines), comprising 0.7% of country’s total land-use (Abraf 2009). The pulp and paper segments have the highest proportion of plantations (both eucalyptus and pines), followed by structural panels segments (Consufor 2009a). Since 2004, the country’s total planted area has increased by 3% per year, on average (Abraf 2009). During this same period, the proportion of areas planted with eucalyptus species increased from 65% to almost 70%. Substitution in the steel industry from coal to eucalyptus biomass, higher investments by short-fibre pulp producers, and new structural panels (e.g. eucalyptus MDF) have all contributed to the increases in eucalyptus plantations (Abraf 2009). Sawmilling is more abundant in the south, where there is a predominance of pine plantations. Firms there are less integrated and there is a greater concentration of furniture segments (Consufor 2009b). There have also been rising inflows of funds in the south from Timber Investment Management Organizations (TIMOs) for the acquisition of both land and standing forest plantations. Canadian and American funds make up approximately 90% of the TIMO investments in the south of Brazil (Consufor 2009b).

4.2.4. The Bioethanol Industry

Sugarcane cultivation in Brazil was pioneered by Portuguese settlers during the 1500’s. For centuries, sugar was the main product. Ethanol as a fuel, on the other hand, only gained momentum during the oil crisis of 1970’s with the introduction of a government-led developmental program called “pro-alcohol”. It was not until the end of the 1990’s that the production and commercialization of ethanol were deregulated (Unica 2009). Since then, it has been “controlled” by market forces. Today, after a decade on the “open market”, the sugarcane-based ethanol industry in Brazil is undergoing fundamental structural and managerial changes. The two decades of governmental support were critical for capacity building and overall advancements along the learning curve (Bermann et al. 2008). However, this also meant that the vast majority of firms were caught unprepared and unable to compete within freer markets contexts. “Some are still refinancing government loans, some family-owned firms were required to bring in professional management, and some firms were simply put out of the game” (Knack 2009, personal communication, February 9, 2009).
Those firms that have survived thus far are now experiencing structural changes in the forms of fragmentation, lateral and vertical integration, and an increasing number of new entrants. With the end of subsidies, a new and more dynamic model of management is expected to spread throughout the industry; a model that is mirrored on the ideas of corporate governance (Matias 2009, personal communication, February 3, 2009). Nowadays, the industry is comprised of over 400 firms producing for both sugar and ethanol markets. In 2008, the total area of sugarcane plantations reached almost 7 million hectares (0.8% of the land area), making Brazil the largest global producer of sugarcane. Over 85% of the country’s production is concentrated in south-central Brazil, predominantly in the state of São Paulo, which is responsible for more than 80% of the country’s total production (Unica 2009).

With discussion surrounding global warming and human dependence on fossil fuels on the rise, sugarcane ethanol has caught the attention of the international community for its alleged environmental friendliness. Proponents cite the industry as a successful alternative energy model; one that does not contribute to the global energy and food price conundrum, unlike ethanol produced from grains (i.e. corn) (Macedo 2005; Mathews 2007; UNHCR 2008; Abramovay 2008). With lower consumer prices than gasoline and diesel, ethanol is currently the major fuel for passenger cars in Brazil. Due to technological advances in Brazil’s auto industry, 92% of new car sales in 2008 were flex-fuel engine vehicles – those that run on either, or any mixture of, gasoline and ethanol (Bressan Filho 2008).

Despite ongoing adjustments to account for newly competing environments, the ethanol industry has received tremendous amounts of national and international investment for the expansion of existing and greenfield projects. Between 2005 and 2008, over 200 new projects were announced (Unica 2009). Investments originate from a variety of national and international sources, from both private and institutional stakeholders (Mathews 2007; Faveret Filho et al. 2008; Unica 2009). Ten years ago, capital from international investors comprised only 1% of the total sugarcane processed by the industry. Today, foreign companies own 12% and have some level of participation in 23% of the industry’s total processing capacity (Siamig 2009). In 2008, the Inter-American Development Bank approved and helped raise over US$ 600 million in investments for three new plants in south-central
Brazil. The Bank’s top management stated that the investments were granted only after social, environmental, and economic dimensions of the projects were assessed and, since then, a “biofuels sustainability scorecard” has been created (IDB 2008). Financial attractiveness seems to be the predominant rationale for increasing investment in Brazil’s ethanol industry. Years of governmental interventions, however, have contributed to a status quo of little regard for social and environmental issues, which are now being more openly discussed by all levels of stakeholders as the industry gains momentum. For instance, arguments about potentially higher opportunity costs for competing crops that could shift the development frontier and, thus, indirectly lead to deforestation are being raised by non-governmental organizations, academia, and other non-industry stakeholders (Abramovay 2008). This study will access factors that are perceived as being critical for the coexistence of competitiveness and sustainability in Brazil’s plantation forest and sugarcane-based ethanol sectors.

4.3. Methods

The approach for this study is based on qualitative research methods, particularly grounded theory and case studies (Glaser & Strauss 1967; Yin 2003). The development of theories from data and a deeper understanding of processes and the nature of phenomena are central to qualitative research objectives (Miles & Huberman 1994; Bazeley 2007). Tesch (1990) also advocates for qualitative designs when the researcher seeks identification, discovery of regularities, categorization, and exploration of connections of phenomena. This study followed the general principles of grounded theory and case studies to induct from data (mostly textual information). Case studies are particularly useful for specific descriptions, clarifications, and reconstructions of situations (Ragin & Becker 1992; Flick 2006). The two qualitative research designs in this study were used in sequential phases. Using grounded theory, the first phase included the use of existing literature and in-person interviews to address the research objectives related to the two industries in question. In the second phase, a case study of a particular sugarcane-based ethanol plant was performed to provide a deeper investigation of the topics that emerged during the first phase.
4.3.1. *Data Collection*

**Phase One: Grounded Theory**

In phase one, three sequential procedures were performed to collect data (Miles & Huberman 1994). First, the unit of analysis (i.e. the sample space), which bounded data collection, was defined, and included various stakeholders from Brazil’s plantation forests and ethanol industries. The final sample comprised stakeholders representing business consultants, research and development institutions, academia, business firms’ management employees, financial institutions, and the media. For the study’s research questions, theoretical saturation was reached at 10 interviews. “Sampling and integrating further material is finished when the theoretical saturation of a category or group of cases has been reached - i.e. nothing new emerges any more” (Flick 2006, p.127). Qualitative research designs often draw from small and purposive samples of experts for more in-depth and contextual investigations (Kuzel 1999; Carter & Dresner 2001; Merkens 2004). Expert interviews were used as the sampling instrument. With expert interviews, participants’ knowledge and expertise are the focus of the investigation (Flick 2006). For the expert interviews, semi-structured interview guides were used (Miles & Huberman 1994; Bansal & Roth 2000; Carter & Dresner 2001; Flick 2006). Benefits of using semi-structured expert interviews include a high degree of focus, avoidance of data overload, and comparability between cases, thus improving internal validity (Weller & Romney 1988; Miles & Huberman 1994).

The interview guide introduced broader topics first and then focused on topics related to the study’s research questions (Seidman 1998). Prior to initiating data collection, the final interview guide was pretested with non-participants of the study (Carter & Dresner 2001). Consent forms, interview questions, and in-person or telephone interviews were carried out in Portuguese. Interviews were digitally recorded with interviewees’ consent; otherwise field notes were taken.

Data collection took place between March and April of 2009 and followed the concepts of gradual sampling or snowballing techniques, where initial participants (often the most knowledgeable) indicate other specialists for further interviews (Kuzel 1999; Flick 2006).
Data analyses of qualitative material were performed with the aid of computer software – NVivo version 8. Data included the interview transcripts, as well as observational evidence and existing documents and literature (see Appendix 2). As proposed by Strauss (1987), qualitative data analysis was completed with the utilization of coding techniques in order to access the ideas and concepts emerging from textual data. Coding was used to group similar emerging critical themes associated with the study’s research questions. Going from text to theory or developing theoretical relationships within and between the emergent themes are the foundation of grounded theory (Bazeley 2007).

Phase Two: The Case Study

To render a deeper understanding of and more specific perspectives on the topics that emerged in phase one (Yin 2003; Flick 2006), as well as for data triangulation purposes (Flick 1992, 2006), a case study was carried out on a sugarcane-based ethanol manufacturer (hereafter referred to as the “case firm”). The choice for the selected case was based on three criteria: size; location; and organizational structure of the firm. In 2008, the case firm’s total sugarcane production (1.5 million tons) ranked close to the industry’s average of 1.7 million tons. Also, the case is located (and represents the only large company) in a small community with a population of 22,000 and a growing ecotourism-based economy. Finally, the case firm had just undergone major administrative changes from a half-century of family ownership to a corporate governance model.

