

# **Rhizo Coffee**

**A Novel Fermented Coffee Product**

**By Ani Morison**



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# Abstract

The aim of this project was to discover whether there is a market for fermented specialty coffee beverages, as the niche for fermented products is expanding, due to people becoming more health conscious and aware about their health (Mellentin, 2017). This fermented beverage could potentially be less bitter due to lower acidity levels and easier to digest than most coffees due to its lower caffeine content. The coffee product would be made from high quality Arabica coffee beans, to ensure the best possible flavour characteristics (Driftaway Coffee, 2018) and ethical sourcing and sustainable practices would be implemented during the coffee's development and fermentation processes. As the specialty coffee industry is expanding globally (Lee W. , Cheong, Curran , Yu, & Liu, 2015), it brings about the opportunity to disrupt the specialty coffee market with this fermented product through the collection of evidence-based qualitative and quantitative research, to build a strong business case for its commercialisation. The key market research findings from this study show that people generally like to experiment with their coffee and are willing to try fermented coffee beverages. Qualities that the majority of respondents look for in a coffee brand are good taste and flavour, ethical sourcing of their products and the use of high-quality coffee beans. Other findings suggest that the specialty coffee industry is a very saturated market (The Register Team (TRT), 2017) and in order to stand out in this market the product needs to have a strong point of difference, a good brand and an interesting story. Good taste and high quality are two traits that seem to be the baseline for coffee products in the New Zealand specialty coffee market (Anthony, 2014). The key scientific findings are to be confirmed in subsequent laboratory trials, which will aim to validate the science in the papers by Lee, Wai Cheong , Curran, Yu, & Shao Quan, 2016b; Lee, et al., 2016c further. The results from this project have enabled the development of a business strategy that primarily targets those who earn between \$50,000-\$99,999 New Zealand Dollars (NZD) per annum (p.a.) in the age range between 18-34 years old. This subgroup could be expanded to those who earn \$50,000+ NZD p.a. and target millennials (born between 1980 and 2000 or 18-38 years old) in future research (Goldman Sachs, 2018). In the early stages of the project if the science is validated on a small scale, capital could be raised through a crowd funding platform like Kickstarter, so that subsequent trials can

continue (Kickstarter, 2018a). When the business case for the product is strong, key investors will be targeted for their assistance in future product development, verification and market validation. This strategy is a part of the business model for the project that outlines the best course of action given the current market research and scientific evidence that is available. If this project were to be successfully funded and a minimum viable product were to be developed, large scale laboratory trials could be conducted bringing the product one step closer to commercialisation. If the product were to reach this stage, it would allow specialty coffee consumers the opportunity to experience a fermented coffee beverage that uses ethical and sustainable practices and potentially contains unique flavour nuances, health benefits and less bitter compounds.

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# Chapter 1: Background

This thesis outlines a business plan to test the viability of a novel fermented coffee product for commercial use as a part of the Master of Innovation and Commercialisation course at the Victoria University of Wellington. The report focuses on the market validation aspect of the product, through face-to-face interviews with specialty coffee businesses in Wellington and a Qualtrics survey about specialty coffee and the potential fermented coffee product, which was distributed through social media to its respondents.

## What is Specialty Coffee?

The term 'specialty coffee' was coined by Erna Knutsen, the founder of Knutsen Coffees Ltd. in 1978 during her speech at an international coffee conference in France. She suggested that specialty coffee is grown in unique geographic microclimates, which produce coffee beans with distinctive flavour characteristics. This reference is the premise from which the Specialty Coffee Association of America (SCAA) have assembled their case, for specialty coffee throughout the history of their organisation (Rhinehart, 2017).

The SCAA was founded by a small number of coffee professionals in 1982, that were looking for a common setting to appoint quality standards and discuss issues in the specialty coffee industry. It is currently one of the largest coffee trade associations in the world (Specialty Coffee Association of America (SCAA), 2018b).

The SCAA have created a standard quality control (QC) tool called a cupping form, which allows coffee beans to be graded based on their perceived quality (SCAA, 2018a). Cupping is a procedure that allows for the evaluation of the characteristics of a coffee bean. It enables the coffee beans to be compared and contrasted with one another to develop a greater understanding of their composition (Hasbean, 2015). The SCAA form is an international grading tool that can be used to distinguish between the coffees that are of a lower grade and those that are of a higher grade (specialty coffee). The cup of coffee is measured against categories such as fragrance and aroma, acidity, flavour, body and sweetness. The final

score is calculated from the points attributed to each of the categories, to give a total score out of 100. Any coffee that scores above an 80 on this scale is considered specialty grade coffee (SCAA, 2018a).

This quality grading system, (Q Grading) using the SCAA cupping form sets a standard and an international language that enables communication with others in the industry at both the export level and consumer level. Q certified coffees benefit farmers and exporters as they fetch a premium price, allowing the green coffee buyers to choose their coffee based off the point system and a variety of other qualities. They are then able to present these options to roasters, which may include coffees from various origins, varieties and processing methods (Westerman, 2016).

