

## Feasibility of exporting Finnish log homes to satisfy New Zealand building demand conditions

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Abstract

The log home has significant place in Finnish history. Through technological advancements in processing and design, Finnish log homes have become a competitive commodity meeting domestic and foreign market demand. New Zealand has a buoyant economy and is experiencing a construction upswing due to population growth from net migration, ex-pats returning due to volatile labour markets and the destruction of housing caused by major earthquakes. The aim of the thesis is to determine the feasibility to export Finnish log homes to New Zealand, versus New Zealand domestic building demand conditions.

In accordance with the literature review Porters Diamond model was used as the theoretical framework for the macro analysis research.

The method of research for the macro and micro analysis is qualitative. Qualitative research was used to justify the findings of the theoretical framework and allow direct and indirect comparisons considering the research questions. The micro analysis was a cost comparison of exporting a Finnish log home kit to New Zealand (including all associated costs) compared with the New Zealand kit price. Both the macro and micro analysis consisted of primary data in the form of e-mail conversations and triangulated secondary data.

Based on the findings from the macro analysis Finnish log home industry does have a competitive advantage to meet the market demand conditions of New Zealand for log homes. This advantage comes primarily from abundance of high quality timber and technologically advanced production methods. The micro analysis in the form of cost comparison between a Finnish log home exported to New Zealand (including associated costs) against a log home produced in New Zealand show the Finnish log home is cheaper.

The major limitation to the research was Finnish log home companies were unable to be contacted by email or phone calls.

Further research on the engineering of the Finnish log home to meet NZ standards, the council consent for this type of structure, and the resale value of a Finnish log home kit.

Keywords/tags (subjects)

Finnish log home industry, Porter's diamond model, competitiveness, export of log houses.

Miscellaneous

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#### 1 Introduction

#### 1.1 Background

The world of consumerism has evolved to a point that price is no longer the sole determining factor in buying a product. Sustainable, ecological, and socially responsible materials used in manufacturing are equally as important. Growth of social responsibility is not isolated to popular sectors such as fashion or food, but also in construction methods and materials. Modern building techniques using synthetic manufactured materials are contributing to global warming. They contribute to global warming through excessive amounts of carbon released into the atmosphere. Production of 1 tonne of concrete creates 1 tonne of carbon (Davidovitis 1994). The only building material regarded as a carbon sink in its production is timber. Timber sourced from well managed forests transform a finite resource to an infinite resource. Finland has sustainably managed forests which cover 76% of the land mass or 23 million ha (State of Finland's forests 2012: Finnish forest and forest management in a nutshell 2016). There are more forested regions in Finland than there were 100 years ago, and timber has been a major contributor to the national GDP. Sustainably managed forests promote the regeneration of the of the trees, the ecosystem which encompasses flora, fauna, and healthy water systems.

The cold climate and lengthy periods of dormancy Finnish forests are subjected to create dense wood not found in timber grown in warmer climates such as New Zealand (NZ). The density gives strength and longevity to a building structure and creates an efficient thermal break insulating from cold in winter and heat in summer (Honka 2017).

Along with thermal break advantages a log house located in a highly prone earthquake zone is advantageous. Tests using an earthquake simulator by Honka log homes stressed the structure to the equivalent of 7.1 on the Richter scale (Honka 2017). The simulated earth quake was the same magnitude as the 2011 Christchurch earth quake in New Zealand (NZ). Structurally the house sustained little to no damage (Honka 2017). Massive laminated logs are partly responsible for maintaining the structural integrity. Timber milled longitudinally releases tension created by growth rings in the log. Sections of the timber are glued together to form a single log of great load bearing capacity and dexterity to flex and resettle in place (see Figure 1).



Figure 1. High Rise Laminated Arctic Logs. (The log house system 2017)

Four different laminated log profiles. The timber sections glued together with growth rings facing outwards to reduce tension in the log, thus reducing splitting and warping.

Consumer perception that wood is not a fire safe material particularly for load bearing walls, and substitutes such as steel frames, concrete, brick structures offer greater resistance to fire. Honka a Finnish log house firm in a controlled environment assessed fire penetration on load bearing walls. The results showed log pillars withstood fire damage better than concrete, or steel. Wood retains 15% moisture that must evaporate to ignite. Logs subjected to heat chars on the outside the charring acts as a protective layer and a fire retardant, logs placed tightly together in the wall do not allow fire to fully engulf an individual log and retain load bearing strength at 500°C. Steel at 500°C loses load bearing strength. (Sathre & Gustavsson 2007).

Finland has historical ties to log house building, it was the most common technique for housing structures up until the 1930s before the introduction of the American light frame (Heikkilä & Suikkari 2017, 1). Changes in manufacturing revived the industry making it economical and a less laborious task.

#### **1.2** Motivation for the research

The research will give NZ home owners a feasible alternative to traditional NZ construction methods. There is a need for construction methods that are ecological, capable of with standing earthquakes, and provide the same level of comfort as a traditional NZ home.

There are many benefits owning a Finnish log home, from comfort to safety, and are advantageous to countries prone to seismic activity. NZ experienced 32 000 earth quakes in 2016, the 15-year average is 20 000 per year (Geonet, 2016). The majority go unnoticed by the public but throughout history tremors have destroyed towns and cities. The Napier EQ in 1931 measured 7.9 on the Richter scale and was the most destructive to property, it caused 256 deaths and was the most destructive EQ on record in NZ. (Geo Net 2017). Napier experienced another significant tremor on the 22.01.2017 measuring 5.4 on the Richter scale. Napier is not the only city prone to major seismic activity, on 22.02.2011 Christchurch experienced magnitude 6.8 earth quake killing 185 and injuring 7000. (Ministry of culture and heritage, 2016). The earth quake left the city of Christchurch in ruins. A log house on the Port Hills (located just out of the CBD) was subjected to  $1m/s^2$  (1g) force length ways and  $2m/s^2$  (2g) force sideways. An engineer reported that the structural integrity of the building was in tact. The only damage was to internal plasterboard which has no relevance to structural integrity. (Hall 2014).

New Zealand is an isolated nation in the South Pacific Ocean with the closest trading partner Australia 2158 km away (Freemaptools 2017). The population is 4 596 502 (Worldometers 2017), the GDP in 2016 grew by 2.4% and predicted to sustain long term growth (Morrison 2016). The exception to sustained GDP growth rate can be seen during 2008, due to the Global financial crisis (see Figure 2).

NZ has its own currency, and can compensate to currency volatility in offshore markets to assist economic growth. NZ, primarily due to low population is an export nation, specialising in agriculture and primary products. A driving force of non-export products or services are tourism and construction. Construction is buoyant due to increase of net migration and natural disasters, such as the Christchurch earthquakes. The 2011 Earthquake was estimated to have damaged 100 000 homes and 10 000 are unsalvageable (Tait 2011). With the ongoing rebuild of Christchurch and the rest of NZ continually experiencing seismic activity there is a need to fill the space of traditional construction methods to earthquake tolerant structures.



Figure 2. New Zealand GDP growth rate and predictions (NZ GDP growth stronger than predicted, AMP Capital, 2016).

As figure 2. shows the GDP in NZ has experienced high productivity year on year. The graph shows in 2008 there was a major downturn in the productivity of the economy due to the world economic crisis. The Forecast for the next three years shows stable growth, which creates a surplus of money circulating in the economy and disposable income.

#### **1.3** Research questions

The objective of the research is to identify the feasibility of the Finnish log house industry to export kit set houses to New Zealand. The main research question is:

What is the feasibility of exporting log homes in a kit from Finland to New Zealand?

To answer the main question, there are two supporting sub questions:

Sub question 1: What is the competitiveness of the Finnish log house industry versus New Zealand market conditions?

Sub question 2: What are the key concerns in the NZ market that Finnish log house exporters should take into consideration?

To answer the research questions Porters Diamond model will be used to address the macro level analysis using a qualitative research approach. For the micro analysis, a comparative cost analysis between a Finnish log home kit set exported to NZ versus NZ kit set price. The research approach will be quantative. The reason for 2 types of analysis is to understand the feasibility in entirety. If the macro analysis suggest that Finnish log homes have a competitive edge due to tradition, superior kit sets, and innovative industry etc, the next stage is the micro level cost comparison calculation. This will determine how competitive the forces on the macro level, compared to existing competition and demand in NZ.

#### **1.4 Outline of the thesis**

The thesis is made of five parts. 1) The introduction introduces the topic of research and the motivation behind the research. The background of benefits of Finnish log homes. Why NZ could have a demand for Finnish log homes, which leads up to the main research questions of: What is the feasibility of exporting log homes from Finland to New Zealand and the sub questions: Sub question 1: What is the competitiveness of the Finnish log house industry versus New Zealand market conditions? Sub question 2: What are the key concerns in NZ market that Finnish log house exporters should take into consideration? Chapter 2 presents the literature review. The literature review considers different theoretical framework to base the research and which model would be the most appropriate. The frame work is applied on firm level to the Finnish log home suppliers and country level to NZ measuring the demand. Chapter 3 describes the methodology of the research. How the research was conducted, what type of research methods are used, how data is gathered and analysed, and secondary data validation. Chapter 4 The empirical study results chapter. Results of the macro level analysis using Porters Diamond model applied to both NZ demand conditions for log homes and the competitiveness of Finnish Log home industry to

export to NZ. A cost comparison of a Finnish log house kit landed in NZ versus a kit set produced by a NZ company addresses the feasibility on the micro level. The Macro and micro level feasibility study will use primary data in the form of emails and secondary data through existing research. Chapter 5, discussion of findings from the results of the empirical study, and suggestions about the feasibility of Finnish log homes entering the NZ market. Also areas for further research.

