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Developing an Ontario Maple Syrup Sector Profile: A Value Chain Analysis

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DEVELOPING AN ONTARIO MAPLE SYRUP SECTOR PROFILE: A VALUE CHAIN ANALYSIS

by

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Introduction

Maple syrup will always have a strong connection to the Canadian economy and identity, partly due to Canada's dominant role in maple syrup production. The questions explored for this paper are: what is the current configuration of the maple syrup industry in Ontario, including its accompanying products and supply chain? Can the implementation of a value chain approach improve the current system? These questions work in conjunction with the larger overall project, funded by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). The larger project's goal is to identify competitive, innovative opportunities for capacity development in Ontario's maple syrup agri-food value chain by increasing value added related to new products and services, better market differentiation and stronger network relationships. It contributes to the increased profitability, sustainability and wellbeing of rural and Indigenous communities. This larger project's goals are:

1) Through a sectoral profile, identify the value chain's key players, processes, activities and inter-intra industry relationships (social capital) providing baseline data on the current status of the industry.

2) Evaluate opportunities for innovation, competitive solutions and capacity development across the value chain, including the in-depth profiling of key industry leaders and elders, best/wise practice benchmarking and challenges/threats assessment.

3) Develop the Maple Syrup Innovation Toolkit (MSIT) to increase stakeholder capacities, participation and profitability and encourage new industry entrants.

4) Finalize deliverables and knowledge translation, including a video, hosting an Ontario symposium focused on value chain innovation and enhancement of inter-intra network relationships

This major research paper (MRP) is focused on Objective 1 which involves:

1) Supplying an overall picture of the maple syrup value chain for members and new entrants

2) Providing information needed for strategic decision-making and relationship building

3) Identifying opportunities to increase network membership

4) Furnishing evidence-based information for policy makers.

Objective 1 involves the analysis of the current maple syrup value system. Value is understood to encompass the economic, social and environmental benefits associated with maple syrup. Benefits include such things as contribution to profits or subsistence, enhancement of socio-cultural relationships and celebrations, spiritual and ceremonial uses, and provision of ecosystem services such as flood reduction. In general, a value system can be understood as a network of enterprises and inter-organizational relationships through which maple products move from preproduction to consumption/postproduction. Preproduction includes research and development activities such as developing more efficient sap line and pumping systems. Postproduction can include the processing of maple syrup into a different product, for example maple candies. To date, little detailed information is known about the maple syrup value chain and value system. This work is designed to study and present findings to fill this gap. Objective 1 also lays the foundational knowledge to allow further study of the larger overall maple syrup project.

Following this introduction, this MRP is divided into three subsequent sections: a literature review, overview of the methods and the MRP's contribution.

2.0 Literature Review

The literature review is organized into two key subsections. First, the literature on value systems, value chains and agricultural value chains is outlined. Second, the review will then focus in on the maple syrup industry and will address such issues as governance, initial understanding of the maple syrup value system and problems facing the industry.

2.1 Value Systems

In the literature, there is some conflation between value chain analyses that focus at the firm level versus those examining the relationships between firms within an industry. For the purposes of this paper, a value chain is based on Porter (1985) who defines a value chain as a tool that "disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation" (pg.33). Then, across an industry such as maple syrup, the ways in which individual firms' value chains are linked is called the value system (Porter, 1985).

Porter (1985) provides this explanation of value systems:

> A firm's value chain is embedded in a larger stream of activities that I term a value system…Suppliers have value chains…that create and deliver the purchased inputs in a firm's chain…In addition many products pass through the value chains of channels…on their way to the buyer" (pg.34)

This lays the foundation regarding the components of a value system, as illustrated in Figure 1.

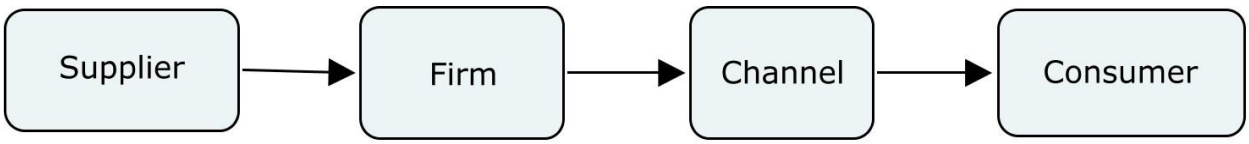

Figure 1: A simple value system (adapted from Porter 1985).

Figure 1 outlines a simple value system as a collection of businesses that are linked together to deliver a product to the consumer at the end of the system. To summarize, the firm requires raw material to create item "X". The firm then contacts the supplier to provide the raw materials for "X". The firm develops/creates "X", then sends it to the channel. The channel is the interface through which the consumer will obtain item "X". From a maple product perspective the system might look like: the equipment dealer (Supplier) sends the necessary equipment for production to the maple syrup producer (Firm). The producer then uses the equipment to transform sap to syrup, once the syrup is processed and bottled the producer then can send the product to a retailer (Channel). From the retailer it is sold to the public (consumer) for use.

An important element emphasized by Porter (1985, 4), is his structural analysis of value systems and his analysis of the "Five Competitive Forces" (Figure 2). For the maple syrup industry, while a more detailed review of these forces will undertake in a subsequent project, some of the basic information about industry structure and the five forces will be collected for this MRP.

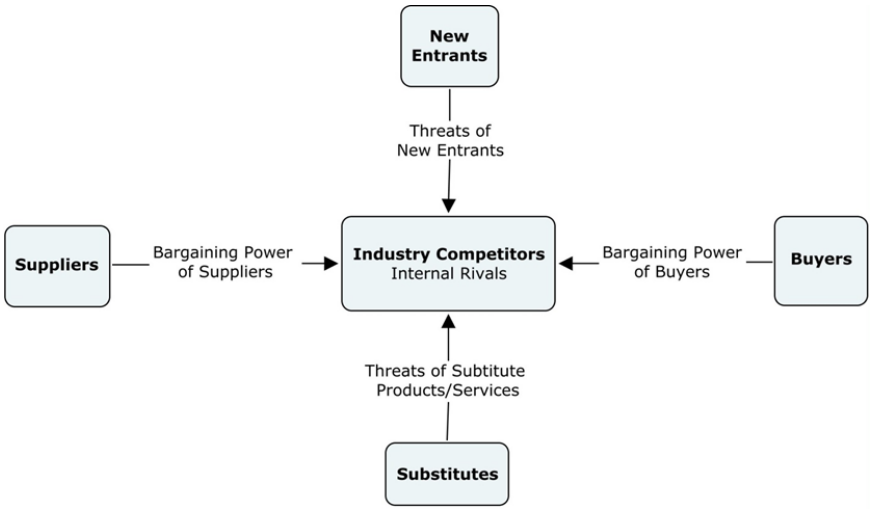

Figure 2 - Porter's five competitive forces (Porter, 1985).

Porter maintains that these forces and associated threats apply to all industries and underpin the profitability, cost structure and opportunities for competitive advantage within all industries. The importance of each of the five competitive forces varies by industry and is a function of the structure of each industry's underlying economic and technological characteristics. The first force is the New Entrants. This threat refers to the potential threats and issues accompanied with the beginning of any new business, such as initial investments, creating contacts and other such obstacles that must be overcome to establish a firm. New Entrants is concerned with the threat of new market sector competitors as determined by the strength of entry barriers including such issues as economies of scale, brand identity, capital requirements, the learning curve, etc. Where the threat of new entrants is high, existing industry members must keep their prices in check or face stiff competition (Porter, 1985).

The second force is Suppliers, this power dwells within the relationship the firm has with the producers of its key inputs. The relationship, in a sense, is balance of power between the buying power of the firm and the essential willingness of the supplier. In other words, the bargaining power. For example a firm may need a certain item to construct their product,

however their supplier has a limited supply and demand a premium price. Thus, the negotiation between the two is the tipping point; if the firm is able to provide a significant offer to the supplier, they may receive the product. However, should the supplier not be willing, the negotiations may fail. The bargaining power of the supplier can have a significant impact on the firm's costs if the supplier's bargaining power exceeds that of the firm (Porter, 1985).

Substitutes is the third power, this refers to other products that can replace the firm's product. In terms of maple syrup, the substitutes may include items such as table syrup, honey, cane sugar and agave syrup. If substitutes are priced lower than a firm's commodity, this can limit the size of the potential market and drive prices downward. Thus the concern is the power that the substitutes have, and if the firm's product is different enough to outweigh the competition (Porter, 1985).

The Buyer is the fourth power, this one is arguably the reason a firm is created, developing a response to demands, created by the Buyer, for particular products and services. However, the firm must be able to be reactive, and if possible proactive, when confronting the Buyer's power. This means the firm must be able to be flexible in reacting to what the public wants to purchase, essentially being able to provide what the Buyer wants. On the note of being proactive, this can entail such activities such as setting prices, and trying to use foresight and see where the market is going (Porter, 1985); regarding foresight this could be considered investment with the realm of research and development, to pursue what the Buyer wants.

The final power lies with the internal competition of the firm's own industry, this is referred to as Industry Rivals. This is where the firm must compete with other firms to dominate and offer a differentiated product (Porter, 1985). Essentially this power is a common element of

any market, the race to be the top firm, the firm that every consumer goes to in order to obtain a product or service.

2.2 Value Chains

The earliest source of understanding value chains lies with Porter in his text *Competitive Advantage: Creating and Sustaining Superior Performance* (1985). Porter (1985) explains that each firm is "a collection of activities that are performed to design, produce, market, deliver, and support its product"; from the integration of these various activities monetary profit and value is created for the firm. Porter (1985) developed this concept to outline how a firm can obtain competitive advantage within an industry and to promote long-term sustainability of the firm (Figure 3). Porter (1985) defines a value chain as a tool that "disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation" (pg.33).

Based on Porter, Carpenter and Sanders (2009) provide an updated conceptual framework of the value chain. According to these authors, a value chain provides competitive advantage that a firm or, a business, will use if there are other competing firms that are similar in not only capacity but also resources. Thus competitive advantage is produced by the firm choosing which activities within their operations to invest that will result in either lower costs, higher prices, or more efficiency. Different configurations within the firm's value chain will result in advantages, for example, some producers sell sap to a processor who makes the syrup. The producer could obtain an advantage by rearranging their firm and installing upgraded equipment to process the sap into syrup more efficiently and in larger batches. This could lower their unit cost. A producer might also be able to capture more value by selling directly to a retailer, rather than working

through a distribution channel. However it is important to note that while there is the promotion of configuration of a firm, it is essential that a firm does not give up its core competency. In other words a firm should not alter itself to the point where what it was once good at is lost, for example a sap producer switching fully over to retail and abandoning sap collection.

Another noted advantage that can be observed is the development of networking or relationship building with other firms, or individuals along the value chain, or value system. This consists of establishing contacts and working with individuals, for example to the ability to ask for assistance or troubleshoot some issue within one's firm. This concept can also be identified and understood within the social capital literature (Inkpen, 2005, Mohan and Mohan. 2002, Putnam, 1993).

Carpenter and Sanders' (2009) value chain consists of two types of activities: primary and support. Primary activities consist of "logistics, operations, outbound logistics, marketing and sales, and services" (Carpenter & Sanders, 2009); support activities are then "human resources, accounting and finance operations, technology, and procurement" (Carpenter & Sanders, 2009). Firms can choose to maximize one of these two activities to gain an advantage. However, the maximization must produce differentiators (a differentiator is a feature that gives the firm an edge over the competition in the market) (Carpenter & Sanders, 2009). An example of a primary activity is outsourcing (sending sap to a third party processor to create maple syrup) and of a support activity is the investment in technology and research (bringing in a high-end evaporators). The key to getting the advantage from the activities is "by either finding better ways to perform the same activities or by finding different ways to perform them" (Carpenter & Sanders, 2009).

When a firm invests in a value chain activity (either primary or support) there is a reconstruction of the firm. The complexity of the reconstruction can vary, but there will be a tradeoff. A tradeoff occurs when a firm either adds or eliminates certain activities in order to maximize and build the competitive advantage from their value chain. However, due to the nature of the business, rival firms may seek to reproduce the competitive advantage that one firm has created (Carpenter & Sanders, 2009). To counter this, Carpenter & Sanders (2009) promote tradeoff protections as a proactive method to reduce or even eliminate the diffusion of this advantage (this is protection gained from the investment in either primary or support activities) to competing firms. This is accomplished when the firm has made such radical changes or such a large investment in the activity that other firms are unable to copy the strategy without significant effort and cost. For instance, Fulton's investment in developing spa products from maple syrup would likely be difficult for other firms to copy (see Maple Lucious Bath and Body Products at http://www.fultons.ca).