It is also important to note that there must be QC procedures in place at each point, from the coffee beans origin (where it is initially farmed) to the final cup, in order to derive a high-quality product (Westerman, 2016). The specialty coffee chain of custody which outlines the necessary procedures that are needed to take place, in order to create a high-quality coffee product are presented in Figure 1 below.

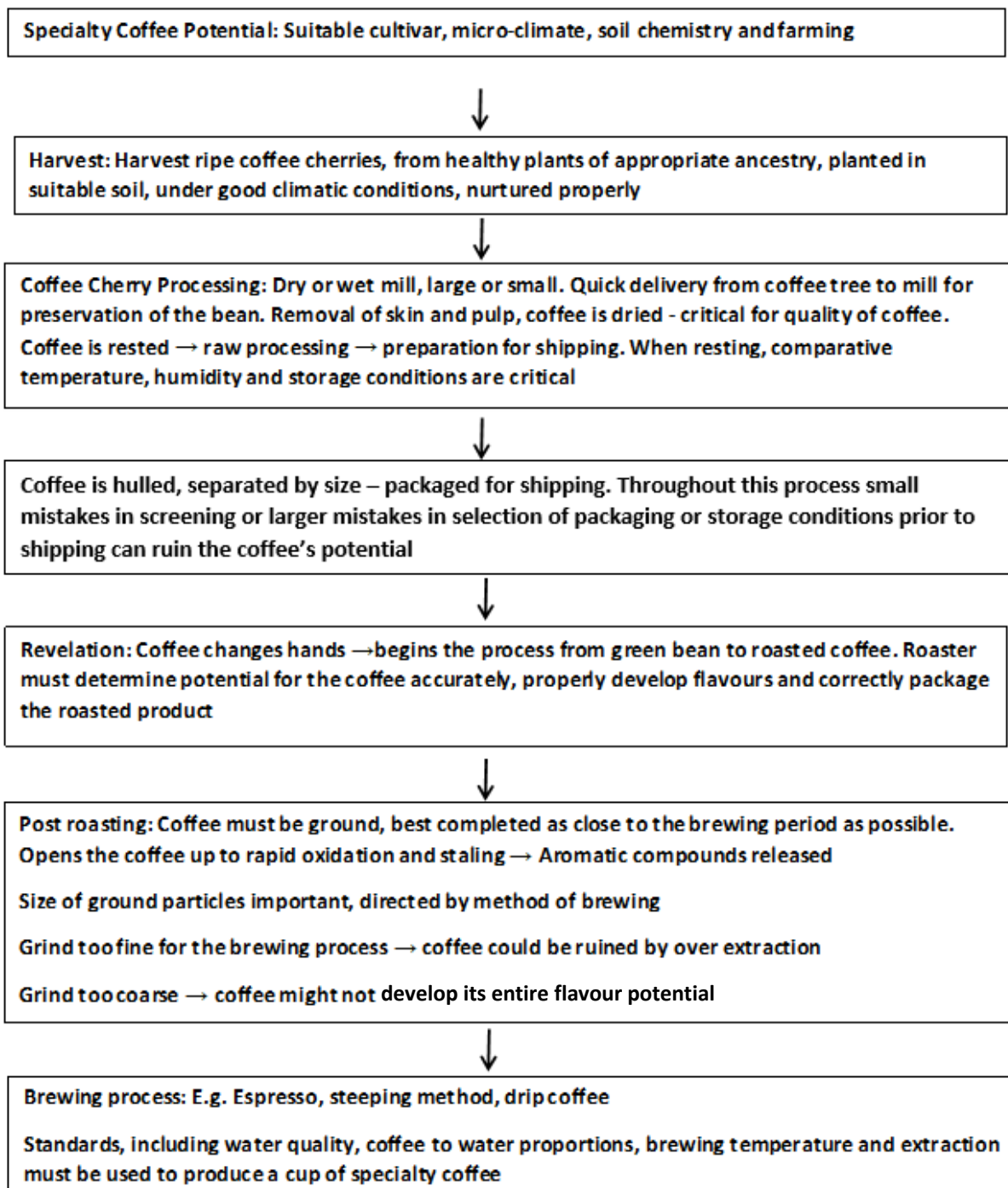


Figure 1. Specialty Coffee Association Chain of Custody from (Rhinehart, 2009a, 2009b).

## Current Situation: Specialty Coffee Industry

Coffee is financially the second most traded commodity worldwide and during the past 50 years, its consumption has continued to rise at an annual rate of 1.9%. Similarly, the market share for 'gourmet' coffee beverages has continued to climb (Lee et al., 2015). In the United States, a consumer survey that was coordinated by the National Coffee Association of America (NCA) found that the global coffee market is said to be estimated at NZ \$68 billion, with the specialty coffee niche making up a 55% share value. Specialty coffee shops are businesses that derive 55% or greater total revenue from specialty coffee sales, including beverages and coffee accessories (SCAA, 2017).

World coffee consumption had increased from nearly 149 million 60kg bags of coffee in 2013/2014 to nearly 158 million 60kg bags in 2016/2017. Over three years, there had been an increase in global coffee consumption by 5.7% or 9 million 60kg bags of coffee (International Coffee Organization (ICO), 2018), which indicates that global coffee consumption is rising.