#### 2 Literature review

#### 2.1 Competitiveness

In economics, competitiveness is a term which is utilised to describe the level of efficiency of all levels of business structure, its internal and external environment, and vulnerabilities (Porter 1990, 20). Competitiveness determinates are geographical positioning in relation to proximity to markets, national competitiveness, and international competitiveness (Porter 1990, 21). There are varied opinions on how competitiveness is increased, the intended outcome of the sequence events is inevitable the same: increased profits and ensuring the longevity of the firm. The differing of opinions of leading economists arise from contrasting industry, production methods or cultural points of view. Klaus Schwab (2013, 4) defines international competitiveness as "the set of institutions policies and factors that define the productivity of the country". The governments of the countries involved and the ones who are dictating the viability of a new entrant entering the market. Global competitiveness index (GCI) founded in 1971 by professor Klaus Schwab a German mechanical engineer and economist. Under his direction the forum has been responsible for reconciliation in various parts of the world a catalyst for many collaborations and international initiatives. (Global Competitiveness Index 2014-2015).

The GCI use's relevant key factors to quantify the overall competitiveness of the macroeconomic environment, quality of educational institutions, technology existing and developing and supporting infrastructure (Global Competitiveness Index 2014-2015). There are 12 pillars, broken into 3 categories; basic requirements, efficiency

enhancers, innovation, and sophistication factors. The index measures the competitiveness of these factors and take into consideration the development stages of the nation (see figure 3).





Factor driven economies are economies which have a large pool of low cost labour. Countries engaged in producing low techs labour intensive products not requiring a high level of skill or higher formal education. These nations are in the development stage and if governed correctly, and appropriate investments in areas such as education, infrastructure, healthcare can make the transition into an efficiency economy. Efficiency economies incorporate the first 4 pillars of competitiveness. Investment in key areas such as education and training, create market readiness of a skilled work force to accept and strive to create new products. The educated work force becomes the foundation and basis for a dynamic economy. Innovation driven economies are at the pinnacle of creating innovative solutions and product development. The economy is sophisticated and innovated built on the foundation of highly educated and productive work force, increasing the competitiveness. (World Economic Forum 2014-2015). Finland and NZ are both positioned in this latter category. The 2016-2017 Global Competitiveness Index Rankings have placed Finland 10<sup>th</sup> from a previous ranking of 8<sup>th</sup> in 2014-2015. This shows that Finland is losing competitiveness against stronger more robust economies, but is not an indication that all areas of the economy are failing. NZ placed 13<sup>th</sup> from a previous ranking of 16<sup>th</sup>.( Global competitive index 2016-2017)

#### 2.2 Competitiveness at company level

Organisations maintain competitiveness due to Internal and external factors. Internal forces that drive competitiveness are factors within the company such as culture, employees, management strategies, and systems (Porter 1990, 868). The internal factors are controllable factors, change initiated when a problem is diagnosed. External factors or chance factors are out of control of companies such as market fluctuations (both national and international), new competitors, exchange rates, planning, lack of demand, legal, and down turn in the economy (Porter 1990, 146). A method to reduce exposure and strengthen the competitive advantage thus sustaining growth is through cluster development. A cluster is the concentrated formation of interconnected business, an agglomeration of supporting industry with a common goal (Porter 1990, 869-870). With in the cluster there are actors all playing an important supporting role to drive forward a specific offering or product. See figure 4.



## MAPPING THE ITALIAN LEATHER FASHION CLUSTER

Figure 4. Mapping the Italian Leather Fashion Cluster (Porter 1998 The new economics of competition).

Figure 4. explains an agglomeration of actors or supporting roles driving forward the Italian textile industry, all members are directly or indirectly reliant on each other.

To go deeper into clusters one must look to the Triple Helix (figure 5) which incorporates 3 important areas clusters should be structured, they are: Academia, business, and public sector (Asplund 2012)

Academia is used throughout the life cycle of the cluster but in varying degrees, usually at the outset of development when investigative research is needed to define potential solutions to problems or develop new products (ibid 2012). The public sector or government is the incorporation of a governing body which is not bias and has no potential to profit as an individual from any decisions made affecting the cluster (ibid 2012).



Figure 5. Triple Helix (C. Asplund 2012)

Business includes the companies working in the supporting role. All supporting companies have a mutual interest in the common goal, success is shared so is the financial gains proportionally. The actors in the cluster are in some cases in co-opertition invigorating clusters to succeed but are also in competition with actors in the same cluster, this increases the competitiveness of the overall cluster.

Porter states that there are 5 forces that drive competitiveness in regional and local business, they are:

- Supplier power: The suppler has the monopoly in the market and can raise prices without the fear of loosing market share. Competition between suppliers is favourable to the customer as compete for market share.
- Buyer power: The buyer dictates the price to the supplier. This can arise from
  products which are easy to source and require no expertise to sell giving an
  even playing field for any new entrant. Thus reducing cost and giving the
  power to the buyer.

- Competitive rivalry: Too many companies competing to meet consumer demand in the same or similar product creates competitive rivalry. With out rivals, there is no competition this creates supplier power.
- Threat of substitution: Companies in order to gain market share often reproduce or offer a substitute product at a lower price point. This can mean inferior quality or more efficient sourcing utilising greater technology or cost effective labour units.
- Threat of new entry: a competitor establishes themselves in the market and replicates what your company does. This will become apparent if the product is simple and easily duplicated. Also, the new entrant may not be carrying as much debt and has the advantage of low overheads to reduce his price point attracting existing customers from the established company. (Porter 1990, 95-96)

#### 2.3 Competitiveness and internationalisation

Internationalisation, is conducting business in multiple countries but focussed in one geographical region USA is an example of this (Hollensen 2007,5). Firms can gain from internationalisation due to increased market exposure, lowering production costs per unit (Knight 2000, 7). Porter (1990, 209) suggests that not all companies or countries succeed in international competition. Companies must ensure own country market share before making the decision to expand their existing national boundaries in search of profit. Commitment and knowledge establishes the way forward in the process of internationalisation (Johanson & Vahlne 1977). New opportunities arise when sufficient knowledge of the intended market is known, and an analysis of unknown elements (Johanson & Wierdersheim 1975). Firms gain intelligence in two paths, 1<sup>st</sup> by experimental and secondly from others who have already gone ahead.

Porter suggests that the diamond model on a national level must be in place before it is possible to look offshore. Home market acceptance, and proven production systems and capabilities will sustain further growth (1990). Firms competitiveness in international business is assessed on factor conditions of the intended trading partner (Rugman & D'Cruz, 1993). Rugman and D'Cruz explain that the diamond model is not sufficient when looking at international trade but suggested the use of the double diamond model which is the diamond model framework mirrored onto the trading partner (ibid 1993). The frame work is applicable for firms dealing in country specific advantage (natural resources, low labour costs), firm specific advantage (technology, patents) (ibid 1993). In the case of multinational enterprise (MNE) the double diamond model provides a solid foundation to assess the competitiveness in small open economies such as Korea, Singapore and Austria or most non-triad countries (ibid 1993).

#### Cage Model

The cage model identifies cultural, administrative, geographic, and economic differences as core components of a firm's internationalisation (Segal & Ghemawat 2011).

Table 1. The CAGE framework at the country level (Seigal & Ghemawat 2011).

	Cultural Differences	Administrative Differences	Geographic Differences	Economic Differences
Bilateral Measures	<ul> <li>Different languages</li> <li>Different ethnicities/lack of connective ethnic or social networks</li> <li>Different religions</li> <li>Differences in national work systems</li> </ul>	<ul> <li>-Lack of colonial ties</li> <li>-Lack of shared regional trading bloc</li> <li>-Lack of common currency</li> <li>-Different legal system</li> <li>-Political hostility</li> </ul>	<ul> <li>Physical distance</li> <li>Lack of land border</li> <li>Differences in climates (and disease environments)</li> </ul>	-Differences in consumer incomes -Differences in availability of: .Natural resources .Financial resources .Human resources .Intermediate inputs
	-Different values, norms and dispositions			.Infrastructure .Information or Knowledge
Unilateral Measures	-Traditionalism -Insularity -Spiritualism -Inscrutability	<ul> <li>Nonmarket/closed economy (home bias versus foreign bias)</li> <li>Nonmembership in international orgs.</li> <li>Weak legal institutions/ corruption</li> <li>Lack of govt. checks and balances</li> <li>Societal conflict</li> </ul>	-Landlockedness -Geographic size -Geographic remoteness	-Economic size -Low per capita income -Low level of monetization -Limited infrastructure, other specialized factors
		<ul> <li>Political/ expropriation risk</li> </ul>		

The CAGE model has four main key points:

- Cultural difference: People put importance or value in different areas of their life, which directly affects the size of the potential market and price point. A product that has demand in one culture can be redundant in another. Business negotiation is one area where difference in mannerisms and etiquette can cause misunderstandings with agreements, verbal and written.
- Administrative distance: Difference in political or legal systems can cause misunderstandings on how binding a contract is.
- Geographic distance: the physical distance between trading collaborates
- Economic distance: Lack of core infrastructure whether it be physical and presents logistical problems, or educational and lack of skilled workers.