According to Carpenter and Sanders (2009) another opportunity for competitive advantage occurs through innovation. While the term "innovation" is poorly defined, Carpenter and Sanders appear to be referring to the creative efforts of individuals within the firm. The investment put into the primary or support activities of the value chain creation is the first and paramount step, for innovation is eligible in either activity, followed by the appropriate tradeoffs to maximize the competitive advantage. Innovation will further promote a competitive advantage, but as well could mitigate tradeoffs (Carpenter & Sanders, 2007). Within the maple syrup industry, it will be important to assess if and how the innovative investment in researching and developing new products provides a competitive advantage and acts as a deterrent for competitors. In terms of research groups for the maple syurp industry there are such as Cornell

and Proctor, as well as the larger supplier corporations such as Dominion and Grimm, as well the larger organizations such as OMSPA and the larger NAMSC (North America Maple Syrup Council).

Porter (1985) conceptualizes innovation somewhat differently. He explains innovation primarily as technological change within a firm. In the maple syrup industry, for example, this could be the upgrade of obsolete technology into more efficient technology such as the growing use of reverse osmosis to reduce energy costs and save evaporation time. The introduction of a technological change can present the firm with two sources of competitive advantage, lower cost and/or differentiation (Porter, 1985). Porter states that "Introducing new automated manufacturing technologies can have this effect [increasing competitive advantage], as can the introduction of new information system technology to manage logistics of design product in the computer" (Porter, 1985, pg 20). Although Porter promotes technological changes as a major innovative tool, there are also possibilities for innovation that are "unconnected to technology" (Porter, 1985, pg, 20). These innovations dwell not within the internal workings of the firm, but within the external partners of the firm in the value system, and possibly extend out to society as well. For example, with the advancements and daily use of computing technology, the internet has become a place of not only information exchange but marketing as well. It can be hypothesized that the internet might be leading to innovation within the maple syrup industry through on online sales of maple products.

It is within the realm of linkages that Porter sheds light on innovation that is uncoupled from technology. He provides examples to illustrate various areas within the value system where innovation can be applied:

> Typical examples of supplier linkages important to cost include the linkage between the frequency and timeliness of supplier deliveries and a firm's raw material inventory, the

> linkage between supplier application engineering and a firm's technology development cost, and the linkage between a supplier's packaging and a firm's material handling cost (Porter, 1985, pg. 77)

2.3Agricultural Value Chains

Beyond the economic literature, other definitions of value chains are available through the agricultural literature. The George Morris Centre released a paper completed by one of their associate researchers, Martin Gooch, which focused on the development of value chains in an agri-food system. The definition of value chains used by Gooch is based on Porter's work:

> Porter's 1980 discussion of competitive strategy highlighted that, to be profitable, organisations must add value to products through the effective coordination of operational and support activities. He presented the value chain as the activities that occur within an individual business to enhance the value of a product as it passes down-stream to the end market. Separate value chains were interconnected by an overall value stream that ended with the consumer (Gooch, 2005, p.4)

The main message that can be taken from Gooch's work is that "Through the formation of value chain alliances, businesses of any size can innovate and compete in ways that would not be possible on their own and are difficult for competitors to replicate" (2005, p.18) .This is an instance where Porter's concept of value chain is directly quoted, while other such guidebooks and resources share close similarities with Porter (1985) and Carpenter & Sanders (2009) such as *Agri-Food Value Chains: A Practical Guide to Building Customer-Focused Alliances*, who define a value chain as:

> The basic characteristic of a value chain is market-focused collaboration: different business enterprises work together to produce and market products and services in an effective and efficient manner. Value chains allow businesses to respond to the marketplace by linking production, processing and marketing activities to market demands (Agriculture and Food Council of Alberta, 2004, p.1).

Notice in this quote that there is some conflation between value chains and value systems. Nevertheless, there is general congruence with Porter's ideas. On the notion of developing alliances within the value chain (and on a larger level, the value system), this

publication promotes communication between the varying aspects of the chain. While there are separate entities within a firm, it is the ideal situation to have clear and coherent communication; this allows the sharing of information, troubleshooting of problems, and discussion of key issues. This can be further established with a step back to the larger value system. While, again, there are individual firms along the value system (and as well competing value chains within the same industry), it is important to establish strong relationships with these firms. These relationships should be viewed as alliances, and with these alliances there can be the establishment of an information/communication pathway between firms. Just as the internal relationships within a value chain of a firm, these alliances in a value system can also share information, troubleshoot, and discuss key issues. This can then help view the alliances not as long-term contract relations, but as relationships that will better the industry.

As defined by Bammann (2007,p. 114), the value chain tool when used for agricultural industries, pushes the analysis "beyond the farm and the farm family and looks into common business relationships and interactions between and among farm enterprises and agribusinesses along the pathway from planning for production to the consumption of the final product". It is the push to consider the idea of the larger picture, moving past the singular value chain on a firm level and moving up the scale to a value system that is a key feature of the value chain and value system approach.

2.4 Maple Syrup Governance

There are two levels of legislation that guide the production of maple syrup and other maple products. Murphy et al. (2012), explain that the federal level

> "…maple products are governed by the Canada Agricultural Products Act through the Maple Products Regulations. Through these regulations, health and safety is governed by the Food and Drugs Act and thus subject to Canadian Food Inspection Agency rules and standards. Licensing to export across provincial lines and outside of Canada is also governed by these regulations" (Murphy et al., 2012, pg. 47-48)

In Ontario, the main governing regulation is Ontario Regulation "119/11 Produce, Honey and Maple Products under the Food Safety and Quality Act, 2001" (Murphy et al., 2012). As Murphy et al., (2012) explain: "The regulation, in line with federal rules, includes grading and labelling requirements; minimum sugar densities; packaging guidelines; upon public request, Ontario Ministry of Agriculture and Food inspections; and maple product marketing guidelines."

Once the maple sap has been processed into maple syrup, a grading system is used to classify the quality and type of syrup. This is currently undertaken at two levels: federal and provincial (Fédération des producteurs acéicoles due Québec, N.D.) On the federal level, there are three categories for maple syrup classification and within these three categories there are five colour variations. Category #1 holds the lighter colour variations: extra light, light and medium; Category #2 has only the amber colour variation within the category. The final category, Category #3 has the dark colour variation, as well as any other variations that do not fit into the previous two categories. This includes much lighter tones and darker tones then the stock colour variations. While the colour variation is the deciding factor as to what category the maple syrup falls into, there are three set guidelines that are standard for each category. They are as follows: the maple syrup in question "must meet the standards…of the Canadian food regulations and; must not ferment; must have a clear and uniform colour;…must have a maple flavour that is typical of its colour grade, and be free of any unpleasant odours or flavours" (Fédération des producteurs acéicoles de Québec, N.D.)

Table 1 – Current Maple Syrup Grading System (Lanark & District Maple Syrup Producers Association, 2013)

• All current grading systems used will be eliminated and replaced by a single, international, standardized grading system. • Only two grades will exist: Grade A (for retail sale) and a Processing Grade. • Grade A will have four colour classes, each having its own quality descriptors, which will eliminate the current discrimination against darker syrup. • Grade A can be any colour, but no off-flavours are permitted to be sold. • Any syrup that does not qualify for Grade A (including off-flavoured syrup) must be labeled as "Processing Grade." This syrup may not be sold in retail markets and must be packed in 5-gallon or larger containers. • Pure maple syrup can only be produced from the concentration of maple sap or from the solution or dilution of another pure maple product in potable water (reconstituting maple sugar into syrup) • Syrup must fall between 66.0 and 68.9 on the Brix scale. Recommended in the 66.5-67.5 range for best flavour. • Must comply with federal and provincial regulations for contaminants. • Must comply with federal and provincial regulations such as labeling, standard containers, etc. • Must have proper determination of grade and colour class • Must be traceable to batch (have a recordable code on container)

In Ontario there are only two categories and the four colour variations are divided into these two categories. These two categories are: Ontario No. 1 (this includes the colour variations from extra light to dark), and Ontario Processing Grade, which is not sold to consumers (OMSPA, 2012). However, the grade is not an indication of quality, for "all retail maple syrup sold by OMSPA [Ontario Maple Syrup Producers' Association] members has the same sugar content, 'thickness' and is 100% pure regardless of grade' (OMSPA, 2012). It is the colour and intensity of the maple flavour that is being graded and categorized (OMSPA, 2012). Currently, there are some changes being proposed to the maple syrup grading system, and the goal is that by 2014 there will be international standardization. The changes are outlined in Box #1.

In Ontario, the OMSPA (2013) provides the guidelines to maple syrup producers on how to properly label their maple syrup. This involves two pieces of Canadian legislation. Federal regulations are again intended for businesses involved with import and export on an international level (OMSPA, 2013). Thus, as OMSPA explains "any non-federally registered producer that sells maple product in Ontario must comply with the packaging and labelling requirements set out in the Ontario regulations" (OMSPA, 2013). Furthermore, the producers in Ontario must

follow these guidelines, as well as following in the Consumer Packaging and Labelling Act outlined in the Ontario Regulation of the Food and Drug Act (Food and Safety Act, 2001). The key points that are important in the context of the labelling under the Ontario legislation are displayed in table 2.

Table 2 - Maple syrup products labelling guidelines (OMSPA, 2013)

Every label on a container of maple product shall set out the following information: 1. The name of the maple product. 2. The name and full address of, i. the packer, or ii. if the packer packs the maple product on behalf of a retailer, producer or other person, the person on whose behalf the maple product is packed. 3. In the case of maple syrup, i. the volume of the syrup in the container, and ii. the grade immediately followed by the colour class of any syrup that is, A. in a consumer container, or B. in a bulk container that is being sold or transported directly to a consumer or retail outlet. 4. In the case of maple products other than maple syrup, the net weight of the product"

2.5 Geography of Sugar Maples and Syrup Production

While there are numerous species of maple trees spread out across North America and Europe, it is only the eastern sections of North America that possess the unique kind of maple trees that is typically utilized for maple syrup production. The primary species used in this industry is *acer saccharum*, or the sugar maple. The range of the sugar maple extends from southern Ontario and Quebec to as far as Tennessee (as noted in Figure 3), with the majority of maple syrup production now occurring within the Canadian region of the sugar maple's range (Maclver et al. 2007).

Figure 3 - Range of acer saccharum (MacIver et al. 2007).

This research is focused on the Ontario maple syrup production region. The OMSPA acts as the industry commodity group in the province. OMSPA has organized the province into "locals" that span across southern Ontario and as far north as Sault Ste Marie, as shown in Figure 4.

Figure 4 – Ontario maple syrup producer's association locals by region (OMSPA, 2014).

2.6 Maple Syrup Production

Maple syrup is produced from sap that is harvested from the trees during the early spring season. Producers must wait for the correct time to tap the trees since the flow of sap and the timing are very much dependent and dictated by temperature. For sap flow in sugar maple trees, air temperatures are required to be below freezing at night (<0 degrees Celsius) and above freezing during the day. The ideal daily temperature range during the late winter and early spring is between -5 degrees Celsius to +5 degrees Celsius. If this cycle is interrupted by periods of temperatures above or below this optimum range, then the flow of sap will also be affected. As days and nights warm, the sap quality and quantity begins to decrease. The cumulative effect of

10 to 15 days with highs above 10 degrees Celsius and/or 10 to 15 nights without a frost, after February 1st of each year, is sufficient to bring the sugar maple trees out of dormancy. In areas where average winter temperatures are above 0 degrees Celsius there is no sap flow and this helps define the southern limits of the commercial range of the sugar maple producing industry (Maclver et al., 2006). Once the sap is collected it is brought to a processing house, also known as the "sugar shack", where the sap is transformed into syrup.

When examining the process of maple syrup there is one constant technique that has not changed. While the tools of extracting maple syrup have changed, one must still make an incision into the tree in order to draw out the sap that is necessary for the production of maple syrup. In the earliest days of maple syrup production, notches were made in the trees with axes and tomahawks shaped as a "V" or a large diamond (Whitney and Upmeyer, 2004); aboriginal people were the first to develop this technique for drawing out the sap, which was also adopted by the European settlers. While innovative for the era, this approach often led to significant tree damage (Whitney and Upmeyer, 2004).

In the 19th century subsequent to the development of the drill bit, drilling a small hole into the sugar maple and inserting a tap to draw out the sap began to replace the notching technique. This method eventually became more widely accepted for it did not have the negative implications of the previous technique. However, it was not a technique that was quickly adopted; it is recorded that the axe method was stilled used until 1880 in Quebec (Whitney and Upmeyer, 2004). A side note is that this method, with the traditional bucket hanging off a tap, is still used today and has become the traditional iconic image of the maple syrup industry and an important part of many syrup producers' marketing strategies.

In the 21st century a significant number of maple syrup producers have moved from the tap and bucket method to using lines and centralized collections systems. This MRP targets producers who utilize both kinds of systems. Attached to the spiles are lengths of tubes, which are connected to the collection house (Clark and McLeman, 2012). These plastic tubes, also referred to as lines, are connected to other trees and spiles creating a web of lines that can span kilometers (Clark and McLeman, 2012). The sap is then drawn to the collection house in one of two ways: either by the natural force of gravity that draws the sap out and pushes it to the house, or if gravity is not enough, vacuums pull the sap down to the collection house (Clark and McLeman, 2012).