Initial contacts and descriptions of the study’s objectives were made directly with the firm’s president. Based on recommendations of Yin (2003), four major sources of data were collected from the case firm: a focused interview with the president; existing documentation; direct observation of activities on the rural and industrial sites; and a within-case self-administered survey (Hanna 2000; Yin 2003) which was used to collect evidence from the firm’s top management (see Appendix 3). The interview with the president followed the same structure as those performed in phase one. However, boundaries were relaxed and time constraints were left to the interviewee’s discretion to allow for a more comprehensive examination. Site visits were digitally recorded and pictures were taken whenever permitted.
Quantitative data analysis from the survey results of the case study was performed using SPSS computer software. Descriptive statistics (e.g. means and proportions) were used to summarize the results from the case study survey. Results from the survey were used in combination with those of the coding process to, whenever possible, enhance the overall analyses in accordance with recommendations for achieving data triangulation and “convergence of evidence” (Yin 2003, p. 99).

4.4. Findings

First, results from the qualitative analysis of phase one will be presented for the two industries, followed by the results of the case study.

4.4.1. The Industrial Forest Plantation Industry

Results of the analysis on Brazil’s industrial forest plantations confirm the existence of two rather distinct models of forest ownership within the sector. Larger and vertically integrated companies, particularly from the pulp and paper and structural panel segments, typify one of these models. The focus of this study will, however, be on the model of ownership of industrial forest plantations that is more predominant in south regions of Brazil. This model has been characterized by a maturing and growing number of players and value chain activities. The region is made up of small- and medium-sized land and forest owners of exotic pine species. They form a sizable regional raw material market for more than five thousand sawmills, which in turn, supply most of the secondary wood products manufacturers in the region. As small- and medium-sized sawmills evolved and became more specialized, they focused on processing activities rather than on owning and managing pine plantations (a number of properties were, in fact, sold, thus contributing to a more active timber

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17 Critical competitiveness, strategic, and sustainability issues of these types of forest companies were discussed in Chapter 3.
market). Accordingly, themes that emerged during data analysis were all related to this more
fragmented model of forest ownership and production capacity of the south.

In the past decade, this region has attracted national and international interest for its
availability of plantation forests that were on the “open market”, or not belonging to large and
vertically integrated companies. The largest investments in the region have come from international
investors, particularly from North American TIMOs. The participation of these organizations were
described by one interviewee as follows:

“Normally, these organizations obtain most of their capital from pension funds…they offer this ‘product’
to investors…and when they acquire properties down here, each property may very well become part of
one fund in particular. The dynamics of such decisions are made and managed by these
organizations…each property becomes one asset of and is managed for a particular fund. North American
TIMOs invest almost exclusively here in the southern states and in pine forest plantations, while the
European ones tend to focus notably on native or Amazonian tropical forests.”

According to participants, TIMOs’ growing participation in industrial forest plantations in the
south of Brazil did not begin until the early 2000. The movement thus far has been towards the
acquisition of mature forest standings, preferably on large areas or on aggregations of smaller ones.
The opportunity for investments in greenfield projects and/or to develop new timber markets is not yet
apparent, but it appears to be a future target for national TIMOs. One specialist mentioned that there
are expectations for more than one billion dollars in future investments in greenfield projects from
increasingly national TIMOs.

One interesting topic that emerged from the discussions around TIMOs’ participation in these
regional forest products segments was the role of “property managers”. This term speaks to a
growing demand for support activities that are being created by these “more professionally managed”
plantations. Contracts are made with service providers for soil preparation and forest planting, forest
protection, thinning, and harvesting. These contractors assume the role of managing the property in
line with the TIMOs’ expectations. Notably, these transactions are also offering opportunities for
small- and medium-sized enterprises to enter the value chain, thus creating spin-off effects seem that
have positive socio-economic and environmental impacts. One participant from a consulting firm made the following point:

“These organizations [TIMOs] are under great scrutiny. They have to sell the ‘product’ to their investor with the condition that these investments are not only financially sound, but that social and environmental issues are proactively dealt with…that the host country’s labour and environmental legislations are prioritized. In the last five years, all invested areas are being either certified or in the process of being FSC\textsuperscript{18} certified.”

As presented in Chapter 3, a modernization of the Brazilian legislative framework dealing with industrial forests plantations was considered to be necessary for, among other benefits, future investment in the sector. This sector has always been under the control of the Ministry of Environment. Participants commented that there have been advancements politically, with the appointment of a new Department of Silviculture within the Ministry of Agriculture (Abraf 2009). In addition, policy changes in the current Forest Code are now underway in Brazil.

Another theme that emerged from the data analysis revolved around the diminishing role of once highly regarded carbon markets. Participants cited that, since 2006, discussions about the potential use of industrial forest plantations, as part of the Clean Development Mechanism under the Kyoto protocol, have slowed down considerably. It was mentioned that investors continue to be attracted mainly by the low risk, high returns, and fast rotations of these plantation forests. Some suggested that carbon could – perhaps in the future – be used as an (financial) option, depending on future developments of the climate change agenda.

4.4.2. The Sugarcane-Based Ethanol Industry

Results from the analysis of the data related to the sugarcane-based ethanol industry emerged in three distinct themes and are discussed accordingly. In the first part, topics of interest regarding the current transitions in the sector are presented. Secondly, topics that emerged regarding future perspectives of ethanol as an innovative product and perceived directions of the industry as a

\textsuperscript{18} Forest Stewardship Council.
whole are discussed. The third part of the results focuses on topics raised about future social and environmental issues in the industry.

Results (confirmed by the literature) indicate that the sugarcane-based ethanol industry in Brazil is undergoing unprecedented structural change. After deregulation in the late 1990’s, the industry has been climbing a steep learning curve to adjust to open-market requirements. The energy crisis of 2002 and the recent global financial recession have brought about additional developments in the industry. The former has created incentives for firms to upgrade their own electricity generation capacity and to invest in newer technologies to supply the market with the surplus electricity. Although the global financial crisis did not affect Brazil’s internal demand for ethanol, a number of firms did make significant investments and leveraged themselves in international capital markets preceding the crisis. As foreign credit diminished, some firms struggled to honour upstream and downstream supply chain obligations. Most firms, nonetheless, are absorbing the difficulties and are rapidly learning to cope with open and more competitive markets. Participants agreed that, contrary to the general sentiment on the current financial recession, the ethanol industry was not drastically affected and investment will continue. The following informant, from academia, exemplify these opinions:

“The current juncture is extremely interesting. I think that it is a privilege to be in Brazil right now, because it is a period of transition and change. In my view of more than thirty years involved with the sector, this is a fundamental moment in time and extremely favourable for the industry to insert itself into a mature and modern context, with its own technological advancements, and with expertise to lead the world.”

Additionally, a number of specialists participating in the study mentioned the growing interest of national and multinational agribusiness and oil corporations in entering the ethanol industry, including Brazil’s own Petrobras. Participants correlate these interests with the increasing attractiveness of the industry, as alternative sources of energy become more critical on a global scale.

A related topic that also emerged from discussions about transitions in the industry indicates a tendency for these larger corporate players to enter the sector via partnerships or joint ventures. Participants noted that there are not many entry barriers in the industry. The availability of inputs at
competitive costs is high and an entire processing plant can be custom-ordered and built within months. The barriers are, however, in operations and in managing supply chain activities. Successful investors that were unfamiliar with the industry have excelled through partnerships that rely on existing expertise to implement and run new or expansion projects. With regards to issues of family ownership versus corporate governance, some contrasting points emerged from the analysis. Interviewees showed mixed opinions about which types of administration have had better results in the sector. The following informant, from a development bank, oversees the majority of the financial loans made to the sector for new and expansion projects:

“We have seen a bit of everything lately. Naturally, we would expect firms with a more professional administration to be, perhaps, in a better position to attract capital. The truth is that we have seen wonderful family-owned firms, very well managed, that perhaps may not be extremely profitable in the short-run…not because of incompetence, but maybe because they simply have a different strategy for growth. Maybe, this is a timely issue…due to the current financial turmoil…but right now it is hard to state that types of governance are correlated with successful firms in this sector. We have seen successful and not-so-successful firms with and without corporate governance.”

The current period of transition was also cited as being a critical time for the industry to represent itself to society; that is, there is the need for the creation of a more extensive and stronger industry association to inform and promote the sector as whole. Participants pointed out that there is still a great deal of divergence within the sector, for instance, between sugarcane suppliers and processors. Moreover, such divergences are considered a hindrance for a more unified sector, which lately, has not defended itself well against recent calls for its real social and environmental impacts.

In terms of the future for the sugarcane-based ethanol industry, there seems to be general agreement, based on all data sources, regarding continued growth and expansion. Accordingly, themes pertaining to a “second generation” for the sector (according to some participants) are now being discussed. This new model of production includes advancements in sugarcane cultivation, manufacturing plants, and new uses for ethanol.