Managers use the framework when assessing the viability for entering international markets. Awareness of distance to managers, limitations to multinational companies compared to local competitors, existing multinationals operating within the sector, and strengths and weaknesses to directly asses the opportunity. (Seigal & Ghemawat 2011).

Ghemawat identifies geographical location to be a major weakness particularly for heavy, bulky or heat sensitive products due to increase in cost. Assessment of logistical infrastructure or lack of can be a determine factor on multinational success (Seigal & Ghemawat 2011).

## 2.4 Comparative advantage through manufacturing and natural resources

Comparative advantage is an element of the overall competitiveness measurement. David Ricardo a leading economist of the 1800s identified market segments where utilising comparative advantage in international trade can be logical and profitable. Cloth produced from Portugal may require 90 labour units, where as Portugal can produce wine which requires 80 labour units. England can not successfully produce wine but can produce cloth at 70 labour units. It is more productive for Portugal to import cloth from England and concentrate on wine production to sell to England. (Ricardo 1817, 155). This is an early example of internationalisation and competitive advantage of specialising in an industry to improve productivity and profitability. Countries will increase profit by specialising in producing goods which have a comparative advantage. In the case of the developing countries, the comparative advantage is the cost of labour and should focus on the production of labour intensive products (wolak 2011). A country with a sophisticated economy resulting from a higher educated workforce will focus on technical and capital intensive products (ibid).

Natural resources (excluding human) include precious, base, and rare metals, gemstones and construction materials utilising limestone, clay, and sand (Geology for global development 2016). Timber is classed as natural resource, but is readily renewable resource (Martinez 2015).

Resource imbalances around the world are calculated by scarcity versus abundance (Heckscher 2016). Other factors for consideration utilising natural resources for trade are: transportation, economies of scale, government policy and environmental issue in relation to pollution of and destruction of naturally occurring ecosystems (World trade forum 2010, 74).

There is an assumption that a resource rich country is more competitive than a nonresource rich country. The phenomenon of the "curse" of the resource rich in competitiveness and economic growth. A study conducted between 1971 -1981 showed resource scarce economies grew at a higher rate after adjustment of initial per capita growth, trade policy, government efficiency, and investment rates. (Warner and Sachs 1995, 2). Economies which become inwardly focussed create policy's and ineffectual bureaucracies, fostering growth of class systems and a disproportionate distribution of wealth. The economy based on natural resources are also susceptible to global shocks with no significant diversification into manufacturing to expand their potential export portfolio. A nation with out factor endowments such as being rich in natural resources, labour or large population can still create competitiveness. (Warner & Sachs, 8). Increasing factor conditions in advanced fields of education, technology, culture, and government stimulus of such initiatives increase competitiveness. (Porter 1980).

#### 2.5 Pestle Analysis

Pestle analysis is a tool used for strategic marketing or preparing to launch a product into a new market. It is a tool for strategic management and can assess market demand on the macro level from multiple directions. (Marketing and strategies 2016).



Figure 6. PESTLE analysis (Marketing and strategies 2016).

- Political: Effects of the political climate and the direct and indirect effect on your industry. How law changes or sanctions affect your company directly or indirectly.
- Economic: Factors such as inflation, tax and interest rate increases, and oil prices, can all play a part in the long-term competitiveness of your product.
- Social: Is your product seen to have a negative social stigma attached to it, is it environmentally friendly, are animals used in the testing of the product, has it gone out of fashion etc.
- Technological: Is technology reducing the manufacturing cost, making it more competitive. Is technology aiding your business to full capability, or are competitors gaining a technological advantage over your company.

- Legal: How is the internal and external sides of your business affected by law changes. Are new regulations about to be introduced which may influence how the business is carried out at national level or international.
- Environmental: This is directed particularly at agricultural products where the climatic conditions have a direct impact on production and quality. It can also be used with industries such as tourism.

The PESTLE analysis considers the macro environmental factors (external factors) for entering a new market in the home environment or abroad. (Marketing and strategies 2016).



#### 2.6 Theoretical Framework: The Diamond Model

Source: Porter (1990)

Figure 7. Diamond model (Porter 1990)

Porters Diamond model is a proactive economic theory for identifying competitive advantage rather than simply quantifying data. The Porter Diamond model is applicable for groups, small localised companies, national and multinational companies, even countries.

The points of the Diamond all interrelate to each other, the more aspects of advantage occurring throughout the Diamond the harder it is for rivals to replicate. This contributes to clarifying deciding factors in the company's competitiveness. Porters Diamond model sees past obvious macro level endowments such as natural resources and identifies factors such as education, technology, infrastructure, and governmental policy as having an influential impact on competitiveness. Factors identified in the Diamond relate to the differences in values, economic structures, institutions, and how history play a role in competitiveness. Due to theses variables no country can, or will be competitive in the same industry. (Porter 1990 74-78). The diamond model elements intertwined with knowledge and technology, are identified to give advantage and are at the for front of each element. With an understanding of each factor it becomes clearer as to the direction a company, industry on national level or international level may be heading. Where the future strengths and weak links may hide. It is not necessary to have competitiveness in all aspects of the diamond. The degree of influence the factors carry will vary from industry to industry and potential market. A strategy can only form based on technology and interconnectedness. (ibid

#### **Factor Conditions:**

All nations have naturally occurring resources all be it in various levels of abundance. Developing trade competitiveness in these resources comes down to factors of production. The most basic theory of trade is the development of industry around a nation inherited resource and exporting to a nation with a deficit. (Porter 1990, 149).

Factors grouped into the following categories:

- Human Resources: The human element can create, introduce, innovative ideas, technology systems and business strategy. Utilising highly skilled employees to educate the workforce and offer constant upgrade of skills to increase profitability or sustainability. Developing culture and work ethic also play a significant role in determining the overall out put of the human resource. (Porter 1990, 150).
- Physical Resource: Physical traits such as arable land, timber, fishing grounds, mineral deposits, green energy production, fresh water, any resource which

can be utilised in production or manufactured from a raw state. Climatic conditions are a physical resource as it plays a role food production and other resources dependent on suitable growing conditions. Geographic location dictates natural trading partners and reduction of logistical costs when expanding into new markets. The location can influence culture awareness in business etiquette and developing relationships. Companies operating in similar time zones make it convenient for communication and organisation. (Porter 1990, 151).

- Knowledge resources: Educational institutes such as universities, private and government research institutes all have a bearing on the accumulation of knowledge resource. The increase in knowledge resource has direct influence on scientific advancement and market knowledge. (Porter 1990, 151). Having a workforce which can speak and understand other languages and cultures has a dramatic influence on market entry of a new product. It reduces misunderstandings and increases trust in the business relationship (ibid 153)
- Capital Resources: Capital can be in many forms from bonds, secured and unsecured loans, venture funding, and equity. Globalised capital markets are reducing the difference of capital resources between countries, but a difference remains. (ibid, 152).
- Infrastructure: Industry is reliant on infrastructure the cost and quality of it can determine the level of competition. Roading, railway, mail services, secure internet. The proximity to harbours with international freight capacity reduces the reliance on a national internal logistical infrastructure, when importing and exporting. Infrastructure also includes housing, healthcare and educational facilities all important factors for determining productivity and happiness in employees. (ibid, 152).

The distribution of factors amongst industry and countries are not equal, advantage can be gained through low cost production or uniquely high quality products (Porter 1990, 152). Technology can increase factor conditions dramatically. Technological advancement can reduce labour intensive production into an automated system. Automation reduces wages and employee associated costs for the employer. Technology advancements in areas of E-commerce has further reduced factor condition limitations. E-commerce has put emphasise on production and quality competitiveness not geographic or traditional trade partners. It has opened the market for small and innovative companies trading in specialised goods to make direct contact with the consumer.

A nation or industry may have access to one or all factor conditions this is not enough to ensure competitiveness. Employees and knowledge can be sourced internationally in the form of head hunting. Productivity and management of the factors is what makes a nation or industry competitive. (ibid 153).

Among factors there is a hierarchy divided into 2 categories, basic and advanced. Basic factors include natural resources, climate, location, labour (unskilled and skilled), and debt capital. Advanced factors are digital communications data infrastructure, and a highly-educated workforce. A nation only inherits a few factors, most factors need time to develop through capital investment, education, and refined production processes. The impact of basic and advanced factors is related to industry, and how they can be used or capitalised on. Basic factors are inherited by nations but not restricted to companies of the resource origin due to the rise of multinationals. Basic factors retain high value in agriculture and extractive industry's such as forestry, as the skill and technology level is low. (ibid 153). Companies and nations reliant on the basic factors for economic growth are utilising the movement of low cost immigrants to carry out unskilled labour intensive roles. Advanced factors are the most crucial factors in today's global market. They are necessary to achieve differentiation and advancement improving the overall competitiveness of the industry or nation. This is achieved when infrastructure is in place or multinational recruitment is utilised, which attracts potential candidates for specific roles in turn increasing the home market with more advanced factors. (ibid 154).