Ball points out that the maple syrup process is very energy intensive; "it is estimated that it takes about 2600 kJ to evaporate 1 L of sap into syrup". Furthermore, "it takes the combustion of 65 L of natural gas to generate about 20 mL of syrup—about 1.5 tablespoons" (2007, p.1648). This is due to the fact that 98% of the water in sap must be removed to make maple syrup, and maple sap is approximately 31% water (Ball, 2007). Even when reverse osmosis is utilized (pumping the sap through various membranes that distill the sap), it only extracts 75% of the water. There is still the need to use evaporation to remove a further 23% of water (Ball, 2007). Given the energy intensity of syrup production, and the ever more sophisticated equipment now used by the largest producers, it was important in the MRP to involve equipment manufacturers and to explore the opportunities for innovation and competitive advantage related to this aspect of the industry.

Sap production is also a highly sensitive chemical process. The sap becomes syrup when the sap reaches the measurement of 66-67 degrees Brix (Ball, 2007). A Brix degree is "defined as the number of grams of sucrose per 100 grams of solution" (Ball, 2007, p1648). An interesting

note about this specific range is that when syrup has achieved this, the syrup is 66-67% sugar, this is paramount due to the chemical composition of syrup. If the concentration is increased, the "sugar will begin to precipitate from the syrup", and if the concentration is lower microbes can grow within the syrup and ruin it (Ball, 2007, p.1648).

2.7 Maple Syrup in the Canadian Economy

In 2011 the total revenue of all maple products were calculated at $349.5 million; that number roughly translates into 32 million litres of maple syrup (StatsCan, 2011). When compared to 2010's figures, this is an increase of 20%, but the price of a gallon (approximately 4 litres) of maple syrup remained stable at "$38.17 in 2011, compared to $37.86 in 2010" (StatsCanada, 2011). However, the most productive year for maple syrup was in 2009 when the total value of maple syrup was 353.7 million dollars (Stats Canada, 2011).

This revenue is divided between four of Canada's provinces: Nova Scotia, New Brunswick, Ontario, and Quebec. Out of these four, Ontario and Quebec are the two main producers, with Quebec being significantly larger. Ontario produced roughly 1.8 million litres and Quebec produced 29 million litres of maple syrup in 2011 (StatsCanada, 2011). Quebec produces almost all of Canada's maple syrup; on the international level Quebec provides more than 80% of the world's maple products (Whitney and Upmeyer, 2004). Furthermore the largest importers on of Canadian maple syrup are Japan, Germany, and the United States (Fédération des producteurs acéicoles due Québec, N.D.).

In 2013 OMSPA commissioned a report on the economic value of maple syrup to the Ontario economy. When examining the number of jobs that this industry offers, in 2011 there were 2,755 businesses engaged in the production of maple syrup; this resulted in 1,486 full time jobs (OMSPA,2013). However, more pressing than the employment, is the potential that Ontario

holds for the future of maple syrup production. This information is paramount to this MRP, as it shows that there is a great possibility for the development of expanded production. According to OMSPA, Ontario has a vast potential for further development of its maple syrup sector through expansion on Crown land. Whereas the maple sectors in Quebec and New Brunswick have access to 11 and 8%, respectively, of sugar maple dominant forests on public land, Ontario made only 0.04% available for maple syrup production in 2011. If the utilization rate of sugar maple dominant forests were the same as in the state of Vermont (which has a maple sector similar to Ontario's), approximately 2%, about 13 000 additional hectares, could be tapped on Ontario's Crown land, which would double the total volume of maple syrup production in the province of Ontario (OMSPA,2013).

2.8 Maple Syrup Production Concerns

The following concerns are important to outline since they can impact the viability of the maple syrup industry. This MRP begins the process of assessing these issues and offers some initial opportunities to mitigate the problems.

From a human health perspective there are a few concerns that affect the quality of the produced maple syrup. The Ontario Ministry of Agriculture and Food (OMAFRA) has only been testing Ontario maple syrup producers since 1998, and during these tests OMAFRA analyses the syrup for lead, copper, zinc, calcium, iron, sodium, and potassium (OMAFRA, 2011). Unfortunately, as required by law, syrup with lead levels above Health Canada's current tolerance level of 0.5 parts per million (ppm) was reported to the Canadian Food Inspection Agency (CFIA). Several producers had their syrup detained by the CFIA as a result (OMAFRA, 2011). This problem is primarily associated with the lead present in older evaporators and is not

a problem with modern production methods (OMAFRA, 2012). The specific areas where lead could be present are listed in table 3.

Additional concerns come from the chemicals used to clean and maintain the equipment such as chlorine, machine oil, and oil based air compressors, which have been detected in maple syrup. In order to combat such instances there is a proactive approach for producers by using good agricultural practices (GAP) in the sugar bush and good manufacturing practices (GMP) during the manufacture and distribution of maple syrup. As a check of the effectiveness of operational procedures, producers are encouraged to test frequently for chlorine residues, for lead, and for other suspected chemical contaminants (OMAFRA, 2011).

Table 3 - Source of Lead in Maple Syrup (OMAFRA, 2013).

Maple sap and syrup can react with lead-containing surfaces, allowing lead to leach into them. Lead-bearing equipment includes, but is not restricted to: • Soldering (e.g. soldered seams) on galvanized equipment manufactured before 1994 • Soldering (e.g. soldered seams) on all other equipment manufactured before 1995, including stainless steel evaporators • Bronze and brass fittings • Terneplate, which is a lead and tin alloy that was used in the past to coat iron and steel sheets (e.g. old milk cans are often constructed of terneplate material and incorrectly used for bulk storage of maple syrup).

Another concern is related to insects, as Majka (2010) explains in his study of traditional methods of maple syrup collection. He states that with the traditional open bucket collection method, insects can enter the bucket. Their study found that twenty-eight species of Coleoptera, Lepidoptera, and Trichoptera were found in maple sap buckets, 19 of which are known to be attracted to saps and nectars. Most of these species are beetles, however the

important conclusion that Majka (2010) draws from their research is that this preliminary study suggests further research on this phenomenon is needed to document not only a more complete taxon list, but also to aid the maple syrup industry in controlling unwanted insect contaminants through methods utilizing the biology of the species. Thus, although the open bucket method is still very attractive for tourism and small operators, Majka raised some concern that pest and pathogen contamination can occur, and noted that there is a gap in the literature when this issue arose. This situation does not exist for the larger commercial producers who use the tubing systems. Further, it can be argued that through the filtration process such equipment as diatomaceous earth sap filters can trap insects, microorganisms and smaller particles before they enter the filtration process (OMAFRA, 2011).

Another important health issue is mold. This problem arises during the packaging or bottling of maple syrup. The most important step with bottling maple syrup is that it must be undertaken when the syrup is hot, otherwise syrup that is left uncapped for a few moments can cool sufficiently and collect enough yeast and mold spores from the air to spoil some cans in an otherwise perfect lot (Hopkins, 2010). To combat this problem the technique of 'hot packing' (packing syrup into its container at 180-200 degrees F) is used, for this allows the hot maple syrup to sanitize the container as it is packaged (Hopkins, 2007).

2.9 Climate Change & Maple Syrup Production

One of the largest threats to the maple syrup production is global climate change. The first factor and the one that can be viewed as the most important and most influenced by climatic change, is temperature. This is argued on the basis that temperature effects production on a daily basis. To first awaken the maple trees out their dormant period there needs to be a period of ten

to fifteen days where the temperature exceeds 10 degrees Celsius. This period tends to occur after the first of February (Maclver et al., 2006). If these parameters for temperature are not met there are various implications for the maple syrup producers. If the temperature is exceedingly warm this will accelerate the flowering of the maple trees, making the sap useless and bitter. On the opposite end, if the temperature goes lower at night and doesn't rise above 10 degrees Celsius the sap will essentially freeze in place (Maclver et al., 2006). This then halts operations, or if operations have yet to begin, pushes the start time to later in the spring and closer to when the maple trees blossom. This may lead to a shorter window to extract the sap (Maclver et al., 2006).

During the winter months, a 30 centimeter snow pack, surrounding a sugar maple, acts as a large blanket and shields the roots by preventing soil freezing and in the spring thaw the melting snow provides the more mature sugar maples with moisture for their roots (Decker et al., 2003). With increasing temperatures where snow is present, the snow will melt at a faster rate. Thus, Groffman et al. (1999) explain that this leads to less snow cover to insulate the soil from freezing. Lack of accumulated snow or a meltdown of the snow pack in winter can result in deep soil frost and root kill. Another element of snowfall and snow cover is the actual timing of when snowfall occurs, as this does influence the insulation of the maple tree's roots. If a continuous snowpack were to develop in December, the soil would be protected from freezing; yet should the snowpack be delayed in forming, the result is then the freezing of soil and possible root damage (Robitaille et al., 1995). The root damage affects the tree in "a reduction in both the quality and quantity of sap" (Robitaille et al., 1995).

There is also the concern that under climate change, the entire sugar maple range may shift northward, undermining traditional production regions in southern Canada. For the USA,

Iverson and Prasad (2002) report that modeling using five different general circulation models projected that the range of sugar maples from key production regions would shrink dramatically, in the next 100 years. This is further demonstrated by Lamhonwah (2011, p.32), whose models project that by 2100 the sugar maple range will move northward towards the border of the Hudson Plains where forest growth will be impeded. Areas in northern Central Ontario where sugar maples do not currently grow (the Timmins area and north of Thunder Bay) will develop conditions suitable for the growth and survival of the species within the next century. This study also found that the climate for sugar maples in central syrup production regions in Ontario, including Lanark County and the Waterloo/Wellington area, may become drier and hotter, leading to a possible decline of the species (Figure 5).

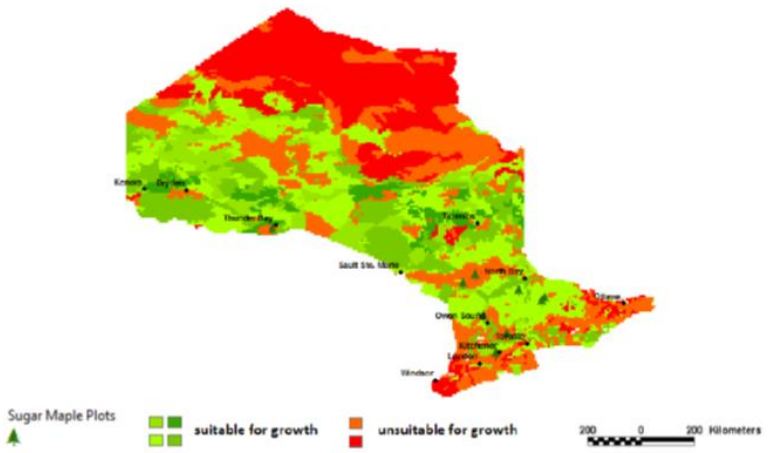

Figure 5 - Predicted range of sugar maple 2041-2070 (Lamhonwah, 2011).

Another important factor is atmospheric pollution. It was argued by Maclver et al. (2006, p.6) that increasing levels of ozone and carbon dioxide appear to have relatively lower immediate effects on sap flow compared to the impacts of temperature or precipitation. If the atmospheric

concentrations of both gases continue to increase in the future climate, this might cause decreases in stomatal conductance [the rate at which carbon dioxide or water vapors pass through the pores of the leaves] and ultimately reduce sap flow.

Another factor that can alter the sap production is acid rain. In eastern Canada there is more acid rain, which results in damaging the leaf surfaces; reducing cold tolerance; decreasing vitality and regenerative capacity; increasing susceptibility to drought, insects and disease; increasing vulnerability to climatic perturbations; and accelerating the rate of soil nutrient decline (Hall et al., 1997 as cited in Maclver et al, 2006 p. 5-6). The acid rain fall results in an increase of soil acidification. This then leads to the soil base saturation dropping along with a declining level of the nutrients that are available for the seedlings (Hall et al., 1997 as cited in Maclver et al, 2006 p. 5-6). If this trend was to continue it is "expected to result in long term declines in forest productivity and health over the life-time of the stand and increases in dieback and mortality" (Hall et al., 1997 as cited in Maclver et al, 2006 p. 5-6).

2.10 Maple Syrup Value Systems: Distribution, Labelling, and Other Maple Products

2.10.1 Distribution

This section reviews the available literature on the economic processes that follow after the maple syrup or other maple product has been produced and deemed safe for human consumption. While the academic literature is scarce, it is possible to piece together a general understanding of what the value system could look like for maple syrup production using such sources as the information provided by the OMSPA (Figure 7). This figure also benefitted from a workshop held in December 2012 involving the research team. At that workshop, some of the

key elements of the value system were laid out by the participants. This MRP strives for a solidification of what a maple syrup value system actually look likes.