The coffee market is highly saturated, especially in New Zealand (NZ) as there is more roasters per capita in this country than any other country in the world. Over the last 20 years, its population has become coffee connoisseurs, some even arguing that NZ has the best coffee. As of 2017, this country was ranked the 13<sup>th</sup> highest coffee consumer per capita in the world ahead of the United States and Australia. In this data survey, people that lived in NZ consumed an average of 2.5 cups of coffee per week, making the fact that coffee was responsible for 90 percent of all Fairtrade retail sales in NZ unsurprising. Fairtrade coffee retail sales grew in 2004 from \$240,000 to \$16 million in 2016 (TRT, 2017).

According to experts in the coffee industry, the total coffee retail sales for 2016 were close to \$150 million. This did not include café sales. Canstar conducted a survey in 2015 which found that those living in NZ were spending an average of \$13.67 a week on coffee from coffee stores, adding up to over \$710 a year per coffee consumer (TRT, 2017; Canstar Blue, 2015).



This research supports the claim that global coffee consumption and the niche for specialty coffee products is rising.

## **Fermentation**

The Merriam-Webster dictionary states that fermentation is “an enzymatically controlled anaerobic breakdown of an energy-rich compound (such as a carbohydrate to carbon dioxide and alcohol to an organic acid)” (Merriam-Webster , 2018) which, in layman’s terms means that energy rich compounds such as carbohydrates, are broken down into smaller subunits in the absence of oxygen to release energy for use. Microorganisms such as bacteria and yeasts are predominant in the fermented food and beverage industry and they aid in the fermentation process (Roos & De Vuyst, 2018).

The fermentation process assists in the preservation of foods and brings out strong flavours in these products. If there are live cultures in the fermented products, there are a range of health benefits associated with them. These live cultures are called probiotics, which contain beneficial bacteria for the digestive system. Probiotics may enhance immune function, lower the risk of some cancers and improve intestinal health. Common fermented products include: beer, wine, kombucha, cheeses, yogurt, vinegars, Korean kimchi, sauerkraut and tempeh (SFGate Healthy Eating, 2018).

## **Fermentation and Coffee**

Inconsistencies are common in conventional coffee processing techniques and the majority of these come from fermentation, which can alter the levels of quality in the beans by as much as eight points on the cupping scale in either direction. As most specialty coffee falls between the range of 80-92 points out of 100, an eight-point difference is astounding.

During the naturally occurring fermentation process in coffee, microorganisms such as yeasts and bacteria release enzymes which aid in the breakdown of carbohydrates in the mucilage. After a series of biological processes occur, the aroma, pH, colour and the composition of the mucilage and coffee beans are altered (Newton, 2017).

The two most widely and internationally used fermentation techniques are dry fermentation and wet fermentation (Newton, 2017).

Dry fermentation brings out fruity, sweet and chocolate notes in the coffee. However, this fermentation process can be challenging to control, as temperature influences the rate of fermentation and can negatively alter the flavour and consistency of the coffee. Therefore, it must be controlled to obtain consistency of product. If the temperature is too high, the rate of fermentation increases and alcohol and acidity can spike, dominating all other characteristics. Flavours that could be perceived at this stage are metal and vinegar notes (Newton, 2017).

The water in the wet fermentation process helps to extend the fermentation period, consequently resulting in a profile that is more refined, has a softer body and complex acidity. Challenges associated with this process include controlling inconsistencies in water quality and temperature (Newton, 2017).

## **Fermented Coffee Products Worldwide**

There are three main fermented coffee products that are available worldwide. These include Kopi Luwak Coffee, Black Ivory Coffee and Cultured Coffee (Newage Consulting, 2015; BICC, 2018a; Watson, 2016).

Two coffee brands: Kopi Luwak Coffee and Black Ivory Coffee have taken advantage of the growth in the specialty coffee niche with their products, using a similar process to the proposed project, but they differ through the fermentation of green coffee beans in the digestive tract of animals as opposed to an in vitro version (Newage Consulting, 2015; BICC,

2018b). Cultured Coffee is a controlled fermented coffee product that does not need an animal vessel for its fermentation (Watson, 2016).

## **Kopi Luwak Coffee**

Kopi Luwak Coffee is one of the most expensive coffees in the world. The retail price per cup of Kopi Luwak ranges from between \$35-\$100 NZD in some parts of the world (Newage Consulting, 2015) in comparison to the average cup of coffee in NZ that will sell for between \$4.00- \$4.50 NZD (My Tax , 2018). Bote Central sells their Kopi Luwak Coffee in one kilo gram lots for about \$680 NZD. This means that it costs about \$68 NZD per 100g of coffee or about \$14 NZD per cup, but the minimum that you can buy is one kilogram (kg) of the product through them (Onishi, 2010).

The staggering difference between the price of regular coffee and Kopi Luwak Coffee is due to its unique coffee process. Palm civet cats (also called Luwaks) from Indonesia, are the fermentation vessels used in this process (Newage Consulting, 2015).