Nations with a disadvantage in some factors such as labour shortages or inflated labour costs can diversify into advanced industry or mechanise the process of production. Advantage in factor conditions over the long term can make an industry complacent in developing innovative approaches to business and how resources are processed. Creation of complacency against advancing companies leads to disadvantage. Complacency allows new market entrants to establish and gain market share. (ibid 160-162).

#### **Demand Conditions**

Demand conditions on a national level is where firms can compete and meet market requirements in the local market. The competition between rivals create dynamic advancement to gain market share. Three broad attributes of home demand are the composition of home demand, the size and pattern of demand and the mechanisms by which the nations competitive advantage is transmitted in foreign countries. (Porter 1990, 165-166).

To meet home demand industry must perceive, interpret, and respond to customer needs (ibid 166). An industry which responds quickly to home demand creates a competitive advantage against foreign companies from entering the market. Pressure in home market demand creates rivalry between existing companies to innovate and develop, to sustain or gain market share. The greater the home demand to innovate and progress the more advanced the industry develops. This limits foreign companies from entering the market and gaining competitive advantage.

The rise of globalisation could be thought to limit the effectiveness for nations own companies to compete and meet home demand, this is not the case. Local firms are positioned to interpret and react to buyers needs in disproportionate ways. Product managers, usually positioned to interpret the market conditions and assess the potential for product release or product development. Firms meeting home demand have advantage of sensitivity. Sensitivity to customer needs due to cultural awareness, how a product is received and free flowing communication channels for customer feedback. The core function or the need that is met is always understood in greater detail from an inside firm. (ibid, 166).

Large home demand can lead to creation of highly advanced firms, that conduct in house R &D for product development and have educated and specialised workforce. The firms connected to universities, and research institutes both private and government funded, and have facility's capable of expansion to meet foreign demand. Large companies entering foreign markets where the home demand is not met, can saturate the market and gain market share. (ibid 167). Home demand is important as it encourages ongoing investment and development of industry to create advancements in products. Home demand relies heavily on other aspects of the Diamond model particularly strategy and rivalry. (ibid 184).

#### **Related and supporting industry:**

National supporting and related industry which are competitive and well established in international markets adds value to firms in the home market wanting to expand into international markets. Suppliers of specialised parts or technology specific for in industry developed in the home market increase the competitive advantage of the nation. (ibid 187). A nation does not benefit in competitiveness by trying to supply all parts needed in the supply chain for local industry. Out sourcing low techs parts offshore can raise the competitive advantage of the firm or nation. (ibid 192-193).

Suppliers that compete on an international level can increase the competitiveness of national companies. Home firms may receive preferential treatment, rapid access, lower cost, and first in line to benefit from technological advancements. Supporting industry gains from collaboration with existing national firms through insight into shifts in demand conditions, and where to focus R&D. By association it allows the firm to maintain competitive advantage both domestically and internationally. (ibid 188-190).

A nation increases its chances of becoming competitive in an industry if supporting roles have a competitive advantage over rivals. Areas of supporting industry that play a key role are, technology development, research, education, and advanced production capabilities. (ibid 195).

#### Firm Strategy, Structure, and Rivalry

The way firms are structured and the strategy they implement varies from nation to nation. Strategy drives the direction of the firm, it is used to identify shifts in the market and direct the firm to maintain competitiveness. Company structures are built based on type of industry and cultural beliefs and norms of what professionalism is. Rivalry in the home market is the competition between companies to gain a competitive advantage, this competition drives innovation and development. Management plays a vital role when looking to internationalise. The strategy of the firm to penetrate foreign markets needs a mix of hard skills and soft skills. Education of the employees in language skills needed to enter foreign markets is obvious, but equally so is the understanding of how unfamiliar cultures interact. Industry built on hierarchy may have difficulties in communicating on a personal level. The emphasise a firm puts on goals and achieved outcomes add stress to differing aspects on what is a successful outcome. Firms may be seen only wanting to build business relationships. Non-hierarchical firms may struggle in the context of professionalism and commitment, but the goal could be to establish the relationship first. The strategy used to gain competitive advantage over rival companies may be the limiting factor in the success in foreign markets. (Ibid 200). Companies with a clear growth strategy gain access to finance via banks or venture capitalists much easier than non-transparent firms.

The structure of companies with in a nation differ due to cultural importance on how management approaches different obstacles. German companies often managed by a person with an engineering background and have a hierarchical structure. This leads to logical well organised systems and processes particularly in manufacturing of high techs products. Germany as a nation puts emphasis on education, and is noticed in the business structure. Italy is made up of small to medium sized privately run firms, in fragmented industry such as designer clothing, footwear, and furniture. This agglomeration of small firms allows companies on there own initiative develop innovative designs and products quickly. This ability to adapt to changing market demand increases competitive advantage both nationally and internationally. (Ibid 197-198).

Both Germany and Italy are competitive nations but in different industry. The management structure of Germany based on technology, highly efficient processes and after sales services make it impossible to manage without a well thought out systematic and hierarchical approach. Development of new products is well thought out and takes time to introduce in to the manufacturing process. Italy being unstructured and able to adapt quickly gives room to free thinking and is more suited to consumer goods. The difference in management style of nations is an accumulation of what is considered as professional behaviour, cultural norms, access to education be it technical or social sciences, and emphasis on what is important social behaviour in various levels of the firm. Understanding cultural difference on how the firm will be perceived plays a vital role when internationalising and building long term trade relationships. (Ibid 199).

Rivalry plays a vital role in the home market driving firms to innovate through R&D and the implementation of technology to update existing processes. Rivalry encourages firms to be outwardly and inwardly focused assessing where competitive advantage can be gained. Outwardly focussed firms are in constant communication with customers, identifying shifts in demand requirements and where improvements can be made. Inwardly focused companies relate to internal workings of the firm and the structure, where improvements are made, streamlining the process and adoption of technology.

Firms looking to internationalise are at a distinct advantage if already competing in a competitive market. The advantages gained through constant development and advancement give a competitive advantage when entering foreign markets. The pressure to develop gives the nations firms an accumulated bank of knowledge, or expertise. (ibid 215). Home market rivalry also encourages firms to venture into foreign markets, taking their expertise with them. Having a competitive home market reduces the ease in which new entrants from multinationals enter the space.

#### Chance

Chance is an unpredictable factor, it can be both positive and negative in gaining competitive advantage across all industry and every nation. Chance factors are influences that are outside the control of firms and nations, the factors are greater when expanding into foreign markets where potential risks are not foreseen.

 War: It creates an unstable environment for attracting investors. Trade sanctions on exporting commodities into the region or importing key components needed for manufacturing.

- Oil prices: industry such as agriculture is dependent on oil for fuel supply, rising oil prices increase logistical cost when transporting goods nationally and internationally.
- Currency fluctuations: Nations reliant on export into foreign markets is greatly exposed to the rising of national currency. Firms which rely on the importation of products as part of the manufacturing chain are impacted on the lowering of national currency.
- Regional rising demand: If home demand is not met it gives room to new entrants to gain a competitive footing.
- World market fluctuations: nations that are highly dependent on imports of natural resources create a demand but once this demand has been met the commodity price drops or there is no longer a market to sell into.
- Political: policy changes in taxation, import duties, restrictions and trade agreements can create opportunity or make make an unviable market situation. (Ibid 221).

Chance events influence the shifts in opportunity and demand conditions for products and services. A nation with the Diamond model in place is well positioned to capitalise on, or minimise the impact of chance. (ibid 223). Government policies actively encouraging entrepreneurship and industry growth through subsidies etc. allows chance factors to spur new growth opportunities for industry (ibid 224)

#### Government

Government plays a key role in shaping industry both positively and negatively through creating or limiting the ability for firms to meet home demand conditions. Governments address the entry of foreign multinationals into the home market (ibid 225). Home firm advantage can be influenced by government through supporting industry. Infrastructure as previously discussed determines the ability for firm to expand and retain competitive advantage. Access to affordable education to drive highly skilled workers, infrastructure for product distribution nationally and internationally. Incentives to start new business to capitalise on shifts in demand in the national market and foreign markets, early introduction of laws and regulations in the way products are manufactured to keep in line with global trends.

#### 3 Methodology

#### 3.1 Research approach

The thesis aims to answer the main question of:

What is the feasibility of exporting log homes in a kit from Finland to New Zealand? To answer the main question, there are two supporting sub questions:

Sub question 1: What is the competitiveness of the Finnish log house industry versus New Zealand market conditions?

Sub question 2: What are the key concerns in the NZ market that Finnish log house exporters should take into consideration?

To answer the research question, a qualitative approach was seen most suitable. Qualitative research approach was used in the study of the macro and micro environment of Finnish log house industry and the assessment of demand conditions of NZ. Qualitative research approach was most suited to answer the factors of Porters Diamond model used in the theoretical framework. The Diamond model demanded written in-depth explanation, which suited qualitative approach. (Lewis, Saunders, & Thornhill 2009, 480). The micro level analyse was a cost comparison of importing a Finnish log house kit into NZ and all associated costs, compared to a NZ kit provided by a local producer. The data collected was numerical it was processed into tables for readability. (ibid, 480).