As explained by Porter (1985), a value system describes the key activities in an industry. The value system begins with the inputs into syrup production including the equipment, raw sap and supplies. The noted "ecosystem" can noted as the physical environment or region where the producer is located. Once the maple syrup, or other maple product, is produced and has met the applicable Federal and/or provincial standards, the next step for some producers is to process the item into a value added product; or to sell it to distributers, large whole sale buyers, exporters or directly to the public (OMSPA, 2013). The outlets for distribution can be as follows: 1) the maple product can be sold directly to the consumer through farm gate sales or local farmer's markets 2) the producer sends out the finished product to a distributor who then sells the item to the consumer (such as a grocery store or a retail store), 3) or if the product is unfinished, it can be sent to a processor, via the distributor, where a final product is developed and then sold to the consumer (e.g. maple syrup used in bakery muffins).

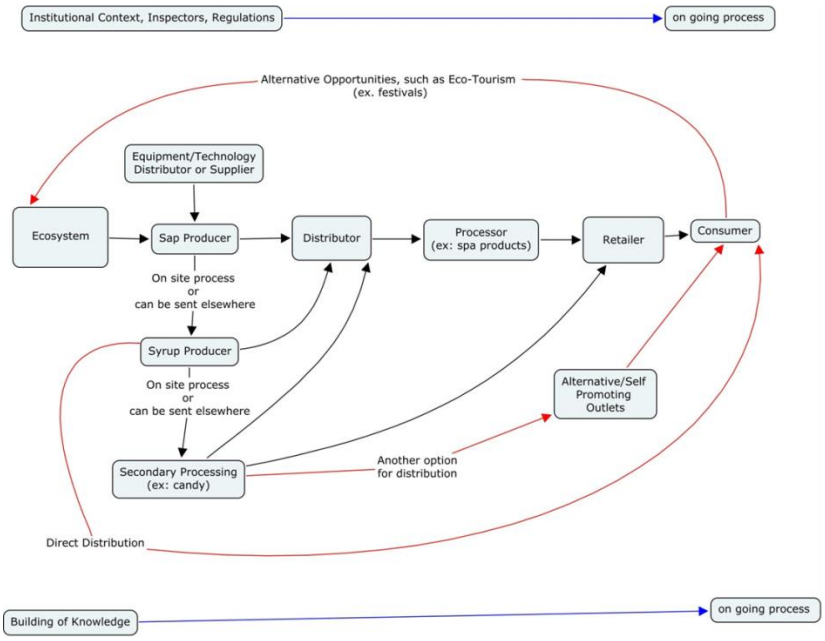

Figure 6 - The maple syrup product value system.

An additional element to consider is the other outlets that are available to producers to present their product for sale. Two additional venues where a producer can sell their product to the consumer are pancake houses and festivals. Pancake houses and maple syrup festivals are important complementary activities of the Ontario maple syrup sector. They are based on the products issued from this sector (OMSPA, 2013). Furthermore, an economic analysis of the pancake and festivals revealed that pancake houses and maple syrup festivals also play a significant role in Ontario's local economies. In 2011, they generated a total of 103 FTEs [full time employment] and $3.4 million in GDP in Ontario (OMSPA, 2013). Finally the feedback arrow described as alternative opportunities, this is to note the return of the consumers to ecosystem where the product originated. In some instances the consumers are returning to the region because there are tourist events being held, such as the mention maple syrup festivals, again this is to note the movement of the consumer back to region, not the product itself.

2.10.2 Product Development and Differentiation

This MRP evaluates several ways that businesses can differentiate their product. One of the ways that maple syrup can be differentiated is to undertake organic certification. While it can be noted that maple syrup is already naturally organic and does not require any chemical input, it can be argued that having an organic seal on the product might increase its value for some consumers and contribute to the development of a niche market (OMSPA, 2013). The term organic, refers to production that is based on principles that support healthy practices (Canadian General Standards Board, 2011). The principles that comprise organic production are listed in table 4.

Table 4 - Principles of organic production Canadian General Standards Board, 2011

The general principles of organic production include the following:

1. Protect the environment, minimize soil degradation and erosion, decrease pollution, optimize biological productivity and promote a sound state of health.
2. Maintain long-term soil fertility by optimizing conditions for biological activity within the soil.
3. Maintain biological diversity within the system.
4. Recycle materials and resources to the greatest extent possible within the enterprise.
5. Provide attentive care that promotes the health and meets the behavioural needs of livestock.
6. Prepare organic products, emphasizing careful processing, and handling methods in order to maintain the organic integrity and vital qualities of the products at all stages of production.
7. Rely on renewable resources in locally organized agricultural system.

If producers choose to go organic, in Ontario, the producer must follow the regulations that are outlined in the Canadian Organic Standards (Canadian Organic Production Systems Standards: General Principles and Management Standards, and the Permitted Substances List) (OMAFRA, 2012). Yet to obtain the actual certification a producer must contact one of the certification bodies (such as Ecocert Canada) that serve as the authority on granting certification as well as monitoring to ensure that the producer is adhering to the regulations. It may take 3-4 years before the producer is certified for the production of organic foods, and this prolonged

period has inspections to ensure the integrity of the producer: An inspection is required on farms in the year before certification and operators must apply to their certification body at least 15 months before harvest of the organic products. In the year of anticipated certification (and annually thereafter), application should be made to the certification body in the early spring to allow for timely review of the applications and to allow the CB [certification bodies] to arrange for inspections during the growing season (OMAFRA, 2012).

Another example of differentiation is that producers could undertake woodlot certification. Woodlot certification entails an inspection every five years by a third party to ensure sustainable forest management practices. These practices are ones that promote environmental sustainability (i.e. the practice of simply removing deadwood), and also social values (i.e. the practice of having a portion of land sectioned off for public enjoyment). These certifications can be used is to demonstrate corporate responsibility and in certain cases tax breaks are offered (MNR,2013).

Other opportunities to provide differentiation and greater revenue streams for producers within the maple syrup industry involve the production of value-added options for consumers. One of the more traditional maple products is maple taffy on snow, as explained by OMSPA (2013), this is the icon of the Canadian sugar bush and no trip to a sugar shack is complete without sampling this stick gooey treat. This maple product is created by pouring hot high density maple syrup directly on frozen snow creating a soft taffy texture. Taffy does not keep well over time so it's typically only available at the sugarbush during the maple season or it can found for sale at larger festivals or fairs (OMSPA, 2013).

Other important products are maple butter, maple candy and maple sugar. Maple butter can be used on toast and in baking. The consistency of maple butter or maple cream (the same product) is light and spreadable, very similar to the consistency of a light peanut butter. Its name comes from the fact that it has a "buttery" or "creamy" texture and not because it has any dairy products added to it. In fact, it has nothing at all added except 100% pure maple syrup. It is perfect as a spread on bread, pancakes, muffins, toast, and biscuits or as a dessert frosting (OMSPA, 2013).

Maple candy comes in two forms. The first is hard sugar and the second is soft sugar candy. Real, pure maple candy is a real treat with a light outer shell and a creamy texture inside. It is typically made by boiling down maple syrup, stirring it, and pouring it into molds to harden. Maple candy comes in all shapes and sizes but you will most often find it formed into the shape of a maple leaf. This delicious maple product melts in your mouth and releases a rich maple flavor almost like fudge (OMSPA, 2013).

Another product is granulated maple sugar that can be used as an alternative to white or brown sugar: Granulated maple sugar is the most versatile product that is made from maple syrup. Because it has no available water, this product is totally shelf stable, it will not separate or mold. It can be stored indefinitely at room temperature and with proper packaging and moisture control will not lose its granular nature. It can be used in recipes as a replacement for brown or white sugar on a one for one exchange by volume or by weight and is the healthiest of all available sugar types. It can also be used as a topping on cereal, placed in sugar straws or used anywhere other sugar would be used to add flavour or sweetness. The flavor of many products is enhanced by using maple sugar in place of white sugar and is especially valued by many consumers for its natural and sustainable origin (OMSPA, 2013)

The above products are more traditional value added products, yet there are now additional value added products that move beyond these. For example at Fulton's Pancake House and Sugarbush, in Eastern Ontario, there are alternative products offered such as: maple mustard, maple BBQ sauce, and as well as spa products (lip palm, body butter, body lotion) that are created from the maple sap or forms of maple sugar (Fulton's, 2013).

3.0 Methods

Although many other agricultural industries have undertaken value chain/system analysis, there still a gap in the academic literature regarding the maple syrup industry. This MRP has pieced together a partial picture of the maple syrup value system. However, there is yet to be a definitive understanding of this system, and it is this gap in literature that the MRP will address.

This project uses qualitative methods, specifically interviewing techniques. According to Kevin Dunn (2010), there are four main reasons that scholars use interviewing as a method: to fill a knowledge gap, to investigate complex behaviour/motivations, to collect a wide range of experiences, personal opinions, and meanings, and finally when a method is required that shows respect for and empowers the people who provide the data. The one that is most suited for this research is the idea of filling a gap in knowledge (Dunn, 2010). As previously stated, there is a very large gap in the academic literature concerning the mapping of the maple syrup industry value system. Thus, it is ideal to make contact with the individuals who work within the Ontario maple syrup industry, and discuss with them the areas representing gaps in the literature.

There are two kinds of interview approaches: structured and semi-structured. This MRP uses a combination of both these techniques. A structured interview is one with a rigorous

structure and strict interview guide to be followed. Structured interviews are useful when the situation call for more of a formal approach, time is limited and specific questions must be answered. When it comes to structured interviews some researchers may find comfort in the rigour and patterns that are presented with structured interviews, yet this approach also has limitations. First, because of the way that the structured interview is designed there is a lack of flexibility and the process is "question-focused" (Dunn, 2010). Without this flexibility there can be gaps or missed opportunities to travel deeper into a comment or answer given by an interviewee. Furthermore, with a closed ended question the interviewee only has a pre-determined number of options for an answer which might not cover the range of possibilities.

A second observation given by van der Zee et al., (2002) is that it has been suggested that in structured interviews important interviewer needs are frustrated, such as the need for autonomy and the need for power…whereas an unstructured interview could offer challenges and autonomy. In other words, it can be viewed as a researcher dominated interview. The power of the interview lies in the hands of the researcher and the interviewee is simply there to provide answers and no further insight. As well, van der Zee et al., (2002) continued this thought, in that the researcher giving a structured interview may be seen as a more cold and calculating individual. This persona may have adverse effects on the results, due the researcher appearing to be the opposite to what interviewee would want to see, that interviewees "are more favorably disposed to interviewers who are attentive, warm, and socially perceptive, and unstructured interviews allow the communication of these qualities better than structured interviews" (van der Zee et al., 2002, pg 1).

Despite these drawbacks there are positives with structure interviews. The researcher develops and follows a specific guide that consists of a list of questions and topics that need to be

covered during the interview. A structured interview also allows a great deal of information to be covered in a short period to time.

For semi-structured interview, like a structured interview, the researcher follows a guide, but is able to improvise and move away from the guide (Cohen and Crabtree, 2006). These are ideal when, there is sufficient time and there is a need for questions to be answered with additional details and perspectives.

Unlike structured interviews, where the roles between the researcher and the participant are quite simple and to an extent more formal, semi-structured interviews are conducted with a fairly open framework which allows a conversational and two-way communication (Keller and Conradin, 2010). The researcher follows a guideline, but may stray from it as appropriate. Not all questions are designed and phrased ahead of time; questions are often created during the interview (Keller and Conradin, 2010). This allows the interviewer and the participant the flexibility to venture into details when desired (Keller and Conradin, 2010).

Semi-structured interviews allow the researcher to change the order of the questions or the way they are worded. The researcher can omit questions that may appear redundant (Keller and Conradin, 2010) or not applicable to the situation (Cohen and Crabtree, 2006). The aim of the researcher is to get the participant to talk freely and openly while the interviewer gets the necessary information (Oatey, 1999).

Since semi-structured interview encourages two-way communication, those being interviewed can ask questions to the interviewer (Keller and Conradin, 2010). In this way, these interviews can serve as an “extension tool”, where there is the confirmation of knowledge from the researcher’s side, but it also brings attention to other elements that may have been missed or

unknown to the researcher (Keller and Conradin, 2010). Information obtained from semi-structured interviews will provide not just answers, but the reasons for the answers.

The interview guides created for the interviews conducted in this project are divided into 3 parts, with each section and questions designed for producers, experts, and commercial producers (see Appendix A). The first discusses the general information about the producer's operation, how long they have been producing, number of taps, who is employed, etc. The second brings in the value chain literature, asking the producer specifics about their production (i.e. technologies used, most time/costly procedure); as well as asking about where information was procured and if the producer has certification, and as well as the trend of their sales. The final section discusses broader social and cultural values about maple syrup production, such as environmental protection. The closing question asks the producer what they would share with the people Ontario if they had the chance to promote the maple industry.

3.1 Semi-Structured Interviews

15 interviews 1-2 hours in duration were conducted. Those being interviewed were non-Aboriginal maple syrup producers as well as other key informants involved with the value chain process, such as equipment suppliers. All interview were people whom operate in Ontario. The criteria on who was selected are as follows. First is the location of the individual industry member. All general areas of Ontario were covered (North East, North West, South West, and South East). Second, producers representing a range of sizes based on the number of taps were interviewed. Third, the producer's place along the value system was considered. While the majority of producers did most of the process "in-house" and mainly focused on farm gate sales, there was a successful attempt to contact producers who also deal with value-added products, as

well as the international market. Fourth, if not a producer than an "expert" within the field, these are individuals who have studied the maple syrup industry or an element of the industry, such as the maple trees. Two experts were consulted for this research.