A theme on sugarcane cultivation emerged with points made about the future of the activity that, according to participants, has the highest potential for overall improvements. First, there is a strong indication in the data that harvesting activities will be all mechanized within the next decade.
Some firms already have as high as 80% of their annual harvest done by machines. Tough working conditions for manual “cutters” have likely been the most criticized activity in the industry for decades. Firms will also have to further improve crop productivity to compensate for some sites that are unreachable by machines (e.g. hill sides). Finally, new spacing regimes and sugarcane varieties will be necessary to match new crops with machine harvesting. Another critical issues within this theme, and one that firms in the future must embrace, is the discontinuance of current crop burnings before manual harvests – likely the second most scrutinized activity in the industry. One participant from a regional industry association mentioned that a newly approved legislation, when in effect, would ban and make it illegal to burn crops. Some burning restrictions are already in place on a conditional basis in some regions (e.g. due to low air humidity). The practice of burning crops has been used to facilitate manual harvest. Therefore, with increasing areas of mechanized harvesting, crop-burning activities will diminish proportionally. The following quote, from an industry association stakeholder, illustrates these topics:

“The modernization of rural activities is a top priority for the industry. In fact, the industry has been, on average, very proactively investing in machinery…and intends to soon have harvesting operations all mechanized. Among other things, there is a real economic benefit from this mechanization…productivity is higher…one set of machines can substitute up to 80 workers. Today, a single [piece of] equipment can cost between 600 and 900 thousand dollars and it may take up to one year for delivery…it will change though…demand is high and new suppliers and dealers are coming in.”

A theme on biorefinery emerged with points made about the future types of manufacturing plants. Until recently, the dominant model of the majority of firms was based on the production of either sugar or ethanol. Further data analysis revealed that there is a great deal of confidence that firms, in the near future, will be important electricity producers to regional and national markets. A number of plants already make use of internal power generation for running their processes. Remaining bagasse from the sugarcane crushing process is used to fuel boilers and to generate steam. Steam, depending on the level of sophistication of a firm, is used directly as a source of power or serves to generate electricity in turbines. A participant from a research and development institution noted that only a fraction of plants has invested in new electricity-generation technology. It was mentioned that, in the past, firms only developed power generation capacity to supply their own
needs. This view began to change after 2002’s blackouts that took place throughout the country’s power grids. Investments in technology and development of newer, more efficient, and cost-effective high-pressure boilers and turbines are now underway. Advancements in cogeneration technologies, according to participants and the existing literature, are likely one of the most critical breakthroughs expected for the industry in the near future. At the time of this study, there seemed to be a great deal of eagerness amongst all levels of stakeholders to see how cogeneration developments would unfold.

The following participant, a management employee in a business, illustrated the points above:

“Today, we already have locally-developed technologies for cogeneration equipment that can double our efficiencies…this more efficient equipment can generate, in most of the existing plants, electricity surpluses that could be commercialized in the market. Some initial studies indicate that, with the current installed capacity in the state of São Paulo alone, there is the potential for the industry to generate an amount of electricity that is equivalent to another Itaipu.”

The time of year when ethanol plants are at their fullest capacities, hence generating the most electricity, coincides with the dry season and lowered dam levels of hydroelectric plants in southern Brazil. An example from the data shows that if one hundred sugarcane-based ethanol firms (with no upgrades) sold electricity in the market, they could contribute to over 5% of the country’s hourly average consumption of 55,700 megawatt-hours (Agroind 2009).

Another theme that emerged regarding future perspectives of the industry revolved around second-generation ethanol. Points were raised about the potential use of the lignocellulosic components of sugarcane to produce ethanol. The current model uses only fermentation of the sugar that is mechanically extracted from the plant in a liquid state. The production of second-generation ethanol is highly anticipated by many current industry stakeholders. One manager from a business interest commented that, as it stands today and despite being in the spotlight, the industry sits at a “quite inefficient” model of production. The informant went on to say:

19 Itaipu is the largest hydroelectric plant in operation in the world and is located in the south of Brazil, bordering Paraguay.
“If you look at it, we don’t do anything new. Ethanol from fermentation has been made for centuries. Our real advantages, and what gives us remarkable economies of scale, are in the agricultural side of the supply chain. This model of production only uses one-third of the raw material that we grow. There are tremendous opportunities to include the other two-thirds in the production process. That’s what I see for the future.”

Biomass from bagasse and leaves are the other “two-thirds” referred to in the previous comment. Some of the bagasse used today is for energy cogeneration, but leaves are either burnt before hand-harvesting activities, or left in the field after mechanized harvesting. Participants sense that research and development are advanced with regards to commercially producing ethanol from biomass and could possibly be the next industry-wide breakthrough after electricity generation.

Next, a theme about potential new uses for ethanol was generated, containing a number of potential uses other than fuelling automobiles. Ethanol is expected to be a substitute for oil products. According to participants, ethanol can serve as a raw material for the production of thermoplastics, diesel, and be a source of hydrogen for hydrogen-fuel cells. The last two uses, according to participants, are technologically possible, but unlikely to achieve commercially viable scales in the near future. Thermoplastic production, however, is becoming a reality and was more closely examined in this analysis. Basically, ethanol can be used as a replacement of petroleum sub-products as the source of compounds like ethylene and propylene for the production of plastics. These compounds are polymerized for the creation of polyethylene and polypropylene, which are two of the most utilized compounds for the production of plastics worldwide. There were at least two major projects underway in Brazil at the time of this study. One firm, a participant in this study, was set to start production in less than eighteen months, but is not from the sugar or ethanol sector. Further examination of data indicated that there were two key reasons for this firm to invest in this new product. First, the firm wanted to diversify its sources of raw material by not relying solely on oil and its fluctuating prices. Second, the firm has a business strategy to develop a product with an environmentally friendly appeal. They claim that there is indeed a market for plastics and plastic products that are made with 100% percent renewable raw materials. The firm is already test marketing the product and has branded it as a “green” plastic. The following participant from the firm in question stated:
“Technically speaking, the process of using ethanol as a source of ethylene is not new for the plastic industry...what has happened thus far is that the availability and cost of ethanol, coupled with uncertainties about the existence of premiums in the market, have signalled unfeasible projects. Depending on oil prices and exchange rates, ethanol can become a more expensive raw material...however, we are betting on the success of the sugarcane-based ethanol industry in Brazil for a stable and reliable source of raw material. Also, we are already gaining good ground into very sophisticated niche markets for our ‘green’ plastic...like global automakers and high-end packaging industries.”

There seems to be great opportunities for firms like the one above to achieve first-mover advantages in this new market space. The participant above also mentioned that the demand for this type of product has escalated and that they are confident that Brazil’s sugarcane-based ethanol would be the most suitable raw material for “scoring higher on the sustainability scale” when compared to fossil fuels. Results pertaining to sustainability issues on the future of Brazil’s ethanol industry are presented next.

There is consensus, confirmed by all data sources, that Brazil’s sugarcane-based ethanol industry has been thrust into the spotlight of sustainability because of discussions on global warming and energy renewability. The sector developed for purely economic reasons, as a cheaper alternative for rising oil prices in the 1970s; “the industry didn’t evolve with ‘green’ objectives...”, noted one industry association stakeholder. Some participants went on to say that it has been a beneficial coincidence for the sector that alternatives for fossil fuels are one of the top priorities for the international community. In other words, the industry has the opportunity to attract investment and, at the same time, expose its social and environmental practices to society.

Three major topics emerged under the sustainability theme. All of them relate to the need for the sector to respond to criticisms of its real environmental and social implications. First and foremost is the issue of public perceptions about future deforestation that could result from expansions of the industry. Most participants resorted to existing research in Brazil and pointed out that sugarcane cultivation will unlikely expand into new agricultural frontiers, particularly towards the Amazonian biome. Instead, available lower-quality or abandoned cattle-raising land is typically used for these purposes. On the other hand, indirect repercussions from the expansion of sugarcane plantations, like rising opportunity costs of land for other crops, have begun to draw the attention of the industry’s
opponents. Stakeholders representing smaller property owners mentioned that the price of land near ethanol plants has increased in the last three years. With increasing investments by the ethanol sector, some landowners in the vicinities of plants saw the opportunity to lease out their properties for sugarcane plantations. Generally for the industry, it is uneconomical to transport sugarcane beyond a radius of 30 kilometres from a plant. One informant from the industry commented on the arguments above and made the following observations:

“The industry occupies just over 1% of the land-use of the country…and half of that – assuming that all plants produce a ‘50/50’ percentage of sugar and ethanol – is for ethanol production. Cattle ranching areas are responsible for more than 20% of the country’s land-use…other agriculture, like grains, more than 15%...So, even if we don’t see any increases in productivity and we wanted to, say, double the production of ethanol, the share of the total land-use occupied with sugarcane for ethanol would still be minimal compared to the other uses. This is a recurring argument that the industry has to deal with, and we are making great advances to that end.”

Some participants also noted that, with current cultivation regimes of sugarcane, some regions are becoming clusters of and leading the country in the production of oleaginous crops. For instance, a specific region in the interior of São Paulo state leads the country in planted areas of sugarcane and, at the same time, in the production of peanuts. Before replanting certain sites, firms enrich the soil with nitrogen-fixing oleaginous crops. “In some areas, firms have up to one fifth of their land, on an annual basis, being cultivated with these crops”, said one informant.