The macro and micro level analyses was comprised of primary and secondary data. Primary data was sourced from direct email contact with NZ log house companies, NZ bio-security and sea freight companies. Secondary data was the primary source of information for the research. Secondary data sourced was viewed critically and if the information could not be triangulated from separate sources it was disregarded.

The theoretical framework used in the macro analyses was Porters Diamond Model. Through the literature review of different competitiveness models Porters Diamond model was chosen as the most suitable. The Diamond model incorporates and identifies competitiveness of a product and demand condition, both nationally and internationally. The Diamond model could be used to measure both the feasibility to export a Finnish log house to NZ and the measure the demand conditions of NZ.

#### 3.2 Research context

Finland and New Zealand are not geographically natural trading partners (see Figure 8), the distance by sea freight corridor between port Helsinki (Finland) and port Lyttelton (NZ) is 22978km and a container ship will take 1 month (Sea rates 2017).



Figure 8. Sea freight route from port Helsinki to port Lyttelton (Sea rates 2017)

Finland is in Scandinavia, the population in 2016 was 5 503 927 (Statistics Finland 2017). Finland is 300 805km<sup>2</sup> (Ibid) giving a population density of 18.2 people per 1 km<sup>2</sup>. More than 76% of Finnish land mass is covered in sustainably managed forest (State of Finland's forests 2012: Finnish forest and forest management in a nutshell). Forestry throughout Finland's history has been a pillar of the economy for the domestic and export market. The introduction of technology to this traditional industry has contributed directly and indirectly through supporting industry to GDP growth. Finland is part of the European union and shares a border with Russia. Proximity to Europe and Russia gives Finnish companies an opportunity to trade in large markets

with low logistical costs. Finland has an open economy and struggled to recover from the 2008 global financial crisis. In 2016, the GDP was 1.6% and is reliant on export trade, exports in 2016 accounted for 25.1% of total output (Workman 2017).

NZ is in the South Pacific Ocean, part of Australasia and Polynesia, and a member of the British common wealth. NZ is 2 islands the North island and South Island and has a population of 4 596 502 and a population density of 18 people/Km<sup>2</sup> (Worldometers 2017). NZ being an island does not have a natural trade partner. The closest trading partner is Australia 2158 km away (Freemaptools 2017). Major cities are located near ports with the capacity to handle international freight. This proximity to the larger populace reduces the demand for internal logistical supporting industry for goods imported and exported. NZs isolation to world markets has not been a limiting factor in GDP growth, experiencing a growth of 2,4% in 2016 (Morrison 2016). The demand for housing in NZ is significant. The demand created by an increase in net migration, ex-pats returning home due to volatility in foreign labour markets, natural population growth, and the increase in natural disasters. In 2011 Christchurch (NZ) experienced magnitude 6.8 earth quake killing 185 and injuring 7000. (Ministry of culture and heritage 2016). The earth quake was estimated to have damaged 100 000 homes and 10 000 are unsalvageable (Tait 2011). With the ongoing rebuild of Christchurch and the rest of NZ continually experiencing seismic activity there is a need to fill the space of traditional construction methods.

Finland has a long history in log house building. With the introduction of technology, the industry transformed from a labour-intensive process, producing traditional log cabin style homes to an industry incorporating modern architecture. The ability to supply kits made with laser precision to building sites for erection any where in the world.

#### 3.3 Data collection

The research is mainly comprised of secondary data. The Finnish log house suppliers were not able to be contacted. The author tried to contact 6 different Finnish log house companies by email and phone calls. One sales rep was spoken to but could not give any information regarding export procedures or export demand. Due to the lack of response it became problematic to gain further knowledge and clarify secondary information sourced to validate the data. Data not deemed from a reliable source was disregarded.

The NZ log home company was contacted and able to give quotes for separate phases of log house completion and was used in the cost comparison. The company was used as an example of existing business and gauge for the feasibility of entering the NZ market on the micro level, and establishing the demand conditions along with secondary data.

The Diamond model was used to identify what Primary and secondary data was needed to be included to answer the research questions in the macro environment. The Diamond model provided the structure to asses both the competitiveness of Finnish log house company and the demand conditions of NZ. The cost analyst which looked at the feasibility on the micro level between exporting a log home from Finland to NZ and what the price point of the competitors existing in the market. Primary and secondary data was used. Primary data in the form of emails from the NZ log house company was used for the log house kit price, logistics cost and insurances were sourced from international freight companies and border clearance fees and requirements from NZ Ministry of Primary Industries. Secondary data from websites for the Finnish log home company's side of the cost comparison was used and deemed reliable.

#### 3.4 Data Analysis

Data collected for the macro and micro analysis was from a qualitative research approach. Qualitative research approach was the most suited to the Diamond model, and needed a detailed explanation to support the findings. Data using secondary sources was triangulated to establish the legitimacy. Once legitimacy was established the data corresponding to areas of the Diamond model was added to an excel spreadsheet under a specific code (Lewis, Saunders, & Thornhill 2009, 487). The code was based on the theoretical frame work of the Diamond Model. The Definition of the code was linked to a corresponding page with in the excel work book (see appendices 1).

The micro analysis was conducted using a comparative cost analysis. The micro analysis was a numerical cost comparison between the cost of exporting a Finnish log home to NZ versus Log home produced in NZ. The cost comparison used both primary and secondary data. Primary data from NZ log home suppliers sourced by email, the same method was used to establish the cost of the sea freight for the Finnish log home to NZ, bio security and border entry costs to NZ. Secondary information was used for the cost of a Finnish log home for reasons discussed previously. The NZ log home kit set price included the erection of the walls in the initial quote. The Finnish log home did not include labour. Data using secondary information was sourced for the cost of labour to erect the walls. This cost was then deducted from the cost of the NZ kit set to give a true comparison.

#### 3.5 Verification of Findings

The findings from the Diamond model regarding the feasibility of exporting Finnish log homes can be used to investigate a competitive advantage in another nation. A nation geographically closer or trading in the same currency could present a greater competitive advantage. NZ demand condition's for log home importation could be applied to other countries such as Estonia which exports log homes.

The macro analyses consisted primarily of secondary data. Secondary data must be used subjectively to draw a conclusion from. All data sourced from secondary sources was triangulated to other sources before it was deemed credible. No Finnish companies were able to be contacted to validate information that was sourced from non-credible web pages, so was disregarded. Information from for the NZ demand side of the research was through primary and secondary sources. Primary sources for costings for both kit set prices, international freight and insurances, and bio-security issues when entering NZ borders were from direct email communication. Background information regarding macro demand condition's were found from secondary sources. All information was used objectively, information not stated in 2 other publications either paper or electronic form, was deemed unreliable. The conclusions reached from the research are an indication of today s market conditions and the validility of border security in NZ. Currency fluctuations influencing the cost of kit from NZ and Finland, and freight etc will have to be considered if further investigation is carried out.

#### 4 Results

#### 4.1 Diamond model

#### 4.1.1 Factor conditions

#### History

Finland has a long and rich history of log house construction. Log homes in Finland were found in rural settings, city dwellings, manor houses and churches, throughout the country. Logs used in the construction of single home dwellings was a popular until 1930 (Heikkilä & Suikkari 2017). During the 1700s manor houses and churches adopted the method of covering the outer façade of the structure with weather board. The boards gave a decorative or personalised effect to the dwelling and offered individuality through colour or patterns. Weather boards became public practise in the 1800s, prior to this weather boards were deemed unessential just another expense. Over time have it was observed that the weather boards as long as an air gap remained and the weather-boards were not directly fixed to the logs increased the longevity of the logs (today this method is widely used). After the 1930s-log house construction slowed due to the introduction of the American light frame method. The American method was viewed as more cost effect use of not only the material (timber) but also was less labour intensive process making it faster to erect. After World war 2, Finland suffered from a shortage of nails (metal in general) which the American style house relied heavily on to bind the structure together, so there was a short-lived revival of the log frame system. The Renaissance didn't last long as the economy recovered and again the lighter frame method was used in preference. One exception was log summer cottages and saunas which retained the traditional building method. During the late 1960s and early 1970s with the introduction of industrialisation and mechanical processing which increased the competitiveness of log house production. (Heikkilä & Suikkari 2017).

Competitiveness increased through industrialisation. Labour, along with timber wastage were the major limiting factors in competitiveness when compared with other frame structures. Labour costs in Finland are high in comparison to the OECD. The industry has managed to combine natural resources with education and technology to produce a sophisticated competitive product. Processed logs can be transported to the intended building site nationally by truck or internationally in containers in the form of kit. Accuracy achieved in the log production has reduced the need for a specialist master builder to control the build, a general builder with the ability to interpret plans is sufficient. Technology has not just improved the building efficiency and reduced human labour costs but the log composition. Traditionally log house structures were singular round logs stacked on top of each other until the introduction of the laminated log. Mold or moisture accumulation in homes around the world is a concern due to health risks associated with the spores. Mold is a health hazard as it can cause asthma, red eyes, skin rash, and other symptoms. Finnish log homes have a proven ability to reduce moisture build up therefore reducing the growth of mold spores.