When the interviews were completed and recorded (via audio recorders), the interviews were then transcribed in Nvivo, which is the second-generation on non-numerical qualitative analysis software. The coding process began with the semi-structured interview data. Within the coding process, the focus was to look for common reoccurrences, terms, and experiences that will allow a proper mapping of the Ontario maple industry value chain. Coding steps followed Dunn (2010). The first step was to develop a preliminary coding system, using key themes or words. This was based on the key ideas outlined in this MRP. The interviews were then transcribed, then read and coded using the developed themes.

3.2 Contribution to Scholarship

Due to the lack of academic knowledge within this area, this MRP is able to provide to researchers, and the research community, with important new insights, as well as foundational knowledge, on the maple syrup supply chain and production process. In terms of the overall project, this provides the baseline to continue the rest of the intended research. Furthermore for participants and others involved with the study, this information will contribute to wider understandings of the production process in terms of increasing value and networking capabilities.

4.0 Results from Interview Data

The data from the semi-structured interviews with fifteen informed participants are explained below. The results of the interviews have been categorized into seven subsections, five of these sections are in accordance to the Five Competitive Forces developed by Porter and explained earlier in the paper (Suppliers, Substitutes, New Entrants, Industry Competitors, Buyers). The remaining two sections are the Change, Opportunities and, Challenges, and Social/Cultural values themes. Please note that identifying information has been removed from quotes, whenever necessary.

4.1 Suppliers

Since maple producers arguably perform most of their operation on site, an important element is the equipment they use at their location (items such as reverse osmosis, evaporators, packaging, lines/tubes, labels etc.). The role of supplier is to help establish the essential framework for the various operations that are undertaken at a sugarbush. However, aside from the supplying aspect of these businesses there is another role that suppliers in the maple syrup industry perform. The additional role that that is provided is research and development, the larger supplying companies often have a department dedicated to this. The interviewee who was employed by one these large companies, explained that the company is constantly creating new innovations, an example was a touch screen interface on evaporators.

On a whole, the producers who were interviewed engaged with supplies that are local to them, but sometimes not the same the supplier. Some respondents noted that they contact different suppliers to "spread the debt around" or to "keep them honest", suggesting that the producers do examine the pricing of various suppliers and do what they can to get the best deal and keep their costs low. This is of course can be expected, however, there is no distinct supplier

that stands above the rest. Interviewees noted that the suppliers are often farmer or distributors of the larger names in the maple syrup equipment business. Regarding larger equipment suppliers, Ontario seems to be at a disadvantage, as pointed out by an interviewee:

"the problem for the Ontario producers is that we are far away from the equipment dealers. And the equipment dealers are mostly in Quebec, the big dealers that make the equipment and know it all, and they have so many big customers in Quebec"

Yet, distance may only be a problem with "brand name" equipment, in instances of custom made equipment or specialty equipment/products, producers suggested that they attempted to stay with local suppliers. One interviewee commented on having a friend in Toronto who constructed for him a custom made pan.

When questioning the interviewees about the equipment used at their sugarbushes, the majority of producers used the modernized equipment that greatly improves production. These pieces of equipment included: lines/tube, reverse osmosis, and commercial evaporators. These three items were the essential equipment needed for large commercial production. However, for smaller operations, there were some producers that still used the buckets and spile method. In addition there was mention of other equipment such as: pressure steam boilers, steam evaporators, wood fire starters, and filter presses. These additional items were used for either cost cutting, wood fire starter (such as wood pellets) instead of oil/gasoline; or used in the final stages of production like the filter press. What can be taken as the main point from the interview results is that modernized equipment has become more wide spread and has replaced the older methods to some extent.

4.2 Substitutes

While the issue of substitute products for maple syrup was not discussed to any great extent, there was one interviewee who addressed the issue eloquently with a few comments:

"I have nothing against those other products at all, but they are much less expensive to buy. Maple syrup is expensive -but you really have to like it to buy it, like you're going to buy yourself a treat, a lot of people will do that buy a small container ; because that's all they can afford. And I can see their point, a lot of people are buying Aunt Jemima, the table syrup cause that's all they afford"

This is a topic of Porter's model that will need to be investigated in more detail at the next stage of the larger research project.

4.3 New Entrants

It can be noted that all of the producers where involved with maple syrup production from a young age, because their family members had been in the business. Thus, for these producers there was no initial barrier for new entrants, because they were entrenched in the industry from an early age. As well, there was general consensus that one of the largest costs for this industry are the initial capital costs including the purchasing of land, the establishing of a sugarbush, buying of equipment, and building a sugarshack. Producers never explicitly talked about "new entrants", instead the terms "future generations", or "kids" were often employed. The concerns raised by some of the interviewees were the fact that the future generations, in some cases, were not interested in maple syrup production. This is another topic that needs to be more fully explored in future research.

4.4 Industry Competitors

An industry is not without internal rivalry, or industrial competition, and within the maple syrup industry there is a great drive to increase the market. This then makes the internal competition more noticeable, for the gap between the producers who are able to expand their operations and those unable becomes very clear. An aspect that often dictates what side of the gap a firm is on is related to information. When the question arose asking what kind of information, in general, would be beneficial if a producer were to expand their operation, there

was an overwhelming response suggesting the need for information concerning marketing strategies. There were other types of information being sought out, including value added and production; some even stated that they needed information about everything because they were in the process of expanding. However, the request for marketing information was dominant and related to both domestic and international markets. As explained by one interviewee:

"…for us specifically we got production down, we've done value added we are working on it. Marketing right now is-we are working at it and it's going really well, we just went federal in terms of being inspected so we can export. So we have a whole slew of things to learn about exporting, and that's where we are going to focus our minds for the next couple of years, the world wants our product, it's just a matter of getting there."

On the other hand when the interviewees were asked about what specific rules and regulations, that they would be interested in learning more about, the response was different in that there was not a strong opinion about one certain type of policy or regulation. It varied from financial assistance in general but most often for expansion of a sugarbush to food safety. This latter concern is important for producers as they are selling food, and if it does not meet the required standards their business will not be viewed in a positive manner. If their product had to recalled, this would impact profits as well as reputation. Another area of information mentioned was related to regulations at the international and national levels, in order to expand businesses, such as the health and safety of other countries, as well as the requirements to sell overseas and across Canada. An interesting comment was made about the rules and regulations surrounding the opening of crown land; with permission from the government to tap sugar maples on government land there would be an increase of production of syrup, though the individual was just hypothesizing about crown land. Yet, there were a few producers that had similar responses, in that there was no specific area that they were seeking knowledge. This was explained by one

interviewee, when discussing rules and regulations. He stated "that's one thing we have to be up on, on a daily basis, we have to know", suggesting that a majority of respondents felt that they had a firm grasp on various rules and regulations that govern production.

While there is information available for the producers, the question that was posed to them was, from whom do they obtain such information? When the respondents belonged to OMSPA, the response was pretty consistent and is captured by this interviewee's response:

"We are a group of people who are willing to share ideas and stuff, and that's why we come to these summer tours. Like here we learn all kinds of good stuff today, some summer tours we don't learn as much, other years we learn quite a bit. So that is why we come to things is to pick up ideas"

In addition to these conferences, both OMSPA and non-OMSPA members found great value in communicating with fellow producers in casual ways via of the phone, email, even going out to each other's sugarbush to share knowledge. As Shirley Fulton-Deugo of Fulton's Pancake House & Sugar Bush Proprietor put it*, "we communicate directly with one another as well. Like you can call someone and say 'hey, how do you do this, because it's not working'"*. It was clear from these interviewees that this ongoing communication promotes a tight knit community within the maple syrup industry among producers. As one producer stated:

"The big producers, there is a certain competitiveness, see ya always want to have the best syrup. But there's also friendship with every producer that you know, they are all hard working people".

This extends to the point that if needed producers will contact other producers, in order to get information or help with production, or trouble shooting equipment issues.

It would appear that the notion of a tight knit community is a foundational relationship for the industry. Within Ontario, at least, this seems to contravene Porter's Competitive Forces relate to Industry Competitors; evidence from the interviews suggests that there is not strong

competition between producers within Ontario. One comment encapsulated a widely held view about the industry in Ontario:

"You don't need to compete for markets because there are all kinds of markets for product in Ontario, yeah it's not like Quebec, where you have producers on every street corner, every farm has a producer. The competitiveness out there [in Quebec] is unbelievable, they couldn't market their product if they wanted to, there's just too many producers"

That said, there was one situation where two producers did take note of the challenge of having their sugarbush near a larger producer, with one commenting that "they [the larger producer] are in every store in this whole area, 'cause they have so much, it's hard to get good sales". While, this is the only real concrete comment about competition, product differentiation is often an element used by firms to gain a competitive advantage. One way of doing this can be through certification. When it came to certification there were different opinions. Some interviewees did have certification, one in particular had multiple certifications due to the interviewee's international trade relationships:

"we are organic certified, plus we are {X foreign country] certified as well. Which is a lot more problems than the organic part, because they require more. We are CFIA, the OMSPA one used to be called the seal of quality, we are that as well"

Yet, while there were many who didn't have specific certification for their maple syrup, some had farm plans because they had already established farms, and maple syrup production worked in conjunction with their farming operations (such as beef, cattle, corn etc.) during the off-season. Many viewed certification, organic certification for example, as too costly and a large time investment. When asked specifically about organic certification, the most common response was that there is no need. Respondents felt that maple syrup is 100% natural and healthy, as captured by this quote from one interviewee:

"it is one of the most healthy sweeteners available, and it tastes good, and it's a hundred percent natural, 100 percent local. Very vibrant part of Ontario, of Canada, or North America, the Canadian flag has a maple leaf on it that tells you everything. It's truly Canadian"

Interestingly, a constant idea expressed by interviewees was that membership in OMSPA was itself considered a form of certification, in part due to the high standards and strict following of regulations that is required of members. This is likely due to the regulations and policies that OMSPA promotes in terms of the quality and safety of syrup production. This would suggest that the policies and standards supported by OMSPA are an important mechanism throughout which the Ontario maple syrup industry maintains the high quality of its products.

However, it is important to note that even while there are claims to there being markets, there are still producers who cannot sell their entire stock and in turn have to store their product for the following year. Some explained that storing some of the maple syrup for the following year is a good foresight, because there is no true indication of what the following year's yield will be like. Yet on the same note, the producers that were claimed to be storing their product were not doing so because they were planning ahead, but because they were unable to sell their product. This again goes back to the drive to increase markets for maple syrup. Some producers still felt that there should be more research done to expand the market, or to help aid producers to get their product known or to the market. This shows the internal industry competition, for those who did have resources for international/provincial trade they were able to find markets to sell their product, thus making the ones who did not have the resources at a loss.

4.5 Buyers

Consumer spending choices are a key factor that determines the success of a producer; when interviewee's discussed various aspects of their production the role of their customers inevitably arose. As noted by an interviewee the pricing of the product often varies by region,

and is discussed by the producers within the region. OMSPA members are divided into their regions, and these regions have meetings to discuss various elements of the industry. Discussions about pricing are designed to inform OMSPA members about what is thought to be a fair price for syrup within the region, considering consumer demand and production costs; the concern is that very low prices by one producer can affect the prices that can be charged by others. However, ultimately each producer sets their own price based on their costs and market demand.