Other emergent themes related to sustainability issues revolved around the rural upstream activities of firms’ value chains. The sector has always been scrutinized for the precarious and dangerous work conditions inherent in sugarcane hand-harvesting activities. Also, for production to be possible, firms burn crops to make it “easier” for workers to increase productivity. As mentioned earlier, firms have been investing heavily in and changing to mechanized harvesting systems, which has in turn, contributed to fewer emissions from crop-burnings. However, harvesting mechanization is causing massive job losses in the sector. One informant from a municipal government noted that there has been a constant increase in unemployment benefits in the local community in the last few years. Upon a closer examination of the data, it seems that few firms are actively participating in retraining or relocating labour displaced by the mechanization. Most of the labour used for hand-
harvesting is by migrants from less developed regions of the country, who come with very little education and training. During peak harvesting seasons, migrants may make up to 10% of a town’s population. They have, at first, positive economic impacts, but once unemployed, they can burden local communities’ social programs. New projects in the industry are designed to utilize mechanized harvesting from the start-up. Existing firms, however, must deal with the transition. Some firms that are in the process of changing harvesting systems are providing in-house training or partnering with local institutions to upgrade workers’ skills. One informant from an industry association mentioned that some workers are being trained and relocated to different departments within firms and that others are being offered training courses in several trades before re-entering the job market. The next section expands on these findings for the ethanol sector with results from a case study.

4.4.3. A Case Study of an Ethanol and Sugar Firm

In this section, descriptive information is presented from the analyses of observations and documents collected during on-site visits with the case study firm. Next, data analysis from the interview with the firm’s president will be presented, followed by the results of the survey with the firm’s upper management employees.

Today, the firm is located where a family of European immigrants owned a coffee farm for a century. In the 1950s, the owners planted the first sugarcane crops, mainly for the production of a hard liquor (i.e. cachaça). Commercial production of ethanol, as a fuel, began in the early 1980s and, in early 2000, sugar production was initiated. In the last few of years, the family changed the firm’s administrative structure to a model based on corporate governance. Since then, investments have been largely for expanding the production capacity of the plant and developing new areas for sugarcane crops. In high harvesting seasons, the firm can employ up to 2,000 people, or roughly 10% of the population of the local community. The firm is organized into three major management teams: industrial; agricultural; and fleet maintenance. Although existing data about types and quantities was not made available, the firm outsources a number of minor activities to the community’s small enterprises and service providers. The firm is also the major provider of tax revenues for the town. The plant is energy auto-sufficient and its rural operations are based on a combination of half
ownership and half contractual leasing of lands for sugarcane cultivation. When running at full capacity, the plant is able to crush up to 3 million tons of sugarcane per year.

Two major themes emerged from data analysis of the interview with the firm’s president, both in line with the results obtained from the industry-wide data. Industrial technology was a theme related to the firm’s future plans for energy cogeneration and the production of second-generation ethanol (e.g. from lignocelluloses). Cogeneration, according to the president, is one the firm’s top priorities. After the completion of the current expansion, the plant will continue to be energy auto-sufficient. However, it was mentioned that the firm’s actual energy-generating equipment is outdated and will have to be replaced. The new technology will permit the plant to have an excess of energy production. “There are still some significant issues to be resolved regarding the technicalities for delivering energy to the power grid and how the price will be set, but we are optimistic about these new opportunities for the firm,” said the firm’s president. There is optimism with regards to the production of second-generation ethanol as well, but as longer-term developments. The firm’s president went on to say that:

“The R&D of second-generation ethanol is a reality. However, this firm, and the sector as whole as far as I am concerned, is not a great innovator on these fronts. We are technology buyers and users…so we have to support national and international bodies of research to make them available for us…but there is a great potential…In fact, the plant of the future will be, in my view, more diversified. It will produce first- and second-generation ethanol, electricity, sugar, and some other products that will have ethanol as a raw material…and the market will determine what the best ‘mix’ of these products will be.”

The second emergent theme pertained to the rural operations of the firm. The case study firm has implemented harvesting that is almost 50% mechanized, confirming this apparent trend throughout the sector. According to the president, the activities in the field account for about two-thirds of the final costs of production. Yet, the major technological advancements in the last decades have been in industrial processes. Some field activities that still offer enormous opportunities for productivity gains include improvements in soil preparation and fertility, sugarcane varieties, harvesting equipment, and transportation. As the president stated:

“We are limited to operate within a distance of 30 kilometres or less due to transportation costs; that is, diesel costs. Overall, there are more uncontrollable variables in field operations than in industrial
operations...so it is harder to manage...and since it is where the bulk of our costs are, any efficiency gains in the field would have positive impacts on our balance sheets. It will happen...but now the sector is still more attentive to industrial breakthroughs.”

Results of the within-case survey are presented next. A one-page structured questionnaire (see Appendix 3) was distributed to the firm’s top management. In total, seven participants \((n=7)\) responded representing all operations, including the president, three directors, and three supervisors. Descriptive statistics of the survey results are summarized in Figure 4.1 and Table 4.1. Figure 4.1 shows the results of respondents’ perspectives on future investments in their firm and in the sector as a whole (expressed as means).

![Figure 4.1. Respondents’ opinions about future investments (means on a 4-point continuous scale).](chart)

Next, respondents were asked to indicate the top-three best opportunities to increase productivity in the firm. Table 4.1 shows the results of the top-ranked areas (expressed as proportions of responses).

<table>
<thead>
<tr>
<th>Area</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy cogeneration</td>
<td>44%</td>
</tr>
<tr>
<td>Agricultural</td>
<td>28%</td>
</tr>
<tr>
<td>Other industrial</td>
<td>28%</td>
</tr>
</tbody>
</table>
With regards to sustainability (e.g. environmental and social issues), respondents were asked to rank their firm relative to the rest of the industry. A five-point scale was used with 1 being well below the sector's average and 5 being well above the sector's average. All respondents marked (3), meaning that the firm, in their opinions, has an average performance with respect to sustainability. Respondents were also asked to indicate the areas of the firm that presented the greatest opportunities for advances in social and environmental issues. Table 4.2 shows the top-ranked areas.

Table 4.2. Respondents’ examples of areas that present the greatest opportunities for the firm to be more sustainable.

<table>
<thead>
<tr>
<th>Social</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of human capital</td>
<td>Agricultural</td>
</tr>
<tr>
<td>Agricultural</td>
<td>Industrial residues</td>
</tr>
<tr>
<td>Benefits (e.g. health plan)</td>
<td>Water treatment</td>
</tr>
<tr>
<td>Fleet maintenance</td>
<td>Boiler efficiency</td>
</tr>
<tr>
<td></td>
<td>Reforestation</td>
</tr>
</tbody>
</table>

The last question of the survey was an open-ended question. It asked participants about their general perspectives for the firm in the near future. Answers were analysed using coding. One common theme was a unanimous positive perspective for the firm. All respondents acknowledged the impacts of the global financial crisis, but also showed great confidence in the potential of the sector and the firm to recuperate by the end of 2009. This, they said, is due mainly to strong internal demand for ethanol and international demand for sugar.

4.5. Discussion and Conclusions

This study examined the forest plantation and the sugarcane-based ethanol industries of Brazil, with the investigation revolving around future perspectives for the two sectors. In addition, critical factors for the sectors’ competitiveness and the role of sustainability were assessed. The competitiveness of Brazil’s natural resource industries, including its robust agribusinesses, is a key contributor for attracting investments. On the other hand, overall infrastructural obstacles still exist, as do widespread government inefficiencies.
Overall, the future outlook for the two studied industries are for continued investment and expansion. With respect to industrial forest plantations, this study focused on the model that is predominant in south Brazil. In this model, institutional investors, such as Timber Investment Management Organizations (TIMOs) with both national and international capital, are increasing their participation in the region. These investors are attracted by a high level of return on investments, due to the availability and feasibility of land, standing forests, and promises of stronger domestic demand for wood products. These investments are also contributing to a higher degree of raw material security in the region and, thus, to the competitiveness of thousands of regional sawmills, mostly SMEs. In terms of sustainability issues, it did not become clear in this study, if social and environmental concerns are being proactively taken into consideration in the investment criteria of these institutions. The only allusions made to sustainability in the discussions with forest plantation stakeholders revolved around a preoccupation to comply with the country’s environmental legislation and obtain FSC forest certification.

Brazil’s sugarcane ethanol industry is expanding as a result of a high demand for ethanol in the domestic market of flex-fuel automobiles. At the same time, the industry is coping with unprecedented (market) challenges following government deregulation at the end of the 1990s and has since been climbing a steep learning curve to operate in newer, more competitive market settings. Moreover, the sector has notably distinguished itself as neither directly competing with food production (e.g. corn-based ethanol) nor causing deforestation. Due to the nature of its rural activities, the sugarcane-based ethanol industry in Brazil is under a great deal of scrutiny. As the industry expands, so too do public concerns regarding the industry’s social and environmental impacts. As a result, competitiveness and sustainability seem to be strongly intertwined in the current and future developments of Brazil’s sugarcane-based ethanol industry. For example, energy cogeneration and mechanization of harvesting activities are two critical drivers of both competitiveness and sustainability in the near future.

Notably, sugarcane cultivation is not recommended in more than 90% of the country’s land base. However, the Brazilian government has recently announced new agro-ecologic zoning criteria
for future expansions of sugarcane crops. This zoning, according to government stakeholders (i.e. The Ministries of Agriculture and Environment), is designed to allow for a sustainable expansion of sugarcane planted areas, from current levels of 7 million ha to 60 million ha. Moreover, these expansions will only take place on degraded lands, in areas that do not require irrigation, and on land that is suitable for mechanized harvesting. Access to government credit will depend on the ability to conform to the new zoning criteria (Brazilian Ministry of Environment 2009). Brazil’s development bank (BNDES) has also just launched various special lines of credit for the plantation forest sector. These lines include financing options for, but not limited to, native forest management, restoration of degraded areas, reforestation with native and commercial species, and expenses incurred for conforming to environmental legislation and forest certification schemes (BNDES 2009).