New Zealand's primary construction material is timber. Historically the intended building site would be covered in forest, suitable timber could be used for construction. The timber utilised this way was native to NZ and now a protected resource. Commercial timber is harvested from man made forests, the tree species are Pineus Radiata and Douglas fir, Douglas fir is used in the production of log homes. Douglas fir grows to full maturity in 40 years and viewed as a superior material to pine because of its durability, aesthetics, and lower risk of buckling. Douglas fir can last over 50 years when properly sheltered from the elements through extended eaves, and not in direct contact with the ground or stone/concrete. (NZ Wood for a better world 2017). Timber is the preferred construction material in NZ for its dexterity and ability to keep its integrity in earth quakes. (Waitakere City Council 2008, 2). The American light frame method is the most common although there are several log house builders. The techniques used to produce log houses is labour intensive and the logs are left round and resemble the rustic log cabin style, but include all modern necessities.

#### **Human Resources**

Finnish log home makers have utilised a technology driven society into their business model. Employing skilled workers who have completed at least basic professional studies in wood processing, university graduates of wood technology, and international sales. The skilled workers employed in the manufacturing of log homes is complemented by graduates working in supporting industry of forestry. The University of eastern Finland, Helsinki, Turku, Oulu, Jyväskylä, provide education in technology development at bachelor's or master's level. Universities of applied science in Tampere and Lapin Ranta educate in forestry engineer or manager. Basic education in becoming a forestry worker is offered at vocational school. (Luke LuonnonVarakeskus 2015). By offering higher education in the supporting industry where the raw material is produced it adds value to the log home business. Through constant assessment of better practise in growing timber and improving the sustainability of the natural resource.

New Zealand's log home industry is not technologically advanced. Human labour is required to prepare and cut the logs. It could be argued that this hand made log home offers the customer some originality, there by increasing sales to customers wanting to be original. To the majority of suburban home owners a the choice of modern design would be preferable. NZ does offer training to staff. Carpenters complete a 4 yr apprenticeship depending on their role and extensive on the job training. The NZ log home industry is complemented by graduates in Forestry. NZ forestry education has has 5 levels of formal education offered at polytechnics and Universities: level 3 forestry worker, Level 4 forestry operations supervisor, Bachelors degree in forestry research, Masters degree, and PHD. The education in this field is important to the log house industry as it guarantees the supply of high quality timber for the log home companies.

#### **Capital Resources**

Finance for business in Finland is regulated by the Finnish government (Finanssivalvonta 2017). Finance for growth nationally and internationally can be sourced outside of the traditional banking sector, or stock market. Some examples of Finnish companies which invest in growth sectors are:

TESI is a Finnish venture capital company. TESI offers industrial investment, venture capital, Growth capital (TESI 2017). Industrial growth finance is for purchasing plants and equipment to support future expansion and, involved in mergers between companies. (ibid 2017) Venture capital is directed towards companies with strong international growth particularly firms that are technologically advanced (ibid 2017). Growth company investments are for companies looking to internationalise or expand in the local market (ibid 2017).

Finnvera is a state-owned finance company in Finland (Finnvera 2017). Finnvera specialises in finance to assist in start ups and existing companies experiencing growth in the domestic market and looking to internationalise (ibid 2017).

Invesdor an equity crowd funder from Finland. Invesdor connects businesses with growth potential to international investors around the globe (Invesdor 2017).

New Zealand has a government regulated finance industry (New Zealand company's office 2016) Some examples of finance resources outside of traditional banking sector and stock market are:

Angel investors association New Zealand connects investors both domestically and internationally to entrepreneur's in New Zealand. Angel investors invest in companies that they are familiar with or see potential in growth sectors. (Angel association investment New Zealand 2017).

New Zealand private equity and venture capital association invests in companies needing finance for growth (New Zealand private equity and venture capital association 2017). Venture capital finance is given to companies who are rapidly expanding and a high return on investment is expected from the company. Venture capital investors generally exit the investment when the company is listed on the stock market.

#### **Physical Resources**

The harvesting of timber can be destructive and exploitive of a natural resource, in Finland due to strict management techniques there are more trees in Finland than 100 years ago, this is an indication of forest sustainability. Finland, relative to its size is more reliant on forestry than any other country in the world. Forestry was responsible in 2010 for 5% of national GDP. (State of Finland's Forests 2012). The management of the forests are conducted in a way to not only ensure the rejuvenation of the trees but the preservation of the ecosystem.

NZ Forestry accounted for 3% of the national GDP and employs 20 000 people (Ministry for Primary Industries 2017). Forestry is divided into 2 categories Natural forest, which covers 6.4 million ha (24% of land mass) or planted forest which covers 1.5million ha (5% of land mass). The planted forest is made up of 99% soft wood species of that 90% is Radiata Pine. Although there is a movement to more durable timbers such as Douglas Fir. (FAO Corporate Document Repository, 2017). Planted forests are what concerns the thesis as native timber is not an option due to restrictions, and is unsuitable for log homes due to moisture retention.

#### Infrastructure

The east of Finland is land locked with Russia, the western border offers international ports and to the south of Finland. Helsinki, the capital is on the Baltic coast line. Helsinki is the major port of Finland 79% of passenger traffic and one third of total value of goods passes through, or 40% (Port of Helsinki, 2017). Other major international ports are Kilpilahti, Kotka, Kokkola, and Rauma. The ports can remain open all year due to the usage of ice breakers which keep the shipping channels free of ice during the winter months. The internal transportation network is efficient and can run through out the year, ensuring processed logs transported to port, and freshly cut logs to the mill. Finland has severe winter temperatures. Due to government spending on internal infrastructure such as roading and rail the climatic influence is minimal.

NZ is country comprising of 2 main islands the North Island and South Island. Isolated in the south Pacific Ocean, with its nearest trading partner Australia 2158Km away (Free Map Tools 2017). NZs isolation means the reliance on sea freight for import and export products, and major cities are built up around harbours. The proximity of the harbours to the city reduces the need for internal transportation of goods. NZ has a railway system and suitable highways for internal logistical industries and a ferry running between the north and South Island for freight and passengers.

#### 4.1.2 Demand Conditions

Demand conditions in Finland and foreign markets are increasing due to an increase in public awareness of the benefits of wood as the primary building material. Benefits include:

- Renewable natural material
- Carbon absorption in the growth phase
- Energy efficient
- Lower susceptibility to mold and damp, creating high quality indoor air. (Good news from Finland 2013)
- Lower structural defects in earth quakes (Honka 2017)

The log house industry has an annual export turn over of 100 million Euro. The majority is to Russia, followed by Japan and EU states.(Good news from Finland, 2013). The world demand for modern log houses is limited only by competitiveness of Finnish production not from global demand (ibid 2013). The article is giving the impression that there is global demand for log houses but production that cannot be met.

Demand for new dwellings in NZ has never been greater. At present, there is a short fall of 28 000 new houses and due to lack of skilled workers only half that number is built (NZ Herald 2016). The increase in demand is due to immigration, foreign investment, New Zealanders returning home from working abroad, the rebuilding of Christchurch after the 2011 earthquake, and natural population growth.

NZ building industry is sceptical of importing building products after what is classed as the leaky home syndrome. Leaky home syndrome is where mono clad external coverings have been fixed directly to the frame. By not allowing for adequate ventilation it causes a build up of moisture and the frame to rot, collapse or fester and grow mold. It has been estimated to have affected more than 80 000 homes between 1992 and 2002 with the cost of repairs estimated to be \$11 billion NZD. (Stuff New Zealand 2011). Leaky home syndrome has affected NZ, Canada, and Australia. Log frame houses have not been recorded to have these problems and do not use any products that caused leaky home syndrome .

NZs economy is reliant on producing high grade natural products for export and due to its isolation is pest and disease free when compared to other countries which share borders. Bio security regulations of flora and fauna entering or leaving NZ at the borders is the major contributing factor to this status. A country identified as having an undesirable pest or disease must heat treatment and/or fumigate the product. Treatment must be carried out 21 days prior to leaving the home port, and inspected on entry to NZ (Import Health Standard sawn wood from all countries 2010). If sawn timber (bark free) from Finland is under 300mm in diameter and imported into NZ, then it is exempt from needing special treatment due to Finland being free of the pest Fusarium Circinatum (ibid). Windows and doors are also exempt from needing treatment or inspection on entry (Ministry of Primary Industry 2015). For all timber and poles over 300mm in diameter, they are treated with one of the following: heat treatment at 70° C, chemically treated, or fumigated with Methyl bromide or sulphuryl fluoride. Method of treatment must be documented and carried out no more than 21 days prior to shipping. When in transit, if the packaging has been split or repacked then a re-export certificate is needed. (Ministry of Primary Industries 2013). Bio security in New Zealand is strict by not adhering to the regulations additional costs will be incurred, goods returned or destroyed. The regulations are subject to change, it is advised to check before sending cargo. The stated treatment is for future reference if Finnish timber does become infected.

#### 4.1.3 Related and supporting industries

The strength of the Finnish log home industry is heavily reliant on timber; therefore, the management of the forests is paramount. By using a certified sustainable product, the log house companies can position themselves to appeal to a wider and growing range of customer who is environmentally aware. PEFC (Programme for the endorsement of forest certification schemes) is an international standard developed in Switzerland as a non-profit, non-governmental organisation and works on the entire forest supply chain. PEFC system promotes ecology, social, and financial forestry management, 10% of the worlds forests conform to this system. In Finland 95% of forests are certified under PEFC. (PEFC Caring for our forests globally 2017). In addition to PEFC Finland has 650 researchers in forest and wood industries, funded by the central government, 300 of them work at the forest research institute. Researchers are also working closely with institutions.