The Luwaks prefer to eat the ripest coffee cherries (which are of higher quality than their unripe counterparts) and once swallowed, the digestive process begins. When the coffee cherry reaches the intestines of the civet cat, a variety of gut microbiota contribute to the cherries fermentation. This fermentation produces unique odiferous compounds that are responsible for its distinct flavour and aroma. Around 24 hours later, the coffee beans are excreted from the cat's digestive route and farmers can collect them. They are then washed, dried and pounded after which, they are ready to be subjected to the roasting process (Newage Consulting, 2015).

This method of fermenting coffee cherries sounds as though it heeds to ethical standards, as the Luwaks ingest and excrete the coffee cherries of their own free will. However, as the product has increased in its popularity, some owners of the Luwak Coffee businesses have become greedy, devising unethical methods to meet the increase in consumer demand. In many cases in Indonesia, this involves hundreds of civet cats being farmed and caged in

close proximity to each other. The civet cats are fed coffee cherries of various degrees of ripeness and as the cats are starved they no longer exclusively ingest the ripest coffee cherries, only feeding to satisfy their hunger. The result is that the coffee made from the product of caged luwaks is of lower quality than that of free range luwaks. The civet cats can inevitably die due to health problems caused by their ill treatment (Newage Consulting, 2015).

## **Kopi Luwak Direct**

There are some businesses that sell Kopi Luwak Coffee without the need to harm palm civets for their production, for example, Kopi Luwak Direct. This company was founded in 2008, when the owners began to work with the B'laan tribe in the Philippines. The owners helped the tribe to grow and farm Robusta and Arabica coffee trees on 400 hectares of mountainside, which is now cultivated by the B'laan tribe alone (Kopi Luwak Direct (KLD), 2017).

## **The Process**

The B'laan tribe searches for civet cat droppings in the Philippines in the early hours of the morning. After their collection, the tribe transports the droppings to the staff at Kopi Luwak Direct, where they process the cherries on their farm. First, the beans are washed and the outer coffee cherry is removed. The beans are then sun-dried for three days until they reach a certain moisture content. They are then sorted, removing any defective beans, after which they are roasted to a light, medium, or dark consistency. Kopi Luwak Direct recommends that their medium roast coffee has the best quality and taste. Kopi Luwak Direct only roasts their beans when they are ordered to make sure the product is as fresh as possible (KLD, 2017a).

## **Social Responsibility**

Kopi Luwak Direct believes in providing a sustainable income for local workers and farmers, which is why they adhere to ethical Fairtrade disciplines. They pay the farmers much more than coffee dealers would pay for the same product and they provide clothing, supplies, education and basic essentials for the B'laan community. Kopi Luwak Direct have also built a school, established a supply of fresh water and educated the B'laan tribe about making concrete bricks, to reinforce the durability of their homes. They also create custom machinery for their benefit and for the benefit of their partner communities (Kopi Luwak Direct (KLD), 2017b).

The company uses 100% organic coffee beans and they claim to never use fertilisers or chemicals on their products. They also claim that they are against animal cruelty and do not keep any civet cats in cages, allowing the animals to roam free and to select the coffee cherries they want to eat (KLD, 2017b).

## **Price of Kopi Luwak**

The taste of Kopi Luwak Directs coffee is smooth, balanced and has less bitter notes than regular coffee. Although the coffee's shelf life is one year, they recommend that the customer drinks the coffee within eight months post roasting, due to the quality of the coffee falling after this stage; at which time, it will not be as rich and flavoursome. They also recommend that the coffee is stored in an airtight container that does not permit light (KLD, 2017a).

Kopi Luwak Direct offers a medium roast as it brings out the coffee's unique flavours and guarantees the best quality possible. However, they also have a light and dark roast on offer to satisfy customer preference. The flavour notes produced are best drawn out with a temperature between 91°C-96°C and grinding the coffee right before brewing is recommended (KLD, 2017a). The coffee is best brewed using a pour over method, but they

have step by step guides for brewing their coffee as an espresso, with a chemex, aero press, V60 (pour over) and as a regular brew (KLD, 2017a).

## **Overall Quality of Caged Kopi Luwak Coffee**

Rocky Rhodes, from the International Coffee Consulting Group visited a farm in East Java (Indonesia) to evaluate their civet cat coffee which he had separated into small, medium and large sizes. The farm contained caged Luwaks which were fed the same coffee. He then cupped the four samples: Regular small, medium, large and Luwak beans, after which he could tell that the Kopi Luwak Coffee was of low quality and clearly sold for its unique story (Kubota, 2011).

Rhodes described the results: “Using the SCAA cupping scale, the Luwak scored two points below the lowest of the other three coffees. The medium-sized coffee, as an aside, scored the best due to its overall flavour and balance. It was a full four points above the Luwak version” (Kubota, 2011).

## **Conclusions**

Overall, the quality of caged Kopi Luwak Coffee has been said to be very poor (Kubota, 2011), as the Luwaks are fed the coffee cherries by employees who do not pick the ripest coffee cherries as the wild Luwaks do (Newage Consulting, 2015). Therefore, the quality of product decreases and consumers are not likely to buy it more than once as with low quality, quite often comes poor flavour.