One of the more predominate comments from respondents was related to marketing and the role of the consumer. While producers advertise when they can, it became abundantly clear that their clientele have a crucial role in marketing, through word of mouth advertising:

"it's a branding thing, we advertise and because we have people there, we sell a lot of syrup so as it gets out there, people talk about maple syrup, it's almost an automatic that they come to us. And that's part of marketing"

Upon further discussion interviewees who were producers revealed that much of their clientele has been built up over the years, and for some, the clientele has been built up from the previous generations of producers. A related notion expressed by interviewees was the idea of building relationships founded on trust with consumers:

"relationships with your consumers, and then relationships with business are very important too. They need to know where you're at and you have good product, you stand behind it, you guarantee your product; if there is a problem-like in our area we are known, the people know the family name cause it's been there for X years and they trust it-so that's one thing you really have to work on to maintaining that trust. If you don't have that, your business can go downhill, in 1 year you can lose everything"

When questions about expanding their operations, obtaining new knowledge, or understanding other policies or regulations were asked, the need for marketing was a common

response. One interviewee, in contrast to the view expressed earlier, provided some insight, explaining:

"*most of us could tap more trees, and we don't have a market for syrup. If we had a better market at a better price, we could sell syrup in say lower Ontario as the same price we sell here. We'd still have to go bulk you know so you can break even"*

Thus, some producers have turned to selling in bulk to large buyers to sell their syrup, and even to the point of selling in international markets. While this seems to contradict the earlier notions of a tight knit community between producers, these interviewees are located in areas where there is an abundance of producers, which creates a more competitive environment. In order to combat the issue of limited markets in the local region, one interviewee explained his reason for going international:

"China and big markets, like we can't sell anymore down there [Lower Ontario]*, but there are a lot of people buying, but there's a lot of syrup produced. They have to get into other countries. Otherwise we going to end up with lower prices for bulk, and people who are using oil are not making any money, and we are using wood so we are a little better off. And prices for bulk are getting pretty low, losing a dollar a year"*

4.6 Changes, Opportunities, and Challenges

4.6.1 Technology

When consulted about technology used for production, interviewees often commented on how much technology has advanced, more often for the better. These advances greatly aid in making production more efficient. As one interviewee stated, "every year I say 'they'll never think of anything better than what we have now' and it just keeps going. It's always something new that works better, every year it keeps evolving". This was further promoted by another who explained:

"well 30 years ago my dad he had X taps on his production, and that was a full time spring job for him. I have X taps and I have a few more people working for me but, basically you could do it yourself if you had to. This technology has abled us to increase the amount of production"

Others compared the modern advances to older technology and the impact this has had on the need for labour:

"there were fewer young men working in the bush that were able to work somewhere else during the breakup then come to the sugar bush. So that's when we decided to start modernizing and install lines. Install lines and the same time we knew we had to change the equipment to accommodate the sap increase, after having talked to several producers we were aware that production, would go up and we were quick, and in the place and the time, would accommodate. We couldn't boil like 450 gallons of sap at all back then. With the equipment that was there we could boil maybe 150. So we had to modernize"

The modernization of such production was also pointed out by researcher Tom Noland of the Ministry of Natural Resources and Forestry, who explained:

"when I was doing the research producers went from standard spiles to the smaller spiles, and looking at the research done on these smaller spiles…they tend to get better production when they use a vacuum system line versus just regular buckets. If you do the vacuum system correctly you get a higher production because you're pulling a vacuum on the tree and that will apparently get the last little bit of sap out of the tree more so than a bucket system"

As well, other producers have turned to steam powered and wood fired evaporators to save on oil and energy expenditures. It was especially noted that many interviewees use wood fired evaporators, because when they are clearing out deadwood or other management techniques they collect the timber and use it for wood powered equipment.

However, one interviewee did raise a point about the modernization of the maple syrup industry. When asked if the technology was for better or worse he responded: "[it's great] for the betterment of the quantity of the season but I am also guessing there is a level where we should

slow down and take care of the trees". This comment resonated with a statement made by Tom Noland:

"The research I did see suggested that the smaller spiles were better for the tree because it caused less damage to the tree and it heals up faster. But what I did look at in my research was how fast the tap holes were healing up afterwords and whether there was an effect of how much damage to the tree had on how fast the tap holes would heal. So, I think smaller spiles, with their smaller diameter are better for the tree in terms of keeping out rot and promoting faster healing. Plus, if you've seen the wood from a tree that has been tapped multiple times, there are all these dark spots where the tap holes were and the rot gets into the tree, just because you introduced a wound that allows a decay organism to get in"

These comments demonstrated that there are both perceived benefits and drawbacks to technological modernization.

4.6.2 Production

One of the issues faced by producers was the ability to obtain hired help. While most producers have family to aid with the production, there are some situations where hired help is a necessity. However, the difficulties associated with hiring were pointed out by an interviewee:

"I have on and off hired people; it's not really that big an operation that we can provide anyone with employment that is worthwhile. I need them for one day then next week I need them for 4 hours…it's hard to get people like that 'cause they are looking for more work than I can give them"

However, there are other instances where the situation is the complete opposite, where production help is not a challenge to obtain:

"what we find is that your average retired guy that still wants to do something, but doesn't want to work all year, we target them and we target students for more the tourism end of things. We haven't had a whole lot of trouble finding help"

While there are variations in the responses regarding production help, there seems to be a consistent thought about hiring the younger generation versus the retired generation. This was pointed out by an interview when comparing the two:

"they [young people] are looking for full-time employment, this is seasonal. Retired guys they are already-they are just doing something to pass the time and spring time they have nothing to do. So they work in the spring time and the fall, summer they have off, winter off too if they want to go to Florida"

As well another interviewee's remarks reflected this situation, especially in relation to skilled labour:

"if you put it in perspective…so it's March - April so all your summer students are out, that doesn't work. We get co-op students all the time wanting to come and work on our farm and learn about it during July, August you know? So that's what I mean by challenge, anybody in March, April that are any good already have jobs, and we get part timers between jobs. It's no problem getting general labour to, you know, chop wood all day, but that's what I mean about skilled help, someone who knows how to actually tap a tree, someone who actually knows how to put in your tubing. They are already doing syrup themselves and they're busy"

Moving away from the theme of production help and focusing on the issues of costs, there are again varying opinions. When discussing key costs or largest investment in their operations with producers, interviewees made the assumption that the initial capital investments were the largest costs. Since this was not an issue, this initial cost was disregarded and led to the focus on yearly key costs for their production. While there were some consistent costs, the three key costs that were always mentioned by interviewees were: fuel, containers/packaging, and labour. These three represented costs that are invested in regularly. In regards to fuel and energy costs, the monthly expenditures refer to hydro bills and the purchasing of oil or gasoline or in some cases wood pellets. In regards to wood producers utilized the deadwood form their sugarbush. In terms of packaging and containers, once the season begins and sap is being

collected, the final product must be stored and/or bottled to sell to consumers. There were also some unique responses regarding key costs due to the interviewee's particular situation. One producer buys syrup from others producers and then sells this larger volume of syrup on the market. In his situation he explained that buying the syrup, just in volume was one of his key costs. Another interviewee brought up the cost of replacing broken equipment, or as he described, when asked what his key costs where: "me breaking toys". Another outlier that was mentioned by a producer was the cost of taxes, but that incident was unique due to the producer being taxed as an industrial site.

4.6.3 Environment/Health of the Sugarbush

When asked about the challenges or changes related to the natural environment or the impact of climate change on a producer's sugar bush, there was more of a focus on weather variability rather than climate change. As one interviewee stated:

"challenges are definitely the weather, at the end of the day when it's all said and done, the weather is going to tell you how much you're going to get. And that's not just at harvesting time, that's happening right now. It's all geared towards the tree's health and what the tree does. This weather during the off season is equally as important as getting the right weather in the spring, so that can up and down your yield, you do double on a good year, or down to 30% on a bad year, so that's a major challenge"

The role of weather is further commented by another interviewee:

"yearly, it's the weather. 2 years ago we made 18-1900 gallons of syrup, this year we made 3100. The volume of syrup is directly related to the weather. So that's the main challenge, is you can't control the weather, but you can improve the bush and that's what we are trying to do. The new bush will be a better, more productive bush now because of the data we have now, compared to 15 years ago. Technology then is much different than technology now. So we are going to get better production per tap out of the new bush than the existing bush, and eventually the existing bush will be redone to get a high production"

However, climate change was not completely ignored, Tom Noland of the Ministry of Natural Resources and Forestry noted:

"with climate change, the optimum area for maple syrup production is moving north. Used to be in the states, now it's in Canada, and it's moving north with climate change at a certain speed every year, so the major challenge to maple syrup production is where is the sweet spot going to be in terms of the weather patterns for production. Because weather in the late winter and early spring determines how much sap production and sweetness that you get. And so that optimum weather of just below freezing during the night, just above freezing during the day, over a period of time that doesn't get too hot, doesn't get too cold, is really the sweet spot in maple syrup production. And that's going to be a challenge for maple syrup producers, there's not much they can do about it but it's something they have to be aware of. And adjust to it in some way, such as having trees bred for a higher sugar concentration in the sap, so even if they get less sap, they can still get good production of syrup"

Producers were also asked if there were any challenges or changes with the health of their sugarbush. From the conversation with the interviewees there seems, as of right now, to be no explicit evidence of climate change on the sugar bush. When asked, one interviewee explained his views by commenting on the yearly periods of sap flow:

"I am not too sure yet. Like we have made syrup in February, that'd be like 10, 15, 20 years ago. We did that in February, this year we boiled to the 27th of April; we boiled to the 29th of April a number of years prior to that. Our season, I always say it starts March 15th give or take a week, it's still pretty consistent last year we started on the tenth of March, this year on the 8th. Last year we were done on the 22nd of March just 'cause we got summer in the middle of March last year and we were all done, this year we went to the 22nd of April.

Another interviewee made note that while he was unsure of the climate change impacts on his sugar bush, he noted that damage from equipment was affecting the health of his sugarbush:

"we can't say we have, my father in law has been there since 1950. Even he can't say the trees are dying more than they use to…what we find is if you damage a tree, it is prone to disease and will die. Like depending on the equipment that you are using in the bush, we this year tapped an area that hadn't been logged, 25-40 years ago, and you could see the trees that had been hit by a skidder or not, and hadn't been cut and hadn't been damaged by machines, and they were diseased; and we had to take them out. They were dying or dead or severely deformed. Because they had been rubbed by a skidder, rub by the logs the skidder draws behind it. As far as dying off, that's what I see most is damage from the equipment"

Another factor mentioned by a respondent was that was about invasive species:

"The only thing we have noticed is ash borer, not the maple trees, but a couple of them have died off due to the ash borer, so we just harvested those out. We 're going to harvest them anyways because they were about to fall over, which affects our lines, we just take them down in the off season that way they don't do any damage"

4.7 Social and Cultural

Throughout the interviews with producers one element of their production became very apparent, in reference to social and cultural values. Most of the producer's operations are family businesses:

"yeah well like I said my family, my father made syrup, my brother makes syrup, syrup is in my family. My two daughters, my son is in X he's a computer guy so he doesn't get involved, but my two daughters are very involved, the way we work it's a family business. Kids help out lots; they are probably planning on taking it over"

In some cases some producers have inherited or taken on the business from their family members, for example, as one interviewee explained:

"My father-in-law decided he was going to retire slowly, so he offered me his share of the sugar bush, and it has always been a part of our life. 200X was our first production year, 200X we bought our share, and went in as partners with my relative and from 200X on we started making changes in the sugar bush"

The same interviewee continued to explain that, in his situation, earlier generations began the production of maple syrup, continued to stay on as staff and still have an important impact even after the business was passed on:

"but a lot of the sales are due to the father-in-law, he is not a shy person he is a good salesman . He'd go door to door and sell the maple syrup. He was the only one in the family who was not shy and was open to the system, and he marketed most of syrup for the operation. At one time

this operation used to be her [interviewee's wife] grandfather's along with his son's, they were all farmers or they worked in the bush, so in the spring time they had spare couple of months to break up from working in the bush and the farmers had a couple of months that were slack for planting season. So that is why they started to do the maple syrup"

Another interviewee explained that due to the family's history with maple syrup production, it has become an important part the interviewee's life: *"I love it in the sugar bush, it's a part of my life, it's a part of my fabric"*. Interestingly, these comments do contrast with those of other producers who were worried that future generations might not be interested in maple syrup production.

The last question that was asked to interviewee's was: if the individual had the chance what would they tell the rest of Ontario about the value of the maple syrup industry and why it should be supported? Predominantly, the interviewees talked about the 100% natural element of maple syrup:

"the flour , the corn or whatever, they are putting pesticides or whatever. From that they are having problems too, well it's not pure anymore. Only thing we do is drill a hole and suck the sap out, and we don't use any preservatives to keep the hole open or anything like that"

Some interviewees also noted the health aspect of maple syrup. As one stated: *"Also maple syrup has a low glycemic index, it's the best, healthful, sweetener on the market"*. The interviewee's wife then added: *"and there is research being done that syrup in its finest form…has plenty of antioxidant properties*". While the natural and nutritious value of maple syrup is extremely important, there are other interviewee's who spoke about the intangible values of maple syrup. One interviewee, an immigrant, explained the importance of tradition:

"it's tradition, nobody should let tradition go…the best thing is community and getting outside, teaching children..it's hard to say cause it is many thing to me. You cannot, should not lose the way maple syrup is made, it's a feeling you know. You should not take all the trees down you're gonna miss them, and you take the tree down-think about it- it's going to take you 50 years to

regrow that tree. And if you're keen on doing it, and you're supported, and know how to do it, there will be trees in the future. But yeah it's a feeling…looking at it you Canadians don't have a huge history….and what you have got you should protect…"

The element of tradition was noted by another interviewee; however their main point was the renewable aspect of maple syrup production:

"I guess its tradition to begin and was a hobby then became a business. I think in general, if we can look ahead 50 years the world is going to be running out of food, in Ontario alone we are looking at millions and millions of tappable trees, that every year will give you a massive food supply. And we are not using it. Its renewable, its green, it comes back every year, and we are not harming the land. And I think it's the future. It's gonna have to be at some point, I just don't know when"

Another conclusion was from Shirley Fulton-Deugo, who is also a grandmother, was able to provide insight into other intangible values:

"ok the value of maple syrup is, as we have seen the economic value, it's getting bigger and bigger. But, more important to me is the social value of family, community, community meaning staff as well. I get great satisfaction of having teenagers get their first job from me, great satisfaction bring women back to the workforce after being home with their children; or retired women, a job because they are bored now that they are not working full time. Values of stewardship, of caring for the forest, the value of having my grandchildren work beside me, learn how to stand in-front of a microphone with the media and do a good interview. Being able to talk to anyone who comes on the property, those skills they take them everywhere in their lives…

For this interviewee final thoughts were ones of human emotions and of the future:

"I hope that we can instill this love of our business into our next generation that they don't look at as a financial opportunity, because it's farming and because it's farming the financial opportunity within it can be unsure because of the weather. And so I feel that if our next generation looks at it only as a financial endeavour they may abuse our trees. A lot of the information they have given on the, as far as production, we have not followed; because we are not in it to produce this year, we are in it to produce from a 100 years from now. Which means we keep our trees healthy, so I guess that's the other piece of information, we have all kinds of experts and research; take them all with a grain of salt. Run your business from your heart rather than your head and look after your trees because they are the basis"

5.0 Discussion

This section analyzes the interview findings in concert with insights from the literature review. It is divided into three sections. First the analysis focuses on the strengths within the maple syrup value system, including key linkages that increase industry robustness. Second, the areas where there appears to be challenges within the industry are identified, as well as observations from the interview data that offer potential remedies or solutions. The final section is a critical analysis of the original value system model developed for this project. Based on the interview findings modifications to the system model are suggested.