Finland is well known for architecture, design products, paper machine technology and mobile phones. Through association of these firms Finnish log homes companies may receive brand recognition through the marketing of Finland as a nation.

NZ planted forests are managed under the international framework Forestry Stewardship Council (FSC). FSC is a 3-tier management system recognised throughout the world. FSC core values are Biodiversity, sustainability, socially beneficial and economically viable. (Forests for All Forever 2017). With a sustainable raw resource, NZ log homes have a continual supply of product to manufacture log homes. By using FSC timber the NZ log homes are seen more ecologically responsible, which increases the home market demand. NZ firms market themselves as 100% NZ made. The NZ log homes have the advantage of being part of this brand, a brand that NZ people connect, with and want to support.

#### 4.1.4 Firm strategy, structure, and rivalry

Finland has long history of producing log homes and there are several with more than 40years industry experience they are Honka, Arctic house, Ikihisi, Kuusomo log homes, Finlamalli, and are all competing in the export market. The rivalry has created competition in both marketing initiatives and technology to create a competitive advantage over rivals.

The Finnish market after World War 2 saw a dramatic decrease as the construction method was expensive and time consuming process. In the 1970s the mechanisation of log processing began to develop which drove the m<sup>2</sup> price down, the next obstacle for the consumer was the design of the house. The early design resembled a rustic log cabin which did not fit into suburban architecture, Honka a leading log house company created material infusion with the massive log structure. Material infusion is the inclusion of stone, steel, lighter timber, or glass incorporated into the overall design of the house, the core material is still massive logs. This infusion creates a

style of building which fits into a suburban setting. (Honka 2017). Honka exports 59% of its production to 50 different countries. Honka also gives the option of partnership or joint investment in large commercial projects and the potential of becoming a franchisee (ibid).

NZ has three main log home companies they are New Zealand log homes, Natural log homes and Euro wood. Euro wood is made from European timber and pre-cut kits imported into NZ from Czech Republic (Euro Wood 2017). Euro wood claims to have some of the benefits that the Finnish log home can offer they are: Thermal insulation, laminated timber frames, and timber sourced from sustainably managed forests (ibid 2017). The bulk of the log homes produced in NZ is sold domestically, Euro wood does export to Australia on a small scale (ibid 2017), and New Zealand log homes has sold 60 log homes to Japan (New Zealand log homes 2017).

NZ companies process the logs in preparation for construction in a labour-intensive process with very little innovation and industrialisation. The houses are unique and express individualism and craftsmanship which is the main attraction of NZ log homes. NZ log homes retain the rustic cabin look and do not blend into a suburban environment.

NZ log house industry lacks technological advancement and home market rivalry. There are not enough competitors to encourage innovation, and drive prices down. The cost of the NZ log home remains high in comparison to the Finnish log home (Table 4 & 5).

#### Chance

Finland uses the Euro as currency and NZ the NZD. A rise in the Euro and drop in the NZD will negatively impact the Finnish log home companies. They will lose competitive edge gained from having a weak currency value. The same risk can also increase demand if the Euro drops in value and the NZD rises in value. This gives the NZ consumer greater buying power of products imported into NZ.

Bio security border clearance may impose regulations against timber products from Finland. Finnish wood products may contract a disease identified as a threat. NZ bio security web site must be checked for country status updates. Products deemed unsafe can be denied border clearance, fumigation may be necessary or returned to sender at the customer's expense. (New Zealand Customs 2017).

Entry of a foreign company to NZ which has a greater competitive advantage than Finnish log homes will lower the demand in NZ. Advantage may come from currency exchange, lower labour costs, superior technology in manufacturing, or a high impact marketing campaign. There is also a possibility of NZ companies gaining a greater competitive advantage through the introduction of new technology.

#### 4.1.5 Government

NZ in 2016 was tied in first place with Denmark as the least corrupt country in the world. Finland was placed 3rd (Transparency international 2016). The rankings indicate high regard for judicial systems, freedom of press, and access to information on government expenditure (ibid 2016).

The Finnish log home companies can benefit exporting to NZ due to low levels of corruption and transparency of government. This makes it easier to identify shifts in competitive advantage due to governmental policy changes regarding import tariffs or restrictions.

#### 4.2 Comparative cost analysis

#### 4.2.1 Shipping costs from Helsinki (Finland) to Lyttelton (NZ)

<u>Shipping costs only</u> of a 40 foot Fully loaded (FL) container. Costs based on 150m<sup>2</sup> log house valued at \$180 000 NZD. Log house exported from Finland to New Zealand all prices are in NZ\$. Table 2 and Table 3 show quotes from separate international shipping companies.

#### Table 2. World freight rates (NZ\$)

Departure	Helsinki Finland

Arrival	Lyttelton New Zealand
Shipping + Insurance	4621.00 - 5108.00

Approximate cost of sea freight of a log home from Finland to New Zealand (World freight rates 2013).

#### Table 3. Global trade solutions (NZ\$)

Departure	Helsinki Finland
Arrival	Lyttelton New Zealand
Shipping + Insurance	4350.00

Approximate cost of sea freight of a log home from Finland to New Zealand (Global trade solutions 2017).

The freight in both quotes are calculated on the assumption of a free on Board (FOB) price from the log house company. FOB means the seller is exempt from liabilities once the product is on the ship.

Port Lyttelon chosen as the destination, it is the local port for Christchurch where the earth quake rebuild of the decimated city continues.

#### **Customs and duties**

Prior to arrival an electronic form is lodged on the NZ customs website. The customer or exporter fills the forms which declares the nature and usage of the goods. (New Zealand Custom Service 2017). Log homes fall into the category of: Wood in the rough/poles, piles and posts of non-coniferous wood.

#### Table 4. Finnish kit price and associated costs. (NZ\$)

Value of kit in Finland	180 000	
Shipping + Insurance	4350	
Import Entry Transaction	49	
Fee		
Goods and service tax (GST)	27 652	
Total landed cost:	212 051	

(Global trade solutions 2017)

(GST charged at a rate of 15% on the total cost of the imported product and included in the calculation).

#### 4.2.2 Cost of New Zealand Log House

A quote from New Zealand log house company was used to carry out a basic financial feasibility analysis of the competitiveness of the existing companies in NZ.

New Zealand log homes produce prefabricated log homes frames in Rotorua (central north island). NZ Macrocarpa logs sourced from commercial forests used in the construction. NZ Log House company has built 60 log homes in NZ and exported 15 kit set houses to Japan. Along with Log homes they also construct commercial buildings. The company consists of Carpenters, log craftsmen, and architects. (New Zealand Log Homes 2014).

NZ Log Homes offers 3 price categories of log homes in relation to state of completion. For the comparison, the 3<sup>rd</sup> stage or the most basic package is used.

Price of 150m <sup>2</sup> basic kit walls only erected	\$ 225 000
Goods and services tax (GST):	\$ 33 750
Sub Total	\$ 258 750
Minus estimated labour costs	\$ 3 360
Total Cost	\$ 255 390

#### Table 5. Approximate cost of 150m<sup>2</sup> NZ Log Home (NZ\$)

(New Zealand Log House company 2017)

The price includes pre-cut logs and the labour of erecting the walls only. Wall erection on average is 1-2 days' work for 3 men, and covers the charge of the hoist or crane. The price also covers transportation up to 300km from the depot, but does not cover the carpenters travel expenses if an overnight stay is required. Log Homes New Zealand also has the capabilities for organising and completing the entire build. (NZ Log Homes 2014). Direct communication with NZ log homes on what the labour cost for erecting the walls was unobtainable. An approximate hourly wage for a skilled self employed carpenter used from additional sources and shown in Table 4.

Table 6.	Calculation	for a self-em	oloyed carpenter	hourly wage	(NZ\$)
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Average NZ wage for skilled carpenter:	56/hour (including GST)
3 carpenters:	168/hour
3 carpenters x 2 days or 20 hours:	3 360

(Trade box 2016)

Costs in Table 5 include Goods and Service Tax (GST) and expressed in NZ dollar.

The findings of the cost comparison show that the Finnish kit set imported to NZ is cheaper than the kit set from NZ.

### **5** Discussion

#### 5.1 Research aims

The aim of the thesis was to show possible business opportunities for Finnish log home companies to expand into the New Zealand housing market. To find reliable answers, the main research question was refined and 2 supporting sub questions were added, they were:

What is the feasibility of exporting log homes in a kit set from Finland to New Zealand?

To answer the main question, the following two sub questions were needed:

Sub question 1: What is the competitiveness of the Finnish log house industry versus New Zealand market conditions?

Sub question 2: What are the key concerns in the NZ market that Finnish log house exporters should take into consideration?

NZ is possibly the most distant market from Finland, not the most logical choice to export kit set log homes to. By not focusing entirely on obvious geographic limitations for trade NZ was chosen as the export destination due to the potential demand in the market which could be filled by Finnish log homes. Log homes from Finland were chosen to meet the potential demand in NZ due to reputation in quality and safety aspects. Finnish log homes potentially offered solutions to satisfy the NZ demand. The Diamond model showed the strengths and weaknesses of the feasibility study and clearly showed what is needed to satisfy the demand of the NZ market. Secondary data was used extensively in the research, as Finnish log home companies could not be contacted for questioning. NZ demand conditions were researched using both primary and secondary data.