The average consumer is not willing to pay the steep price that Kopi Luwak Coffee asks for. Consumers may want to try the coffee for its novelty, but once this wears off a low quality, poor tasting product is all that remains. Granted, there is a small market in Europe, the United States and East Asia that are willing to pay a premium price for the false perception of high quality and luxury (Kubota, 2011), but if a business is wanting to create a new fermented coffee product, the preferred characteristic of high quality coffee at an affordable price, will aid in the maintenance of revenue streams from consumer segments.

The research that was conducted into Kopi Luwak Coffee businesses has illuminated the importance of producing a good tasting, high quality product, so as to avoid the consequences of having the opposite attributes mentioned above. The importance of brand and the story behind the product was also established in this research. Kopi Luwak Coffee's biggest selling point and their point of difference (POD) is their unique coffee fermentation process, but as the evidence above shows, having a great story is not enough to produce a successful product. High quality and affordability are also major influencing factors that contribute to the products success in the specialty coffee industry.

## **Black Ivory Coffee**

Black Ivory Coffee uses a similar fermentative process to Kopi Luwak Coffee, but it works with elephants originating from Northern Thailand for its fermentation (The Associated Press, 2012).

Blake Dinkin is the Canadian founder of Black Ivory Coffee, which had been ten years in the making before truly getting the coffee process right, with the right ingredients and elephant vessels, from its initial conception in 2012. His choice to settle in Thailand was due to the unique combination of high quality coffee it produces, its adequate supply of elephants and its strong conservation approach to elephant care (Black Ivory Coffee Company (BICC), 2018).

## **The Process**

Black Ivory Coffee is made in Ban Taklang, Surin, Thailand (BICC, 2018a) on Anantara's Golden Triangle Asian Elephant Foundation resort (Chiang Rai Times, 2012). The company has made sure that their coffee meets high quality standards (BICC, 2018b). The coffee cherries are refined through a fermentation process in the elephant's intestines. These are 100% Thai Arabica cherries which have been hand-picked (BICC, 2018a) (as opposed to being stripped by a machine off the tree) (BICC, 2018b) from altitudes of up to 1500 meters

by mahouts, which are elephant keepers (Mahoutship, 2018; BICC, 2018a). The cherries are then transported to Ban Taklang, where each mahout family combines the cherries with the elephant's food (catered to their acquired taste). The combination of their favourite foods with the coffee cherries help to ensure the elephants are happy and well nourished. The digestive process takes 12-72 hours. The time it takes is dependent on the amount of food that is present in its stomach at the time (BICC, 2018a).

The cherries are then transferred to the school in the area, where the eldest students wash, rake and dry them in the sun for a stipend. After the cherries are dried to an optimal moisture percentage, they are hulled and machine sorted to test their density and then they are sorted by hand. Only the biggest coffee cherries are picked, to make sure the roast is even. The beans are then roasted and put into a one-way valve package, to keep the coffee fresh; it is then shipped out (BICC, 2018a). Black Ivory Coffee roasts the beans only when they are ordered, generally the day before they are sent out in three-kilogram batches (BICC, 2018b). The roasted coffee is not stored to ensure its freshness (BICC, 2018a).

The coffee tastes as it does due to the coffee cherries undergoing a fermentation process in the elephant's intestines after they are ingested. This process breaks down the proteins found in the coffee beans, reducing the bitter tasting compounds in the coffee. Elephants are almost completely vegetarian (herbivores), so due to the high fibre in their diets from the plant matter, the vegetables and fruit that they consume undergoes intestinal fermentation. The fermentation also helps to lift the sugar from the coffee, bringing the fruit from the coffee cherry into the bean. Black Ivory Coffee's flavour profile contains chocolate, cherry and malt with a hint of grass, without the bitter aftertaste of regular coffee (BICC, 2018b).

## **Social Responsibility**

Dinkin helps the local Thai community in various ways: His coffee cherries are paid for above market price and he generates income for the mahouts and their families who can earn a full day's wage within 45 minutes of working for him (BICC, 2018b). They pay 350 Thai Bhat



(THB) per kilogram of picked coffee. On average, it only takes 15 minutes to pick one kilogram of coffee cherries. Typically, a coffee worker in Thailand would earn seven THB per kilogram and in Ban Taklang (where Black Ivory Coffee is made), they can earn 200 THB after harvesting rice for seven hours (BIIC, 2018c).

The production of this coffee generates valuable incomes for mahout families and high school students in the area who wash and dry the coffee. Generally, the money goes into supporting aging parents, school fees, health costs and buying clothing and food. Children go to a National Park where they may see elephants in their habitat for the first time. For most of these children, it may be the first time that they venture outside of their villages (BIIC, 2018c).

Black Ivory Coffee is committed to elephant welfare and conservation through their support of the Golden Triangle Asian Elephant Foundation (BIIC, 2018c). They currently donate 8% of their sales to the foundation, which is a Thai registered charity (BICC, 2018b). These donations began in 2012 (Chiang Rai Times, 2012).

This support aids the children of mahouts through their education about wild Thai elephants and their conflict with human beings (BIIC, 2018c). The money also goes into paying for medicine, food and veterinary care for the elephants and the building of a laboratory. This charity has about 26 elephants, 18 of which have been rescued from damaging environments. They provide a home and bring these elephants to a safe and beautiful place in Northern Thailand (BICC, 2018b).