Brazil’s economy has effectively only been “opened” in the last two decades. Increased opportunities from international markets were followed by higher levels of competition from international players and Brazil’s rudimentary business practices and simplistic strategies were highly exposed during this period. Major transitions have occurred in the last ten years throughout the economy, as existing firms adapt to these changes and new projects begin. The forest plantation and the sugarcane-based ethanol industries have been adapting accordingly. Although economic benefits are the driving forces, social and environmental requirements have now gained an unprecedented importance. A major implication of this study emerged from the fact that there is potential for these two industries to validate theoretical relationships of competitiveness and sustainability issues. The economic potential of the two industries are clear. So long as national and international stakeholders consistently and rationally maintain or even raise the levels of social and environmental demands, these two industries can insert themselves into a unique context of sustainability. In the case of the ethanol industry, there is the opportunity to establish itself as a feasible, renewable, and sustainable substitute of fossil fuels. As for industrial forest plantations, there is the opportunity to increasingly supply Brazil’s demands for wood fibre and products without impacting native forests. In this latter case, TIMO’s could serve as conduits to Socially Responsible Investments (SRI), which is the incorporation of economic, environmental, and social criteria into the investment and lending decisions of banks and pension funds (Jayne & Skerratt 2003; Sparkes & Cowton 2004).
It is beyond the scope of this analysis to affirm causality or to conclude that these two industries are realizing economic benefits by advancing their sustainability agendas. What becomes apparent though is that they are taking advantage of a highly favourable economic period to advance their social and environmental positions. In turn, such advances may offer opportunities for further, and more specific, quantitative assessments of the role of sustainability on firms’ competitiveness. In more practical terms, these sectors have traditionally been highly exposed to social and environmental issues due to the nature of their activities. As such, improvements to their respective sustainability agendas could perhaps resonate with and lead other agribusinesses to an overall enhancement of sustainable practices in the context of developing economies.

Finally, another interesting argument that emerged from this study, despite not being explicitly studied, is the potential for these two sectors to become more closely intertwined in the future. More specifically, there is conceptually an enormous potential for industrial forest plantations to serve as raw materials for the production of second-generation ethanol.

4.6. Advancement of Knowledge and Study Limitations

This study used inductive designs like grounded theory and case studies to examine theoretical interrelationships between sustainability and competitiveness in the forest plantation and sugarcane-based ethanol sectors of Brazil. The study, therefore, can be used to inform and guide future research and managerial decisions that are more quantitative in nature. The findings indicate a number of themes or critical topics for future investigation in these two industries, such as potential markets for SRIs, the implications of “greener” electricity generation and second-generation ethanol to firm competitiveness, and socio-economic and environmental benefits of latifundia industries. That said, this study is limited as far as inferring onto a broader population is concerned. It is also cross-

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20 Perhaps more environmental scrutiny in the case of forest industries (Juslin & Hansen 2002) and equal social and environmental scrutiny in the case of the sugarcane ethanol industry (Abramovay 2008).
sectional, and conjunctural circumstances at the time of the study may have influenced the data (Zikmund 1997).
4.7. References


Consufor. (2009b). *Brazilian forest sector (Portuguese only)* No. 09/02. Curitiba, Brazil: Retrieved from http://www.consufor.com/download.php?a=6512bd43d9caa6e02c990b0a82652dca


5. CONCLUSION

5.1. Summary of Findings

5.1.1. Key Results

This investigation assesses British Columbia’s secondary wood products industry, the forest products industries of New Zealand, Chile, and Brazil, and Brazil’s sugarcane-based ethanol and industrial plantation forest industries. More specifically, perspectives on the future competitiveness of each sector and the potential relationships between competitiveness and sustainability were investigated. Qualitative methodologies of grounded theory and case studies were used to uncover the critical internal and external factors that will likely impact firms’ strategies in the long run. Findings indicated that business-related strategies are the most critical factors that firms would have to consider for their long-term competitiveness. In addition, participants in each of the studied regions were generally positive with respect to sustainability and competitiveness being increasingly intertwined in the future of their industries.

One of the overall aims of the study was to examine the dynamic and interrelated concepts of competitiveness and sustainability within the contexts of the BC secondary wood products sector and other competing regions. Definitions and assessments of these two concepts vary, even within their own domains (Porter 1985; Krugman 1994; Hoff et al. 1997; Robinson 2004; Garelli 2006). As such, this investigation did not attempt to delve into the theoretical nuances of each construct. Rather, qualitative analyses were used to uncover emergent themes related to competitiveness and sustainability.

That said, some functional fields of study (e.g. management) were used to bound the information collected within certain constraints. Specifically, this study drew from the literature on firms’ manufacturing and business strategies (Sun & Hong 2002; Ward et al. 2007) to guide data collection and analyses, and to provide linkages between competitiveness and sustainability. In particular, the concept of strategic resonance, put forth by Brown and Blackmon (2005), was used to inform this study. External factors to the firm (Porter 1985; Martin & Porter 2000) were also considered, since they are known to impact competitiveness. For sustainability issues and their
potential relationships with firms’ strategies (i.e. competitiveness), boundaries of analysis were even more relaxed. Any and all allusions made to environmental and/or social implications of the industries studied that emerged in the data analysis were taken into account. In other words, study participants were given the freedom to articulate their own definitions and interpretations of sustainability, and its potential impacts on firms’ strategies. This was advantageous in that a variety of business cultures and industry stakeholders representing different viewpoints were assessed.

Results in Chapter 2 indicate that the quality of managerial and entrepreneurial capacity will perhaps be the most critical factor for the future success of BC’s secondary wood products industry. Access to raw materials and labour also seem to be significant hurdles for the future of the industry, confirming some of the previous literature (Kozak et al. 2003; DeLong et al. 2007). Interestingly, a great deal of importance was also placed on external factors to ensure the future success of the industry, such as the support needed from government and industry associations. To increase their levels of competitiveness, small- and medium-sized enterprises in BC’s secondary wood products industry will likely have to incorporate sustainability into their manufacturing and business strategies. Promoting the “greenness” of the industry and its products (compared to substitutes) and integrating with other firms’ value chains are some examples of how this could manifest itself, while also leading to increased competitiveness.

The results of Chapter 3 show that the success of the forest products industries in New Zealand, Chile, and Brazil are intertwined with (considerations of) their forest plantations. The literature (Sedjo 2001; Cubbage et al. 2005; Bull et al. 2006) has shown that the industrial infrastructures and the forest plantations were developed concurrently in these countries. In fact, discussions revolving around competitiveness and sustainability of forest plantations were very often extended to the industry and vice-versa. All that said, several common themes related to internal and external factors required for future success and sustainability emerged for each country’s forest products industry.

In New Zealand, for instance, business strategies that ensure greater control over downstream value chain activities and firms’ abilities to form consortiums (domestically) or joint
ventures (internationally) will likely be critical for their future success. On the other hand, fragmentation of forest plantation ownership seems to be the most critical hurdle to the industry’s long-term competitiveness, and as future investment in manufacturing becomes uncertain, industrial forest plantations in New Zealand may become even more diversified. Looking forward, expertise on industrial forest plantations and R&D on sustainability issues may play critical roles in helping New Zealand to promote its perceived “greenness” and find new uses for its forests and wood fibre.

Results from the assessment of the Chilean forest products industry indicate a more stable, “business as usual” scenario than in New Zealand. In fact, the future competitiveness of Chile’s forest products firms will likely be derived from the maintenance or improvements of their well-established value chain integration in export markets. Chilean forest products industries have made great advances in business-related strategies that are international and customer-focused. Like New Zealand, Chile’s distance to final markets may be an obstacle in the future, due to rising global shipping costs. Larger companies in Chile, particularly in the pulp and paper segment, have complied with international market requirements for better sustainability practices by incorporating forest certification schemes, for example (Paredes 2005). However, there seems to be a general sense from local communities and academia that certification schemes neglect some of the important social aspects of sustainability (e.g. integration of small forest owners in local communities).

In Brazil, the forest products industry seems to be more concerned with external factors that could affect its future competitiveness. In particular, improvements to the environmental legislation dealing with forest plantations and increasing pressures from social movements were considered to be critical. These laws have brought about additional transaction costs to the industry (i.e. increased bureaucracy) and spread inefficiencies and corruption throughout regulatory governmental institutions. Some social movements engaged in agrarian reform causes oppose the extensive use of monoculture trees in plantations, and land invasions may be an issue in the future. Except for larger companies competing in international commodity markets, the majority of Brazil’s wood products manufacturers sell into the large domestic market. For those operating (or planning to operate) in international markets, a business strategy focused on some level of differentiation will be
required, as firms that currently compete on price only are losing market share. Like Chile, the 
(plantation) forest products industry in Brazil relies on the adoption of forest and chain of custody 
certification schemes to ensure environmental sustainability. However, companies are generally 
reactive in this regard, implementing certification only as necessary to gain and/or maintain market 
access.