5.1 Strengths found within the Maple Syrup Value System

When examining the research data there are some elements that can be noted as strengths. First and foremost is the ongoing innovation within the industry. The technological leaps that have been made within the industry over the decades were a recurring theme in the interviews with producers. This is arguably one of the greater strengths for the industry as a whole. This innovation greatly parallels Porter's (1985) conceptualization of the idea that through technological advances a firm can gain a competitive advantage. The ever advancing equipment and tools, as well as techniques, further develops the industry making it ever more effective and efficient. Those producers who choose to update their operations with the latest technology such as the upgrading from buckets and spiles to using lines and tubes, are able to reduce some elements of the labour intensive nature of maple syrup collection. This technology has allowed producers to cut down the number of staff required and the time needed to collect the syrup. Other technologies such as the reverse osmosis, efficient and food-safe evaporators and processes, and holding tanks, are also technologies that allow the operations to run smoothly; this

means that there is less need for constant observation and tending of the operation. For example, buckets need to be inspected regularly to ensure that they have not overflowed, by switching to lines the sap is collected at a central location and kept in a large holding tank. The technological advances have allowed yields to increase and has equated to increased output of maple syrup from the producers. These increasing yields are especially notable when considering that producers involved in previous research have indicated that weather variability during the production season has also increased (Murphy et al. 2009, 2012). This suggests that technological innovation in the maple syrup industry is also contributing to climate change adaptation.

Interestingly, what can also be noted is that while the conveniences of technology have greatly reduced the demand for physical labour, there has been a corresponding increase in the need for technical knowledge to operate the production systems. While this information is available, producers must actively seek it out from equipment dealers, through organizations such as OMSPA or from government authorities. In addition, as noted by one respondent, Ontario's distance from the headquarters of the key equipment manufacturers in Quebec and Vermont can lead to issues in obtaining answers to specific niche knowledge.

As noted in the results and literature review sections, technological innovation is driven by an active research and development sector both within the equipment supply companies and the industry-focused research institutes located in both Quebec and the United States. The work in this sector is also supported by both OMSPA and NAMSC who, despite modest budgets, dedicate funds to research each year. The research and development sector is important not only for the equipment supplier's value chain, but for the maple syrup industry as a whole. At the firm level, the investment in research and development is part of the strategy for developing a

competitive advantage. For example in 2013 two members of OMSPA were awarded the Premier's Awards for Agri-Food Innovation Excellence (OMSPA, 2014). The first innovation was a tap and tube wireless monitoring system, and the second was the utilization of the bag-in-box method of transportation of maple syrup, much like boxed wine (OMSPA, 2014).

Referring back to Carpenter & Sanders (2009), the large equipment suppliers are investing in support activities to glean a competitive advantage; this advantage results in differentiation of their product, and as well as the advancement of knowledge across the entire industry. This contributes to the overall robustness of the industry and the advancement of the entire value system.

On the one hand, the advancements learned from a large equipment manufacturer arguably have trickle-down effects; the producers purchasing the corporation's product will learn of the advancements from the corporation. Such advancements include wireless or touchscreen interfaces for equipment, new bottling techniques, better reverse osmosis methods, better vacuum systems, etc. On the other hand, it can also be argued that the reverse is also true. Some innovations start with individual producers and then this gets passed on along the value system. Particularly with value-added products using maple syrup such as maple ice wine, maple dipping sauce, maple barbeque sauce etc., it is the producers who develop the products in their own test kitchens and pilot them with their customers. Therefore, there are various research and development sectors in the industry that generate significant innovation with equipment suppliers, university and research institutes and the producers themselves as key locations of research and development activities.

Another important strength within the value chain and also the larger value system of the maple syrup industry is the relationships between various actors. From the data gathered from the interviews, there are clearly strong bonds of support that have developed amongst members in the industry. This appears to contradict one of the Industry Competitors characteristics outlined by Porter (1985) whereby he suggests that there is always strong internal competition within the industry among members all vying for increased profits and market share. Although Porter does acknowledge that strategic relationships can occur, the networks developed within the maple syrup industry appear to be at the level of close ties, mutual trust and friendships. This is closer to relationships as understood with the social capital literature (Inkpen, A. 2005, Mohan and Mohan. 2002, Putnam, R. 1993).

Ongoing communication and network development appear to be the key mechanisms through which the relationships are created among producers and across the maple syrup value system. Discussions between firms, including tips on using technology and solving problems, can arguably have multiple paybacks. As suggested by Carpenter and Sanders (2009), there is a competitive advantage created from the relationship amongst industry members; firms with the strongest networks can use those connections and the associated collective knowledge pool to support and inform the activities of the firm. This is a more subtle advantage, based on communication and networks developed from relationships amongst producers. For example, if one producer's evaporator has a malfunction, and the supplier of the equipment is from Quebec, the producer may know of a nearby producer who has the same or similar equipment. If the producer has established a strong network, it is quite likely that local assistance and advice will be available.

These relationships are further strengthened by formal organizations such as OMSPA and NAMSC. This is due to the ongoing information sharing opportunities that are provided by such organizations, including annual meetings, regional meetings, tours of innovative operations, and celebrations such as First Tap ceremonies. Moreover, industry groups such as OMSPA, not only provide ongoing knowledge sharing and network development for their members, they also act as a source of information for potential new entrants, particularly in Ontario where efforts are being made to expand the industry (Bonenberg 2014). This latter aspect of OMSPA's activities also seems to contradict Porter's model, since new entrants are being encouraged, rather than discouraged by the industry.

An additional strength for both the producer and the industry is the central role of family; this is also an aspect of the maple syrup industry that differs from Porter's model. This is likely the case since Porter's observations were focused on large corporations and industries rather than smaller, rural-based agri-food sectors. Family members are often skilled labourers that volunteer their time. On several occasions interviewees mentioned that family members regularly come out to assist in the tapping of the trees and selling of syrup. Aside from the skilled volunteer force, family members also provide additional markets and contacts. This is more notable in families that have been in the industry for a few decades. Previous generations of producers within the family helped established a loyal clientele over the years. Some interviewees agreed with this, confirming that they do have second and third generations of loyal consumers.

Furthermore, the role of consumers in the maple syrup value system suggests another adjustment that could be made to Porter's (1985) model. While Porter focuses on the influence the Buyer has on final prices, for the maple syrup value system, loyal customers also help promote and sell the products through word-of-mouth marketing. This highlights the importance

of a positive relationship between the maple syrup producers and the consumers. To illustrate, if the producer's product is exceptional and the consumers enjoy the product, the consumer will then be more likely to recommend the producer to others. This would then increase the clientele for the producer because individuals are going to the producer based on the recommendation of the current customer. However, this also implies that this close-knit relationship could easily be undermined with one bad experience. If there is any problem with the final product this will reflect poorly on the producer's reputation with their clientele and could ultimately impact sales and profitability. More broadly, quality problems in one operation, such as mold or other food safety related issues such as lead, can also have negative repercussions across the industry. Therefore, as an industry, producing a high-quality, safe product is in everyone's best interest.

It is also important to note, that word-of-mouth advertising is likely to have limitations, especially if the immediate locale has a small population base. Thus, focusing on this approach is likely more suitable for smaller scale producers who will be able to find enough buyers for their inventory in the local market. Also some producers may decide not to choose the retail option, and instead choose to sell bulk to more distant markets. In contrast, the larger producers cannot rely only on word-of-mouth because this type of advertising is most effective within the geographic range of consumers' daily activities.

If producers have utilized word-of-mouth along with basic marketing strategies (such as signage and internet advertising) and still have surplus syrup, other marketing channels could be explored, such as paid advertisements in local media outlets and mail flyers. However, Farrel (2013) suggests that these are not necessarily cost effective. He maintains that donating syrup to local fundraisers is a more beneficial mechanism for increasing the producer's profile and sales in the regional market. One interviewee mentioned that entering maple syrup contests and being

recognized by the industry for producing an outstanding product also contributed to increased sales and product differentiation.

If the local market is small or there are many producers located within their region, operators might want to consider extending their market into less saturated areas within the province, across Canada or internationally. If moving to sales outside of the province is of interest, producers would be required to obtain the appropriate approvals from the Canadian Food Inspection Agency and any other certifications required by other jurisdictions. While noted in the literature review that Canada supplies the majority of the maple syrup to the world, at the moment, nearly all of that product comes from Quebec. Could the Ontario maple syrup industry be at a point where producers step outside their boarders and start contributing more substantially to an international market?

In regards to product differentiation, this again is a noted strength of the industry. While maple syrup is often noted by producers for its health benefits, there is also a benefit in its diverse uses in various products, from candies and spreads to alcoholic products (maple whisky, ice wine and liquor). These value added products can be seen as another tactic for the producers selling on the international scale, if one product does not sell at the location, it could be argued that a different maple product might. However, this could depend on how unique the product is, and what the consumer is looking for. In such situations the firm must be able to understand and respond to the needs in the foreign marketplace.

5.2 Challenges found within the Maple Syrup Value System

What is clear from the interviews is that while technological advances provide the ability to increase syrup production, the market must be able to grow along with the rise in production.

Currently, the most often used techniques for marketing maple syrup are associated with websites on the internet and road signage. The market has not expanded enough for some producers, who at certain times have excess syrup. To counter this, some producers may choose to store syrup for next year, ensuring the ability to supply syrup and maintain market share, even in years when yields are reduced. This is especially important in Ontario where the supply and distribution of maple syrup relies on the good management of individual producers. As explored above, other tactics are related to expanding local markets, moving into other markets and developing value-added products.

It is important to note that the internet has become one of the more commonly used mediums for daily activities, thus it is only logical that producers should take advantage of this. However not all producers are technologically inclined to develop and manage effective websites and online stores. It is also noted that OMSPA members have their contact information displayed by region, on the OMSPA site; this is one advantage of belonging to the organization. If producers are not technologically inclined, their membership with OMSPA at least offers the opportunity to have their contact information displayed and affords another marketing channel for the producer.

Another tactic that can be used is signage; in some instances producers had road signs directing the public to their locations. Again, this is a very simple and basic method for marketing and advertising, for it does hold the necessary information for individuals to locate the producer, and with the correct display on the signage it will draw attention. While it was never stated during the interviews why others chose not to use signage, Farrell (2013) maintains that the producers may not want the public coming directly to the sugar house due to its location or liability concerns, or may feel that their other means of marketing and advertising are sufficient.

As well, it should be noted that signage would only work in highly populated areas, or on major transportation routes frequently used.

Therefore, while a range of marketing strategies do exist, these may or may not be appropriate for particular operations. Producers need to be willing and able to invest in marketing and in establishing relationships with broader markets as well as undertaking the time consuming process of obtaining any necessary certifications. For producers who do not want government control through certification inspections, who do not have technological know-how, or for whom maple syrup production is a spring sideline, market expansion will likely be more difficult.

In other words, when returning to Porter's terminology, one of the challenges in the industry is the role of the channel. If the channel is not efficient enough to transfer the information about the product, or get the product itself out to the consumer, this is then a link that needs to be strengthened for the success of the firm and the industry. The producers can make large amounts of syrup, but if there are unreliable or limited channels to deliver the product to the consumer, there will be a surplus of product. Unlike Quebec, Ontario does not have a mandated management system to market and distribute maple syrup as well as manage the supply and surpluses. In Ontario, it is up to the individual members to develop and manage their own channels and markets. According to a recent OMSPA report there is strong consumer interest for maple syrup products (OMSPA, 2013), but the issue remains that the marketing channels have not reached many of these potential buyers.