Black Ivory Coffee's mission is to resolve the issues around human-elephant abuse by creating a premium product that benefits the elephants. The organisation also wants to produce a coffee that tastes exceptional, is unique and creates a lasting positive experience for the consumer (BICC, 2018b).

### **Price of Black Ivory Coffee (2018)**

Each single package of Black Ivory Coffee comes in 35-gram (g) lots. In each lot there are five espresso sized servings. Therefore, a single espresso sized cup of Black Ivory Coffee costs \$23.56 NZD, but the minimum amount that can be bought online is 35g which costs \$117.79

NZD. This indicates that it costs about \$336.54 NZD per 100g of Black Ivory Coffee (BICC, 2018b).

One cup of the coffee at one of Anantata hotels (in Thailand, the Maldives and Abu Dhabi) costs \$68 NZD (Dombrowski, 2013), but it generally sells for an average of \$68-\$82 NZD per cup in five-star restaurants and hotels (Sirachadapong, 2016).

Exactly 33kg of coffee cherries are needed to make 1kg of Black Ivory Coffee. The result is a very unique cup of coffee with chocolate, spice (leather and tobacco), red cherry and grass notes. The coffee is not bitter and its complexion is almost tea-like (BICC, 2018a).

Only 50kgs of Black Ivory Coffee was made in 2012 (Dombrowski, 2013; Chiang Rai Times, 2012). The coffee sold for \$1505 NZD per kilogram in 2012. Kopi Luwak Coffee sold for an average of \$684-821 NZD per kilogram or \$41 NZD per cup (Chiang Rai Times, 2012).

## **Black Ivory's Mission**

Black Ivory Coffee's aim is to sell their coffee in the most prestigious five-star hotels and restaurants in the world. They have also reserved a limited supply of off Black Ivory Coffee to sell online via their website. In 2017, only 150kg of the coffee was produced, making Black Ivory Coffee the rarest coffee in the world (BICC, 2018b).

Black Ivory Coffee has been featured many times in magazines, newspapers and on television, as can be seen on their website. USA Today, National Geographic, Traveller, CNN and The Telegraph are some of the places that they have been featured on.

Black Ivory Coffee currently distributes and sells to 17 hotels worldwide (BIIC, 2018c). Dinkin only sells to five-star hotels, as they provide a distinguished service and a beautiful atmosphere. He wants people to go back to a time where they had conversations over coffee and weren't buried in their iPhone's or blackberries (BICC, 2018b).

He claims that Black Ivory Coffee is for the "open minded, adventurous" person who is "willing to spend a little bit more, for an experience that they're probably not going to have

anywhere else in the world". He wants people to relax, take in their surroundings, have a good conversation with each other and feel great about the coffee they're consuming (BICC, 2018b).

## **Black Ivory Conclusions**

The research into Black Ivory Coffee shows that the company is good at selling their POD, which is their unique coffee fermentation process and the use of high quality Arabica coffee beans, which remain of a high standard post fermentation. They also produce a very limited supply of premium priced coffee beans per year, to be sold on their website and in luxury hotels and restaurants. This adds perceived value to the product, as it creates an allure of exclusivity.

Black Ivory Coffee educates their employees about their assets, including that of the Thai elephants and the fermentation process that they use to produce the coffee. Greater knowledge about the value chain associated with the production of fermented coffee from the farming stage to the final brewed cup, may result in few errors being made and a greater appreciation of the process and the collaborative effort that goes into producing the final product.

## **Afineur**

Afineur is a company that was founded by Camille Delebecque and Sophie Deterre in 2014 (Passy, 2017). Camille has a PhD in Synthetic Biology and he has trained as an agronomical engineer (Afineur, 2018c). Sophie has a PhD in Analytical Chemistry (Laurence, 2016).

Afineur designs microbiomes, which are communities of microbes that engage with each other in a common place. They are necessary to sustain life in every form. Afineur selects and pairs together microbes that can naturally enhance a food's nutritional taste, value and texture through the use of fermentation (Afineur, 2018c). They use the latest developments

in food science and biotechnology to control fermentation so that they can adjust it to produce better products in a natural, sustainable and economical way by unlocking the full potential of plant-based foods, ingredients and agricultural by-products (Afineur, 2018a, 2018c).

### **Afineur: Cultured Coffee**

Cultured Coffee is Afineur's very first product (Afineur, 2018b). After thousands of microorganisms were screened, five microbes were eventually identified that together, remove the bitter notes from the Arabica coffee beans over two days of controlled fermentation. Roasting the coffee beans sterilises them of all microorganisms, resulting in a more aromatic, less bitter coffee. Delebecque says that the bitterness is reduced to the extent whereby coffee drinkers who add milk or sugar could do without and those who do not usually drink coffee due to its bitterness could enjoy a cup (Watson, 2016).

Afineur's initial target market is wine drinkers, food lovers, tea enthusiasts and coffee consumers that are after a premium product and individuals looking for a more affordable, ethical coffee than Kopi Luwak (Watson, 2016).