Results in Chapter 4 specifically focus on the future of Brazil’s sugarcane-based ethanol 
industry and the forest (plantation) sector predominant in the south of the country. The future 
competitiveness of the ethanol industry seems to be closely tied to advances in social and 
environmental sustainability. This industry, despite undergoing adjustments in industry structure and 
markets, has recently attracted a great deal of investment. At the same time, it is under enormous 
pressure to meet its claims of being an environmentally friendly, renewable alternative to fossil fuels. 
It is likely that the industry will prosper only if sustainability issues are considered to be intrinsic parts 
of firms’ strategies. In the forest product industry in the south of Brazil, smaller firms (i.e. sawmills) 
may be in the best position to benefit from the currently high levels of investment by Timber 
Investment Management Organizations (TIMOs). Specifically, this trend may lead to increased 
security of wood fibre for these sawmills. Apparently, and unlike New Zealand, TIMOs in south Brazil 
are interested in timber commercialization. Furthermore, if investors supporting these TIMOs demand 
greater levels of environmental and social performance, the region’s timber markets could potentially 
benefit from a higher availability of sustainably managed wood from forest plantations.

5.1.2. Business-Related Strategies in BC’s Secondary Wood Products Industry and 
Other Competing Regions

This investigation indicates that advances in business-related strategies will likely lead to a 
higher degree of competitiveness in BC’s secondary wood products industry, as well as in the forest 
products industries of New Zealand, Chile, and Brazil. These findings are very much in line with past 
studies within this domain (e.g. Williams et al. 1995; Ward et al. 1996, 2007; Sun & Hong 2002; 
Chang et al. 2003; Bell et al. 2004; Brown & Blackmon 2005). Each studied region, however, is at a 
different stage in their pursuit of such business-oriented strategies. The forest industry of Chile seems
to be at the forefront of a business orientation that is focused on customers, high levels of control along value chains, and services. For example, Chilean firms are generally able to set and control their own distribution channels to export markets.

In British Columbia, despite the existence of a few successful firms, the secondary wood products industry generally lacks the managerial and entrepreneurial capacity to enhance business strategies. This is not to say that firms do not recognize the critical role of such strategies in the long-term; the need to attract skilled management and entrepreneurs was the most critical factor in the opinion of industry stakeholders. The issue in BC, however, relates to a high dependency on external factors (e.g. government, raw materials), as well as a need for assistance in accessing capital, developing target markets and products, and engaging in collaborative strategies.

These sorts of discussions also emerged in the case of the future competitiveness of New Zealand’s forest industry. Specific issues revolved around the business strategies that relate to firms’ control over value chain activities. Nonetheless, in the case of New Zealand, there are more pressing issues that potentially will have to precede advances in firms’ business strategies: the fragmentation of forests and land ownership and the exit of larger, multinational corporations. The sector is becoming increasingly disjointed and linkages among raw material supplies, processing, and markets have weakened.

Interestingly, the firms in BC and New Zealand that have developed and maintained customer-oriented business strategies have been successful in capturing both domestic and international markets. Managers of these successful firms are generally able to “internalize” many of the external hindrances, such as a lack of access to raw materials and skilled labour, and long distances to markets. These firms also tend to focus on customization, are design-oriented, and provide a variety of services in export markets. Examples of such firms in BC and New Zealand include manufacturers of prefabricated housing and kitchen cabinets.

In Brazil, the importance of business-related factors to the future competitiveness of the forest products industry is not as explicitly apparent as in the other regions under study. In fact,
external factors, such as the need for improvements to the country’s environmental legal framework (also confirmed by the literature, e.g. Nascimento 2005), are considered to be more critical at this time. Brazil’s larger domestic market and expanding economy has traditionally been the target for most wood products manufacturers. This market is sufficiently large for all firms to engage in and robust business strategies (e.g. marketing strategies) are currently not required. However, some of these firms have ventured into export markets and been reasonably successful, but those with low-cost and price-competition strategies are faced with declining margins. In the long run, it is anticipated that business-oriented strategies will become critical for Brazilian firms, as well, particularly those operating in export markets. Wood products manufacturers in Brazil could potentially take advantage of profitable periods in the domestic market to invest in and build capacity with forward-thinking, business-oriented management strategies.

5.1.3. The Relationship between Sustainability and Competitiveness in the Forest Industry

There seems to be an undisputed agreement in all of the regions and industries under study that sustainability and competitiveness are interrelated. Despite varying interpretations of the sustainability concept, data from all regions points to an overall willingness and need to incorporate sustainability into firms’ manufacturing and business strategies. These findings are in line with the existing literature on the relationships between the two constructs (Lefebvre et al. 2000; Miles & Covin 2000; Talbot et al. 2001; Lee & Ball 2003; Madsen & Ulhøi 2003; Rennings et al. 2003; Thorpe & Prakash-Mani 2003; Wagner & Schaltegger 2003; Welch et al. 2003; Wuestenhagen 2003; Rao & Holt 2005). On the other hand, each studied region and sector differ in the way that these two concepts are considered and measured. It is beyond the scope of this study to infer the causalities of these divergences. Nonetheless, it is worth noting, as previously stated in Section 1.3, that further work is needed to understand the methodological nuances of assessing these two dynamic concepts and the problems in finding universal criteria to measure the interrelationships of competitiveness and sustainability.
This investigation adds to this body of work by assessing these concepts from the perspectives of two (understudied) natural resources industries (i.e. forest products and sugarcane-based ethanol), operating within different business cultures and representing both developed and developing global economies. These particularities allow for additional arguments regarding the relationship between sustainability and competitiveness to be put forward. For example, it appears that forest products industries in all regions, despite being early adopters of environmental sustainability practices (i.e. forest certification), have not advanced much beyond these schemes. Knowledge of corporate social responsibility does exist in the forest sector and responsible business practices are on the rise (Vidal & Kozak 2008), but it appears that the industry’s clear advantages with respect to renewability could be better explored and exploited. In particular, the “green” aspects of wood and wood products should perhaps be better used for promoting the industry as a whole.

In this vein, results from the investigation of Brazil’s sugarcane-based ethanol industry may provide, to some extent, lessons for the forest industry. The sugarcane-based ethanol industry in Brazil has traditionally been replete with social and environmental mistrust. Like the forestry industry, questions about its real environmental impact are, time and again, being raised by all levels of society. The ethanol industry, however, has taken a proactive approach in clarifying and promoting its advances towards more sustainable behaviour (e.g. energy cogeneration, improved working conditions, and promoting the “greenness” of ethanol). In doing so, the industry is demystifying preconceptions, seeing real gains in efficiencies, and accessing capital more readily by lowering risks. The forest industry, particularly those relying on industrial plantations, could incorporate many, if not all, of these strategies. With increasing calls for firms to address ethical issues that affect both society and the environment, these two studied industries could potentially lead by example and, ultimately, validate the convergence of the competitiveness and sustainability constructs.

As a contribution to theory development, this investigation lays the foundation for understanding the emergence of, perhaps, a new competing environment; one that goes beyond the post-industrial requirements of Brown and Blackmon’s (2005) and Nahm and Vonderembsez’s (2002) theses. By examining the interrelationships of competitiveness and sustainability, this study proposes
a theoretical base for future research on competition that situates sustainability as a fundamental requirement. Ultimately, such a theoretical base requires that the post-industrial firm cope with not only increasingly global competition and faster rates of change, but also with pressing demands for improved environmental and social practices. This opens the door to a shift to, perhaps, more of an ‘eco-’ or ‘green-economy’ stage of competition.

5.2. Research Limitations

This investigation was largely based on an inductive and qualitative approach and the inability to infer onto a broader population is its first limitation. Two other limitations should be pointed out, as well. First, semi-structured interviews were extensively used throughout this investigation. Discussions regarding the forest industries of New Zealand, Chile and Brazil may have included the lumber and pulp segments of these countries. These segments are commonly categorized as primary wood industries, whereas, in British Columbia, this investigation focused on the perspectives of the secondary wood products industry only. Finally, this investigation assessed opinions about future scenarios that, in cross-sectional studies, may be influenced by conjunctural conditions at the time of the investigation. In fact, during much of this investigation’s data collection phase, each of the countries under study were being affected by the global financial crisis.

5.3. Opportunities for Future Research

Given its inductive design and qualitative approach, results from this investigation can be used to inform and guide future research and managerial decisions that are more quantitative in nature. Future research could, for example, quantify how advances in firms’ business-related strategies relate to their competitive position and the extent to which such strategies incorporate sustainability issues. In British Columbia, future studies could focus on empirical assessments of firms’ managerial and entrepreneurial capabilities against benchmarks of other competition regions. In the three southern hemisphere regions, the success of industrial plantation forests could be further investigated with empirical assessments of their real contributions to regional economies. Here, the potential for these forests to be used more broadly and attract socially responsible investments could be measured. Finally, enormous opportunities exist in Brazil’s sugarcane-based ethanol industry for
empirical research revolving around the relationship between sustainability and competitiveness. This could include quantifications of the direct and indirect impacts of the industry on deforestation, the final energy balance of the industry’s activities (i.e. emissions versus sinks), and/or the socio-economic benefits derived by local SMEs and communities as a result of their operations.
5.4. References


APPENDIX 1 – INTERVIEW GUIDES IN ENGLISH, SPANISH, AND PORTUGUESE
Value-Focused Forestry in BC: Competitiveness and Sustainability Issues in the Secondary Wood Products Industry.