Another challenge for the maple syrup industry is the use of sweetener substitutes, including table syrups and cane sugar. It can be argued that these substitute products have a

larger market share because they are cheaper and are more readily available. Yet, interviewees noted that maple syrup should be viewed as a high value product, rather than just a simple sweetener. For instance, several respondents noted the health benefits of maple syrup and the contribution of maple syrup to supporting local economies. More consumer education and marketing about the value-added benefits of maple syrup is likely needed to entice consumers towards buying maple syrup rather than the cheaper substitute sweeteners. Given that interviewees suggested that they undertook little or no marketing, this is a significant deterrent to the growth of the industry.

An additional challenge facing the Ontario industry is that while OMSPA represents about 500 producers, including some of the largest in the province, there are likely another 1500 or so producers that are NOT part of OMSPA. Non-OMSPA producers are at a disadvantage, especially in relation to accessing information about technological innovation and the involvement in a mutually-supportive sharing network. It is also important to note that buyers do not necessarily differentiate between members and non-members. If sub-quality syrup is sold, this can taint the image of the whole industry. The concern here is that producers who are less well connected might have less technological savvy in producing a high quality product. While non-members participate in a larger informal network within the province, they are still isolated. Those individuals who are apart of OMSPA gain a competitive advantage from the information they obtain from the organization. For example, OMSPA offers advice related to sugarbush management, production best practices, marketing and firm growth. Generally, these publications and best practice guidelines are made freely available to all members. Below is an example from the most recent publication about maple syrup economics:

As you increase production some local advertising and off-farm retailing may be needed to move the crop. Attending a local farmers' market or teaming up with a local retail outlet might be the next step up in the marketing chain. Further market expansion could involve adding value and diversity to your mix by making candies, sugar, or taffy.

For producers with the facilities, time and a knack for dealing directly with the public on a larger scale, branching out into sugar parties and seasonal maple based experiences for the public can offer good profit potential. A word of caution here however; launching such a venture is like starting another business and requires a different level of planning and management. There are liability issues to be addressed prior to opening up your property to the general public (OMSPA, 2013).

5.3 Value Chain Modifications

With the data collection complete and additional information provided, this section revisits the initial conceptualization of the maple syrup value system and makes some additions and changes. The first addition is the category of Manufacturers of Equipment/Technology. This was added due to one of the interviewees explaining that the large equipment dealer, such as Dominion and Grimm, or La Pierre, build their product in house. These companies then send their product out to suppliers/dealers, which is more prominent in Ontario where there are no large manufacturers of equipment. The second addition is the Network of Support concept. This block was added because of the interviewees explaining that their information and support comes from informal networks within the family or amongst producers or through organizations such as OMSPA. A third addition is the Research and Development section. This is to note that research and develop occurs on both the large scale corporate and individual (firm based) levels, as well the sharing of information between the two levels. Fourth there is the addition of the word-of-mouth advertising, which is implemented to show how the consumer's link and influence carries back to the producer via advertising.

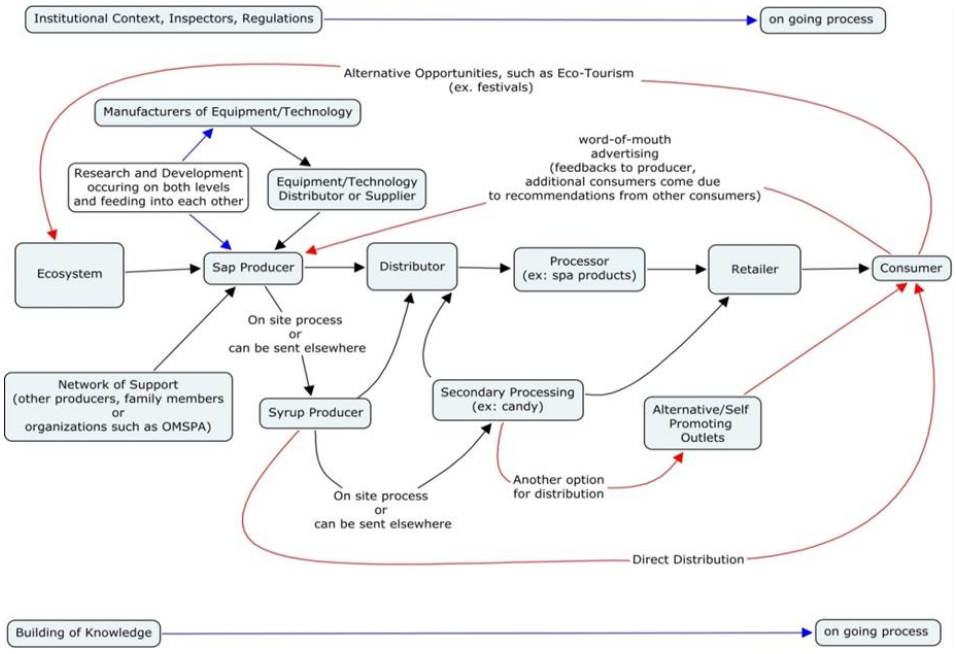

Figure 7 - Updated maple industry value system.

6.0 Conclusion

Maple syrup production has had a fundamental role within Canadian history. Canadians can take pride in the fact that Canada supplies the majority of maple syrup to the international markets. While much of the syrup comes from Quebec, Ontario does have a presence. The goal of this paper was to solidify understanding of the value system for the Ontario maple syrup industry. Using Porter's (1985) work, the outline of the key components of a value system was reviewed (supplier, firm, channel, consumer). Once this was established, it was important to also comprehend the possible obstacles and opportunities faced by those entering or present in the industry, as noted by Porter's Five Competitive Forces. From value systems, the focus shifted to the individual firm based value chains. Drawing heavily upon Carpenter & Sander (2007) the paper identified the tradeoffs and competitive advantages as key strategies used by firms. After reviewing the value system literature, the focus returned to the maple syrup industry and the

examination of the governance and regulation of maple syrup. The section continue with an examination of maple syrup's standing in the Canadian economy, the geographic location of the sugar maple, production concerns in the context of climatic change, and the process of making maple syrup products.

Following the introduction, literature review and methods sections, in the results section, the interview data was reviewed under the key themes of suppliers, substitutes, new entrants, industry competitors, buyers and changes, opportunities and challenges. Each section presented the appropriate data found corresponding to the heading, as well a sub-section was provided where producer's gave their final thoughts. The discussion section assessed the results with reference to the value system literature, and then concluded with the updated value system model.

It is important to critically review the methodological process of the data collection. The semi-structured interview guide was ideal for this situation; it allowed the interviewees more freedom, such as going off on tangents and lengthy discussions. However, there were some difficulties with minor elements such as the wording of the questions, a small detail that could nonetheless cause discrepancies in the data. For example, clarification about the term "commercial" was always one asked. By simply saying "for profit" or "for sale", this quickly cleared any miscommunications. The selection for interviewees was successful, and 100% of those who were contacted agreed to share their knowledge. Interviewees represented all geographic regions of maple syrup production in Ontario, however since the large proportion were OMSPA members, non-OMSPA producers were not adequately represented in this research. Since OMSPA only represents about 500 of the producers in Ontario, for future studies this is a gap that needs to be addressed. As well another element that was considered for

selection was the actual size of the sugarbush. This factor was covered successfully, as the study was able to interview producers with operations as small as 100 taps, to larger ones with 20,000 taps. An extra consideration for future studies is the need for additional interviews with more representatives from the large equipment suppliers. While one interviewee from this sector was able to provide an overall view of the sector, it would be ideal for additional viewpoints about the equipment supplier side of the value system.

In most instances there was the promotion of various strengths the industry has, especially within social and professional relationships built up in the industry. With innovations there was the identification of where in the value system innovation occurs (firm level producers, and corporate research and development sectors). However the topic of innovations should still be further pursued in future studies. Another additional element that should be pursued in future studies is marketing, which is a reoccurring theme in both the results and discussion. As production increases there is a concurrent need to develop the markets necessary to sell the produced syrup.

A final note is the contribution that this MRP will make to the world of academia. Due to the lack of academic knowledge within this area, this MRP is able to provide to researchers, and the research community, with important new insights, as well as foundational knowledge, on the maple syrup supply chain and production process. In terms of the overall project, this provides the baseline to continue the rest of the intended research. Furthermore for participants and others involved with the study, this information will contribute to wider understandings of the production process in terms of increasing value and networking capabilities.

7.0 References

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8.0 Appendix A – Interview Guide

Small Scale and Commercial Producers - Interview Questions

Date:_____

Interview with: _____

Interview: The questions will be broken down into 3 sections. The first section deals with production details and the second with economic value. The third focuses on important cultural values and benefits. The first two sections deal with numbers and facts and use more structured questions. The third section asks broader questions about societal values. We'll take a five minute break between sections. Of course we can take a break whenever you need to.

1) Production Details:

1) First I'd like to ask you a few questions that deal with sap and syrup production.

a. How long has sap been gathered? _____Years

b. How many taps? _____ Size of sugarbush? _____Acres/Hectares

c. Approximately how much sap/syrup is gathered each year? _____Litres/Quarts

d. Who gathers the sap and/or makes the syrup? (you, family member(s), other-define)

e. About how many people are involved in sap/syrup production? _____Number

f. What types of technology are you using for gathering and boiling the sap?
   i. Buckets and spigots YES ___ NO ___
   ii. Lines/tubes YES ___ NO ___
   iii. Reverse Osmosis YES ___ NO ___
   iv. Pots and heaters YES ___ NO ___
   v. Commercial evaporators YES ___ NO ___

vi. Other, define YES ___ NO ___

g. Have you noticed any changes, opportunities or challenges associated with production? Please explain. Can you suggest a solution to any challenges that are noted?
   i. Changes to levels of production? YES ___ NO ___
   ii. Types of technology used? YES ___ NO ___
   iii. Community support or interest? YES ___ NO ___
   iv. Production help? YES ___ NO ___
   v. Health of sugarbush? YES ___ NO ___
   vi. Other changes, concerns or challenges (define)? YES ___ NO ___

h. If you were interested in learning more or expanding your operations, what type of information would you find the most useful? (production information, value-added products/services, economics/financing, marketing, other-define). Please explain your answer.

i. Would you be interested in being involved in a group where producers can share information and knowledge? YES ___ NO ___
   i. If not, why?
   ii. If yes, what is the best way to get you that information? (mailed newsletter, internet posting, workshop, community gathering, other-define)? Please explain your answer.

2) Economic Value:

This section focuses on the economics of sap and syrup production.

a. Is the sap/syrup used for:
   i. Personal consumption and private use within the community and/or family? YES ___ NO ___

****If only for this purpose, please proceed to section #3.****

   ii. Commercial sale? YES ___ NO ___

b. If for sale:
   i. Is it for personal/family profit? YES ___ NO ___
   ii. Community profit? YES ___ NO ___

c. Why do you produce commercially? Circle: (income in early spring, good side line income, main source of income, other-define).

d. What kinds of supplies do you need for your operation? Where do you get them from? (equipment, cleaning supplies, bottles, labels, fuel, other-define). Please explain your answer.

e. What kind of products do you make? Circle: (syrup, candies, butter, sauces, other-define). Please explain your answer.

f. Who looks after the distribution and sales of your product? Circle: (you, family member, community, other-define) Please explain your answer.

g. How are products distributed or sold? Circle: (direct to consumer, farmer's markets, festivals, pancake houses, ecotourism, wholesaler, distributor, consumer, retailer, other-define) Please explain your answer.

h. Do you undertake any marketing? YES ___ NO ___ Why/ why not?
   i. If yes, please explain (signage, brochures, business cards, websites, online sales, advertisement, other-define).

i. What are your key costs? (land, equipment, financing, supplies, energy, transportation, marketing, other-define). Please explain your answer.
   a. Have these changed over time? YES ___ NO ___ Why/why not?

j. Have your sales changed over time? YES ___ NO ___ Why/why not? (changing production and products, impact of 'eat local' discourse, selling price, other-define).

k. Do you undertake any additional certifications? Why/why not?
   i. Organic certification YES ___ NO ___
   ii. Woodlot certification YES ___ NO ___
   iii. Other-define YES ___ NO ___

l. For commercial producers there are rules and regulations that govern production and sale of syrup. Are you interested in learning more about these policies? YES ___ NO ___
   i. If not, why?
   ii. If yes, what would you like to know? (food safety, bottling, labeling, distribution, other-define) Please explain your answer.
   iii. If yes, what is the best way to get you that information? (newsletter, internet, workshop, personal visit, other-define)? Please explain your answer.

3) Social and Cultural Values

In this section we deal with broader values and benefits.

a. Why is collecting sap and making syrup important for you and your community? Please explain the benefits of any that apply.
   i. Spiritual/Ceremonial
   ii. Environmental protection/Enjoying nature
   iii. Sharing of culture and traditions
   iv. Family/community sharing
   v. Social networks and relationships
   vi. Maintaining rural communities
   vii. Other-define

b. If you had the chance, what would you tell other people in Ontario about the value of maple syrup and why the industry should be supported?

****

4) Wrap-up

a. Is there anything else that you can think is important for us to know?
b. Is there anyone else that you think we should talk to?
c. Do you know of any available information or documents that we should review?