Afineur claims that Cultured Coffee is:

*“Easy to digest* - our fermentation significantly lowers the concentration of four main molecules associated with digestive discomfort: catechol, caffeine, hydroxyhydroquinone and pyrogallo

*Sustained energy* - our coffee beans contain less caffeine and more theophylline, a caffeine alternative more commonly found in tea and cocoa. The result is more balanced energy without the "jitters"

*Extra bioactive compounds* - enhance your wellbeing with naturally-occurring vitamin B3, inositol and lower levels of phyto-estrogen (trigonelline)

*Less bitter* - shining fruit and rich chocolate aromas (Eat Cultured, 2018)”

Cultured Coffee was launched on Kickstarter on the 30th of July, 2015 (Delebecque, 2015b). The campaign was funded completely (the goal was \$21,376 NZD), within six hours of going live on the website (Cosgrove, 2015). The Kickstarter was live from 30/07/2015 - 02/09/2015 (32 days) (Delebecque, 2015b) and during this period they were able to raise \$73,697NZD with 894 backers pledging towards the cause (Delebecque, 2015a).

Kickstarter takes a 5% fee of the user’s total earnings if the project is fully funded. This does not include the payment processing fees of between 3-5% and \$0.20 NZD per pledge. Pledges below \$10 NZD have a discounted fee of 5% + \$0.05 per pledge. If the funding is not successful, no fees are incurred (Kickstarter, 2018b).

Other than the use of Kickstarter for a capital raising platform, Afineur also received capital and training from IndieBio, a food tech incubator (Fassler, 2017).

Afineur are currently selling their Cultured Coffee (in whole roasted bean form) at a retail price of \$27 NZD on sale, with their regular price fetching \$40 NZD per 141g (10-15 servings). This works out to be an average of \$28 NZ per 100g or \$2.70-4.00 NZD per serving at their regular price (Eat Cultured, 2018). The coffee bean that they use is called Peaberry Arabica which is purchased from Guatemala. It is a smaller bean than most Arabica coffee

beans, but it is used for its ability to create a uniform fermentation process (Cosgrove, 2015).

Afineur have worked with the Food and Drug Administration (FDA) to talk over their fermentation process. They expected the regulatory process for commercialisation to be a quick one, as they only work with natural, safe and characterised non-genetically modified organisms for their fermentations. They comply with strict manufacturing guidelines to supply a great product (Delebecque, 2015; Afineur, 2018d).

## **Afineur Conclusions**

Afineur explains their POD which is their unique fermentation process, in detail on their website (Kickstarter, 2018b). They are educating consumers about who they are and how they differentiate from other fermented coffee products on the market and from specialty coffee in general.

This research suggests that Kickstarter might be a good crowdfunding platform to use in order to raise capital for the development of the minimum viable product (MVP) of the proposed fermented coffee. It has a low risk profile and there is no fee incurred if the goal set by its user is not accomplished (Kickstarter, 2018b). Afineur has shown that Kickstarter has worked very well for them in the past and Cultured Coffee uses a similar fermentation process to that of the proposed product, suggesting there is good cause to imply that the project could successfully raise capital through the platform (Delebecque, 2015b).

Larger incubators such as that of IndieBio in which Afineur received resources and capital from, can give businesses the opportunity to grow at a faster rate, through their access to assets such as their networks and mentors in return for their investment (Fassler, 2017; Zwilling, 2015).

## Conclusions

Kopi Luwak, Black Ivory and Cultured Coffee each use unique fermentation processes to ferment their coffee products, resulting in changes to the flavour and aromatic composition of the beans. Cultured Coffee and Black Ivory Coffee are generally of higher quality than Kopi Luwak Coffee and they are sold in smaller batches to imply scarcity of product, allowing their coffee to be priced higher. Cultured Coffee's POD relative to the other two products is that it does not need an animal vessel for its fermentation process. Hence, its process is more ethically sound and can be produced with greater consistency and efficiency in comparison to the others. The proposed product would also offer these POD's in addition to a potentially unique flavour profile and health benefits associated with the product, which cannot be confirmed until further laboratory trials have been conducted.

The price range for the fermented coffee products that have been mentioned above can be found in Table 1 below.

**Table 1. Average prices of specialty coffee in New Zealand and fermented coffee products worldwide**

Average price (NZD)	Regular Specialty Coffee	Cultured Coffee	Kopi Luwak Coffee	Black Ivory Coffee
Per Brewed Cup (wholesale price)	\$1.00	\$2.70- \$4.00	\$13.50	\$23.60
Per Brewed Cup (retail price)	\$4.00-\$4.50	N/A	\$35.00-\$100.00	\$68.00-\$82.00
100g coffee beans	\$5.00	\$28.40	\$121.50	\$336.50
1kg coffee beans	\$50.00	N/A but would be about \$284.70 if sold per kg	\$787.00	\$2494.30

*Note.* Retrieved from: (Coffee Supreme, 2018; Eat Cultured, 2018; Onishi, 2010; KLD, 2017b) and (BICC, 2018b).

## **Coffee Fermentation in the Digestive Tract: Palm Civets and Black Elephants**

Palm civet cats ingest the ripest coffee cherries they are able to find, after which the cherries are completely disintegrated in their digestive tracts. The coffee beans remain relatively intact and are excreted in the mammal's faeces. The digestive enzymes in the civet cat's intestines aid in the fermentation of the coffee beans, resulting in unique flavour profiles which have been characterised as syrupy, rich, musty, earthy and smooth with chocolate and jungle undertones (Marcone , 2004).