Interview guide: discussion themes and topics of interest.

**Theme 1. Long-term competitiveness:**

a. General and introductory questions:

- In general, what do you think BC’s economy will look like in 10 to 15 years?
- In your opinion, what will BC’s (natural) resources, manufacturing, and service sectors look like in this time frame? What do you see as the main winners and losers in BC in the next 15 years? Why? What will China’s impacts be in this time frame? Other global competitors?

b. Forestry-related questions:

- What do you think BC’s forest sector will look like in 15 to 20 years?
- How would a successful forest sector in BC differ (in 15 to 20 years) in terms of wood supply, operations, manufacturing, and/or marketing compared to today’s model?
- What role do you see for BC’s secondary wood industry in the future?

c. Questions about factors of competitiveness:

- Given that SMEs constitute the majority of secondary wood industries, what are some of the key factors for BC’s secondary wood producers to increase and sustain their competitiveness in the long run?
- What would need to happen for these factors to become a reality for the BC secondary industries? Which stakeholder(s) will have to play the major roles and why?
- Could you give me any examples of firms or industry segments in BC or other competing regions that have engaged in such forward-thinking strategies? Could these strategies be replicated or adapted to BC’s secondary industries as a whole?
- Will SMEs still be the main players in BC’s secondary wood sector in the future? Why?

**Theme 2. The role of sustainability:**

a. Questions about overall knowledge and opinions about sustainability:

- Do you believe that there is a business case to incorporate sustainability initiatives into SMEs’ strategies? If so, what and how should sustainability issues be considered? How do you think this strategy will change in the next 10 to 15 years?
- Do you think that there is or could be a relationship between firms’ improved sustainability and stronger long-term competitiveness? How so? If so, could BC’s firms make use of sustainability as a competitive advantage?
Forest Industries of New Zealand, Chile, or Brazil\textsuperscript{21}: Competitiveness and Sustainability

Interview guide: discussion themes and topics of interest.

**Theme 1. Long-term competitiveness:**

a. General and introductory questions:

- In general, what do you think New Zealand/Chile/Brazil’s economy will look like in 10 to 15 years?
- In your opinion, what will New Zealand/Chile/Brazil’s (natural) resources, manufacturing, and service sectors look like in this time frame? What do you see as the main winners and losers in New Zealand/Chile/Brazil in the next 15 years? Why? What will China’s impacts be in this time frame? What about other global competitors?

b. Forestry-related questions:

- What do you think New Zealand/Chile/Brazil’s forest sector will look like in 15 to 20 years?
- How would a successful forest sector in New Zealand/Chile/Brazil differ (in 15 to 20 years) in terms of wood supply, operations, manufacturing, and/or marketing compared to today’s model?
- What opportunities do you see for value-focused/secondary wood industries in the future? In which (global product/service) markets?

c. Questions about factors of competitiveness:

- What are some of the key factors for New Zealand/Chile/Brazil’s forest industries to increase and sustain its competitiveness in the long run?
- What would need to happen for these factors to become a reality? Which stakeholder(s) will have to play the major roles and why?
- Could you give me any examples of firms or industry segments in New Zealand/Chile/Brazil or other competing regions that have engaged in such forward-thinking strategies? What is the major competitive advantage of New Zealand/Chile/Brazil’s forest industries? Is it being fully exploited?
- How will New Zealand/Chile/Brazil’s forest industries be positioned in the future in terms of industry structure within increasingly global markets? Will it be more or less concentrated? Which segments will potentially be buyers? And which will be bought out?

**Theme 2. The role of sustainability:**

a. Questions about overall knowledge and opinions about sustainability:

- Do you believe that there is a business case to incorporate sustainability initiatives into firms’ strategies? If so, what and how sustainability issues should be considered? How do you think this strategy will change in the next 10 to 15 years?
- Do you think that there is or could be a relationship between firms’ improved sustainability and stronger long-term competitiveness? How so? If so, could firms make use of sustainability as a competitive advantage?

\textsuperscript{21} Actual interview guides for each country only included questions about the country in question.
El valor del bosque en Chile: La Competitividad y la Sustentabilidad en la Industria Forestal.
Guía de la Entrevista: Preguntas sobre los siguientes temas

Tema 1. Competitividad a largo plazo:

a. Preguntas generales e introductorias:

- ¿En general, cómo piensa usted que será la economía de Chile dentro de 10 a 15 años?
- ¿En su opinión, cuales serán los recursos (naturales) de Chile, las manufacturas, y los sectores de servicios en este mismo periodo de tiempo? ¿A cuales sectores de los antes mencionados ve usted como los principales ganadores y perdedores en Chile en los próximos 15 años? ¿Por qué? ¿Cuál es el impacto de China en este mismo periodo de tiempo? ¿Ve otros competidores globales?

b. Preguntas relacionadas con lo forestal:

- ¿Cómo piensa usted que estará el sector forestal en Chile en 15 a 20 años?
- ¿Cómo se diferenciaría en Chile un sector forestal exitoso (en 15 a 20 años) en términos del suministro de madera, operaciones, fabricación, y/o vendiendo productos, comparado con el modelo existente hoy?
- ¿Qué oportunidades ve usted para las industrias secundarias enfocadas en el valor de los productos de madera en el futuro? ¿En cual mercado (producto global /servicio global)?

c. Preguntas acerca de los factores de la competitividad:

- ¿Cuáles son los factores claves para que la industria forestal de Chile aumente y sostenga su competitividad a largo plazo?
- ¿Qué necesitaría suceder para que estos factores sean una realidad? ¿Cuáles agentes tendrán que jugar los principales roles y por qué?
- ¿Podría darme cualquier ejemplo de industrias o de sectores en Chile u otras regiones competitivas que se hayan comprometido con estrategias que apuntan a los resultados futuros?
- ¿Cuál es la mayor ventaja competitiva de la industria forestal en Chile? ¿Está siendo aprovechada al máximo?
- ¿Cómo será posicionada la industria forestal de Chile en el futuro, en términos de la estructura de la industria dentro de los mercados cada vez más globales? ¿Más o menos concentrada? ¿Cuáles segmentos serán potencialmente compradores? ¿Y cuál serán comprados?

Tema 2. El papel de Sustentabilidad:

a. Preguntas acerca del conocimiento y opiniones generales acerca de sustentabilidad:

- ¿Cree usted que es importante para el negocio incorporar iniciativas de sustentabilidad en la estrategia de una compañía? ¿Si ese es el caso, cuales y cómo los temas de la sustentabilidad deben ser considerados? ¿Cómo piensa usted que esta estrategia cambiará en los próximos 10 a 15 años?
- ¿Piensa usted que aquí hay o podría existir una relación entre compañías para mejorar la sustentabilidad y la competitividad a largo plazo? ¿Que tanto? ¿Si ese es el caso, podría la compañía utilizar la sustentabilidad como una ventajas competitiva?
Competitividade e Sustentabilidade da Indústria Florestal Brasileira.

Guia de entrevista: temas para discussão e tópicos de interesse.

Tema 1. Competitividade a longo prazo:

a. Perguntas introdutórias:

- De um modo geral, como você vê a economia brasileira daqui a 10 -15 anos?
- Na sua opinião, como estarão os setores de recursos naturais, de manufaturados e de serviços neste mesmo espaço de tempo? Quem serão os principais ganhadores e perdedores nos próximos 15 anos? Por quê? Qual será o impacto da China neste período? Outros competidores mundiais?

b. Perguntas relacionadas ao setor florestal:

- Na sua opinião, como estarão os diversos segmentos do setor florestal brasileiro dentro de 15 a 20 anos?
- No geral, como seria uma indústria florestal bem-sucedida no Brasil (em 15-20 anos), comparado com o modelo atual em termos de oferta de madeira, sistemas de produção, produtos e marketing (vendas/distribuição)?
- No futuro, quais oportunidades você vê para as indústrias secundárias e de maior valor agregado? Em quais mercados (produtos/serviços, nacionais/internacionais)?

c. Perguntas sobre fatores de competitividade:

- Quais são os fatores fundamentais para que o setor florestal brasileiro aumente e sustente sua competitividade a longo prazo? O que teria que acontecer para tais fatores tornarem-se realidade? Quais agentes teriam os principais papéis e por quê?
- Poderia me dar exemplos de firmas ou segmentos do setor florestal brasileiro que tenham implementado estratégias diferenciadas, focadas no futuro e/ou de liderança?
- Qual é a principal vantagem competitiva das indústrias florestais brasileiras? Está sendo inteiramente aproveitada?
- Em relação a estrutura industrial, como estará o setor florestal brasileiro no futuro com mercados cada vez mais globais? Mais ou menos concentrada? Quais segmentos serão potenciais compradores? Quais serão adquiridos?