#### 5.2 Summary of main findings

The literature review was used to find suitable competitiveness models which could be applied at both Firm level and country level. Porters Diamond model was chosen for the theoretical framework as it could be applied at firm level to the Finnish log home kit-set industry and the demand conditions in NZ. The Diamond model finds both potential, and weakness and where competitive advantage lies. It is an advantage to use the same model on both cases to find the strengths and weaknesses in relation to each other and if they compliment. Secondary sources were used for most of the empirical study on the macro level. Information from secondary sources that could not be confirmed by cross referencing to other publications paper or electronic was disregarded. The cost comparison was made up of information of primary data from NZ firms and secondary data from Finnish log home companies as they could not be reached.

The findings of the research showed it to be feasible to export a Finnish log home to NZ. The Finnish log home met the demand conditions in NZ on the macro and micro level. The macro level analysis found that safety and mold resistance to be the major areas of concern to the NZ market and the Finnish log home met these demands. The fact NZ is prone to seismic activity and the Finnish log home was proven to with stand earthquakes on a simulator is a competitive advantage over non-tested log home structures. The Diamond model considered all positive and negative aspects of

creating a stable business opportunity that has longevity through progressive technological advancements, education, and supply sustainability of raw material (see Table 7) The Diamond model also finds key points in which to market the log homes through historical reference, learnings from past mistakes and sustainability of forestry management. These points give credibility to the Finnish log home industry and will provoke customer interest.

Table 7 Factors deciding demand conditions in NZ for Finnish log homes (↑ Increase in demand for Finnish log homes ↓ Decrease in demand for Finnish log homes)

New Zealand demand for Finn-	Finnish log home Competitive			
ish log homes	Edge			
Construction boom throughout the country due to	Precision industrialized industry thus reducing la-			
immigration and natural disasters. $\uparrow$	bour costs and human error $\uparrow$			
NZ has its own industry of log house industry. $\checkmark$	Highly educated and technologically advanced			
	workforce 个			
Traditional log house design (rustic cabin) $\uparrow$	Offers modern functional design options and can			
	incorporate other materials $\uparrow$			
NZ log homes offer essential comforts for NZ con-	Gives top rated insulation by Scandinavian stand-			
ditions no unnecessary technology and cost $igslash$	ards which are not essential in NZ $\checkmark$			
NZ has a highly-educated work force to meet the	Finland trades using the Euro a stronger currency			
requirements for building the Finnish log homes $\uparrow$	than NZD 🤸			
NZ market sceptical of imported building systems	Finnish log homes prevent build up of moisture			
due to the leaky home syndrome disaster $igsymbol{\downarrow}$	and have a proven history in damp resistance and			
	longevity $\uparrow$			
Sustainable forestry regulations 🗸	Sustainable forestry regulations 个			
NZ is found on a fault line. The need for earth-	Finnish log homes are resistant to earth quakes or			
quake resistant houses is increasing $\uparrow$	suffer minimal damage in a magnitude 7.1 earth-			
	quake 个			
NZ has a brief history in building with logs $\uparrow$	Finnish log house building industry is centuries in			
	the making $\uparrow$			
Benefits of Finnish log houses may not be known				
by the public, which reduces resale value $igstarrow$				

The results show on the macro level that NZ has a demand for homes that are earthquake resistant, fire safe, healthy in form of mold resistant, and modern design. NZ log homes keep a rustic look which does not fit into the suburban setting of modern architecture but is more suited to isolated regions. Finnish log homes would be suitable to meet this demand.

The micro level analyses showed that a Finnish log home kit imported into NZ was cheaper than a NZ log home kit. This finding takes into consideration logistics and import costs.

#### 5.3 Managerial implications

The considerations a manger would have to allow for are the difficulty in contacting Finnish log home suppliers, bio security when entering NZ, chance factors and marketing a non-NZ made product in NZ.

The author made numerous attempts to contact Finnish log home distributors with no success. E-mail was the primary means of establishing contact, also direct contact with employees were made but no valid information was gained as the employee was only involved in regional sales.

Bio security issues when entering NZ are subject to change. Regulations regarding the import of wood products from Finland to NZ must be checked prior to sending. The regulations are subject to change as the status of wood products from Finland may pose a threat. If bio security is not met the cargo can be refused entry, or additional fumigation is needed at the importers expense. (New Zealand Customs Service 2017)

Chance events to consider are currency exchange rates and oil price rises. Finland uses the Euro and NZ the NZD. If the Euro rises the micro analysis will no longer be valid. A rise in oil prices will have direct effect on production costs, internal logistics of both countries and shipping.

Marketing a non NZ made product in NZ may reduce the demand. NZ made products are strongly supported and customers will seek them out over a rival.

#### 5.4 Limitations of the Research

Obtaining primary information from the Finnish log home companies was a major factor limiting the research. Without direct communication, it was hard to establish if prior sales had been made to NZ customers, and how recent were the sales, what were the risks. No prior research was found on the feasibility of exporting Log homes to NZ versus the NZ demand conditions. Prior research would have offered information on how demand conditions have changed in NZ, or how Finnish log home building industry has gained competitive advantage over time.

#### 5.5 Recommendations for future research

Further research is needed to establish whether the Finnish log house would meet NZ engineering and safety standards. All other costs from the alteration of the structure, engineers, and council fees would have to be calculated into the micro analysis. Without direct communication with Finnish companies the author was unable to use existing information on whether the process of importing a Finnish log home was a proven practical choice for NZ demand conditions.

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## Appendices

Appendix 1.	Qualitative	Data Analy	ysis Methods
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Diamond model	Code	
Factor conditions	D1	
Demand conditions	<u>D2</u>	
Firm structure, strategy, and rivalry	D3	
Related and supporting industry	D4	
Chance	D5	
Government	D6	



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	▼ : X ✓ fx A naturally et	fficient Log Home	. 2017.Honka. Accessed 0n 24 January. Retrieved from http://honka.com/	en/why-a-	honka-log	-home/res	pect-for-na	iture/		
А	В	с	D	G	н	1	J	к	L	м
ode	Text	Source	Reference							
D2	When combined with an ecological and modern heating system, a Honka log home is a high-quality and naturally low- energy concept that allows you to reach any given energy class both today and in the future. A log wall is a natural insulator with a large thermal mass. Unlike timber frame walls, a log wall is capable of storing heat. This capability means lower energy consumption in the household.	Web site	A naturally efficient Log Home. 2017.Honka. Accessed 0n 24 January. Retrieved from http://honka.com/en/why-a-honka-log-home/respect- for-nature/							
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#### nka.com/en/why-a-honka-log-home/respect-for-nature/



When combined with an ecological and modern heating system, a **Honka log home** is a high-quality and naturally low-energy concept that allows you to reach any given energy class both today and in the future. A log wall is a natural insulator with a large thermal mass. Unlike timber frame walls, a log wall is capable of storing heat. This capability means lower energy consumption in the household. Read more about the energy efficiency of log homes.



Appendix 2. Global trade solutions quote for a Finnish log home shipped to New Zealand (e-mail).

## Import duty & taxes calculation results

Please find below the import duty & VAT calculations results of your recent query with the DutyCalculator.



Total customs value:	NZ\$180000.00
Import duty:	NZ\$0.00
Import Entry Transaction Fee:	NZ\$49.24

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Edit

ALAC (HPA) Levy:	NZ\$0.00
HERA Levy:	NZ\$0.00
SGG Levy:	NZ\$0.00
GST:	NZ\$27652.50
Total import duty & VAT due:	NZ\$27701.74
Total landed cost:	NZ\$212051.74

Appendix 3. Quote from New Zealand log home company (e-mail).

Dear James

Thank you for your enquiry regarding our log homes.

With regard to the price of the log homes, I would advise that the price depends on the plan and size of the building you wish to build, but as a guide:

#### Category one:

\$3500.00 sq. metre approx. (complete) Includes all log-work re-erected on site, foundations, aluminium exterior windows and doors, ground and first floor systems, interior partitions and wall linings, interior doors, Formica kitchen, shower, WC, plumbing, electrical, Color steel roofing. Transportation costs of log-work and materials to site within 300 kms of Rotorua. Additional costs will apply for transportation if exceeds 300 km radius and if there are access problems to site. (Excludes: Accommodation for Carpenters (if applicable).

#### Category two:

\$2200.00 sq. metre (shell only) i.e. Includes all log-work re-erected on site on foundations already prepared by client, roof frame, color steel roofing, aluminium windows and exterior doors. Transportation costs of log-work and materials to site within 300 kms of Rotorua. Additional costs will apply for transportation if exceeds 300 km radius and if there are access problems to site. Excludes: decking, plumbing, electrical, kitchen and bathroom fittings. Accommodation for Carpenters (if applicable).

#### Category three:

\$1500.00 sq. metre. Includes all log-work re-erected on site on foundations already prepared by client. Transportation costs of log-work and materials to site within 300 kms of Rotorua. Additional costs will apply for transportation if exceeds 300 km radius and if there are access problems to site. Excludes: Accommodation for Carpenters (if applicable).

(All prices quoted are GST Exclusive)