Tema 2. O papel da sustentabilidade: aspectos econômicos, sociais e ambientais.

a. Perguntas sobre sustentabilidade - idéias e opiniões gerais:

- Em relação a estratégias empresariais, você acredita na incorporação da sustentabilidade como uma prática corporativa? Se sim, como e quais aspectos de sustentabilidade deveriam ser considerados? Como tais estratégias se comportarão nos próximos 10-15 anos?
- Você acredita que há ou pode haver uma correlação (positiva) entre avanços nas práticas de sustentabilidade da empresa e sua maior competitividade a longo prazo? Se sim, como as empresas podem se utilizar dos aspectos de sustentabilidade como vantagens competitivas?
Brazil’s Forest Products and Sugarcane-Based Ethanol Industries.

Interview guide: discussion themes and topics of interest.

a. General and introductory questions:
   - In general, how do see Brazil’s agribusinesses in next 5 years?
   - With regards to social and environmental responsibilities, how do Brazil’s agribusinesses compare to other economic sectors?

b. Forestry- and ethanol-related questions:
   - In general, how do you think that investments in these sectors will occur? International sources, domestic sources, or both? In addition to financial returns, what else attracts these investments?

c. Questions about factors of competitiveness:
   - What are some of the key factors for Brazil’s forest and sugarcane-based ethanol industries to increase and sustain their competitiveness in the long run?
   - What would need to happen for these factors to become a reality? Which stakeholder(s) will have to play the major roles and why?
   - How will these two industries be positioned in the future in terms of industry structure? More or less concentrated?

d. Questions and opinions about sustainability:
   - Do you believe that there is a business case to incorporate sustainability initiatives into firms’ strategies? If so, what and how sustainability issues should be considered? How do you think this strategy will change in the next 10 to 15 years?
   - Do you think that there is or could be a relationship between firms’ improved sustainability and stronger long-term competitiveness? How so? If so, could firms make use of sustainability as a competitive advantage?
Competitividade e Sustentabilidade dos Setores de Bioetanol e Florestal

Guia de entrevista: temas para discussão e tópicos de interesse.

a. Perguntas introdutórias:
   - De um modo geral, como o senhor(a) vê o agronegócio brasileiro nos próximos 5 anos?
   - Em relação às responsabilidades socio-ambientais, como o agronegócio se compara com outros setores da economia?

b. Perguntas relacionadas ao setores de bioetanol e florestal (produção):
   - No geral, como estarão ocorrendo os principais investimentos nestes setores? Fontes internas, externas, ou ambas? Além do retorno financeiro, o que mais atraem tais investimentos?

c. Perguntas sobre fatores de competitividade:
   - Quais são os fatores fundamentais para que os setores (bioetanol e florestal) aumentem e sustentem suas competitividades a longo prazo? O que teria que acontecer para tais fatores tornarem-se realidade? Quais agentes teriam os principais papéis e por quê?
   - Em relação as estruturas industriais, como estarão estes dois setores no futuro próximo? Mais ou menos concentrados?

d. Perguntas sobre sustentabilidade - idéias e opiniões gerais:
   - Em relação a estratégias empresariais, você acredita na incorporação da sustentabilidade como uma prática corporativa? Se sim, como e quais aspectos de sustentabilidade deveriam ser considerados? Como tais estratégias se comportarão nos próximos 10-15 anos?
   - Você acredita que há ou pode haver uma correlação (positiva) entre avanços nas práticas de sustentabilidade da empresa e sua maior competitividade a longo prazo? Se sim, como as empresas podem se utilizar dos aspectos de sustentabilidade como vantagens competitivas?
APPENDIX 2 – ILLUSTRATION OF THE CODING PROCESS
1. All data sources are used to create open codes.

2. Open codes within similar contexts are grouped to form parent codes.

3. Parent codes are further analyzed to form themes.

Examples of open codes:

- Competitiveness factors
- Competitive advantage
- Future economy
- Legislation_policy
- Future forests_products
- Stakeholders
- Industry structure
- Raw material ownership
- International competition
- External factors
- Zoning
- Regulatory failure_corruption
- Importance of study
- Transport cost
- Land use impacts
- Export markets
- Business strategies
- Security of supply
- International competition
- Infrastructure
- Timo impact
- Environmental pressure
- Management skills
- Social pressure
- Greener market share
- Increase value to forests

Hierarchic relationships between themes:
APPENDIX 3 – CASE STUDY QUESTIONNAIRE IN ENGLISH AND PORTUGUESE
**Case Study Questionnaire: [Company’s Name]**

1. **What department of the firm do you work in? (choose only one option)**
   - 1. [ ] Upper
   - 2. [ ] Industrial
   - 3. [ ] Human Resources
   - 4. [ ] Agriculture
   - 5. [ ] Fleet Maintenance
   - 6. [ ] Other (specify)

2. **In your opinion, what are the trends for investment in the sector for the next 5 years?**
   - 1. [ ] Decrease
   - 2. [ ] Decrease Somewhat
   - 3. [ ] Increase Somewhat
   - 4. [ ] Increase

3. **In your opinion, what are the trends for investment in this firm for the next 5 years?**
   - 1. [ ] Decrease
   - 2. [ ] Decrease Somewhat
   - 3. [ ] Increase Somewhat
   - 4. [ ] Increase

4. **In general, what is the participation of your area in the decisions about the competitive strategies of the firm? [choose one option between 1 (rarely participate) and 7 (frequently participate)]**
   - [ ] Rarely
   - [ ] 1. [ ] 2. [ ] 3. [ ] 4. [ ] 5. [ ] 6. [ ] 7. [ ] Frequently

5. **Considering the firms’ value chain activities, could you indicate, in descending order, three areas where there may be the best opportunities to increase productivity?**
   - 1st. 
   - nd. 
   - 3rd. 

6. **Regarding sustainability (i.e. social and environmental issues), where does [name of the firm] rank in comparison to the industry as a whole?**
   - 1. [ ] well below the average
   - 2. [ ] below the average
   - 3. [ ] on the average
   - 4. [ ] above the average
   - 5. [ ] well above the average

7. **Again, considering the firms’ value chain activities, could you indicate, in descending order, three areas where there may be the best opportunities for improvements in:**
   - a) Social issues?
     - 1st. 
     - nd. 
     - 3rd. 
   - b) Environmental issues?
     - 1st. 
     - nd. 
     - 3rd. 

8. **In your opinion, what is the outlook for [name of the firm] in the near future? Why?**
Estudo de Caso: [Nome da Empresa]

1. Qual a sua principal área de atuação na empresa? (selecione pelo menos uma opção)
   - [ ] Diretoria
   - [ ] Recursos Humanos
   - [ ] Manutenção Automotiva
   - [ ] Industrial
   - [ ] Agrícola
   - [ ] Outra (especifique)

2. Considerando o setor de bioetanol brasileiro como um todo, quais serão, na sua opinião, as tendências de investimentos para os próximos 5 anos?
   - [ ] Diminuírem drasticamente
   - [ ] Diminuírem parcialmente
   - [ ] Aumentarem parcialmente
   - [ ] Aumentarem significantemente

3. Considerando as atividades da [nome da empresa] especificamente, quais serão as tendências de investimentos para os próximos 5 anos?
   - [ ] Diminuírem drasticamente
   - [ ] Diminuírem parcialmente
   - [ ] Aumentarem parcialmente
   - [ ] Aumentarem significantemente

4. De um modo geral, como você classifica o nível de participação de sua área de atuação nas decisões sobre estratégias competitivas da empresa? (selecione uma opção de 1 [raramente participa] a 7 [frequentemente participa])
   - [ ] Raramente
   - [ ] [ ] 2. [ ] 3. [ ] 4. [ ] 5. [ ] 6. [ ] 7. [ ] Frequentemente

5. Considerando toda a cadeia produtiva da empresa, você poderia indicar, por ordem decrescente, três áreas onde existam as maiores oportunidades para aumento de produtividade?
   - [ ] 1º.
   - [ ] 2º.
   - [ ] 3º.

6. Sobre o tema sustentabilidade e especificamente sobre aspectos sócio-ambientais, onde a [nome da empresa] se posiciona em comparação com o restante do setor sucroalcooleiro?
   - [ ] muito abaixo da média do setor
   - [ ] abaixo da média do setor
   - [ ] na média do setor
   - [ ] acima da média do setor
   - [ ] muito acima da média do setor

7. Novamente considerando toda a cadeia produtiva da empresa, você poderia indicar, por ordem decrescente, três áreas que apresentem as maiores oportunidades para melhorias:
   a) Sociais
      - [ ] 1º.
      - [ ] 2º.
      - [ ] 3º.
   b) Ambientais
      - [ ] 1º.
      - [ ] 2º.
      - [ ] 3º.

8. Na sua opinião, quais as perspectivas da [nome da empresa] para um futuro próximo? Por quê?
APPENDIX 4 – UBC BEHAVIOURAL RESEARCH ETHICS BOARD APPROVAL
CERTIFICATE OF APPROVAL - MINIMAL RISK RENEWAL

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The Annual Renewal for this study has been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board.

Dr. M. Judith Lynam, Chair
Dr. Ken Craig, Chair
Dr. Jimi Roemer, Associate Chair
Dr. L. Claire L. Associate Chair
Dr. Daniel S. Associate Chair
Dr. A. A. Associate Chair