In Macone's (2004) paper, composition and properties of Indonesian palm civet coffee (Kopi Luwak) and Ethiopian civet coffee revealed that there was surface micro-pitting at 10,000 magnification, through microscopic examination of the digested coffee beans, using scanning electron microscopy. This indicates that the proteolytic enzymes and acidic substances present in the gastric juices of the civet cats, were infiltrating the coffee cherry and reacting with its surface to change its micro structural properties, during the coffee's transition through the palm civet's gastrointestinal tract (Marcone , 2004).

The civet coffee beans total protein levels were lower than they were prior to fermentation, which signifies that the proteins were partially disintegrated and leached out of the coffee bean. Lower protein levels are associated with decreased levels of bitterness in coffee, as proteins act as precursors to certain bitter substances upon roasting. Macone's results also showed that acidity and body levels were lower in the civet coffee in comparison to their controls (Marcone , 2004).

Many researchers can confirm that wet processed fermented coffees are of better quality than dry processed coffees. Wet processed coffees generally have a superior flavour profile and in turn, command a higher price than dry processed coffees. As the coffee cherries



undergo a fermentation process in the digestive tract of civet cats, they are subjected to a form of wet-processing during their acidification within the stomach and then their fermentation in the digestive tract, due to their natural intestinal microflora. During the processing of wet-coffee, all mucilage should be removed as it could prompt secondary fermentation to occur during the drying and storage phases of production, which will inevitably lead to flavour defects in the coffee. However, many researchers have discovered that mucilage degradation appears to be associated with acidification, which is similar to the acidic environment of the civet cats stomach due to its gastric juices. Coffee cherries are exposed to these stomach acids after they are ingested by the cats (Marcone , 2004).

Another finding of interest in Macone's paper suggested that researchers have found that lactic acid bacteria are the preferred microorganisms that are used in wet processing operations, as these bacteria enable the fermentation to remain relatively neutral. It is noted that lactic acid bacteria make up a large proportion of the microflora in the digestive tract of civet cats. The type of wet fermentation process that is carried out in the digestive tract of palm civets may be the reason for the coffees unique nuances and flavour profile (Marcone , 2004).

The process of coffee bean fermentation in the digestive tract of civet cats and black elephants is somewhat similar. However, their enzymatic, acidic and fermentation processes may differ due to the disparity in the structure of their gastrointestinal tracts and the composition of the microflora that are present. There are no scientific studies on Black Ivory Coffee at the moment. Research should be conducted into the effects that the intestinal microflora in black elephants have on the flavour profiles of the ingested coffee beans. This research could then be compared with that of Marcone's research into civet cat coffee (Lee et al., 2015).

# Scientific Literature: Methodology Development for Rhizo Coffee

## ***Rhizopus oligosporus* I**

A paper by Lee et al., (2016b) described a process that utilised a food grade fungus, *Rhizopus oligosporus* to ferment green coffee beans. This fungus is commonly used in the fermentation and production of soy tempeh. The objective of this study was to produce *R. oligosporus* solid-state fermentation of green Arabica coffee beans, in order to evaluate changes in the volatile and non-volatile characterisations of the green coffee beans, which are produced by fermentation. The study found that the fermentation by *R. oligosporus*, induced substantial changes to the structure of aroma precursors in the green coffee beans (Lee et al., 2016b). This paper by Lee et al, informed the scientific methodology that was used for 'Rhizo Coffee's' first laboratory trial.

## ***Rhizopus oligosporus* II**

Part two of the study aimed to identify the effects that *R. oligosporus* solid-state fermentation of green Arabica coffee beans had on the aroma and volatile profiles of roasted coffee. The fermented beans were exposed to three distinct roast degrees, light medium and dark (Lee L. , Cheong , Curran , Yu, & Liu, 2016a).

The fermentation of the beans with *R. oligosporus* caused favourable fragrant compounds in the light, medium and dark roast aroma profiles (National University of Singapore, 2017). The lightly roasted fermented coffees displayed an increase in sweet and caramel attributes and a decrease in smoky and sulfuric notes in comparison with unfermented coffees. Dark roasted coffees pronounced an increase in spicy and sweet attributes and a decrease in roasty attributes after fermentation and roasting in comparison to unfermented coffees. At the medium roast level, the unfermented and fermented coffee's attributes were somewhat similar. The impact of *R. oligosporus* fermentation was the most pronounced at the light roast level when compared to the medium and dark roast levels (Lee et al., 2016a).

There were lower acidity levels (including amino acids) present in the *R. oligosporus* fermented roasted coffee beans. Amino acids are precursors to proteins (Berg, Tymoczko, & Stryer, 2002) and lower levels of proteins are correlated with lower levels of bitterness in coffee (Marcone, 2004). Therefore, this suggests that *R. oligosporus* fermented coffee is less bitter than regular coffee.

All living organisms were killed during the roasting step, where they were unable to survive the very high temperatures. Additionally, neither the fermentation process nor the roasting step reduced the desirable antioxidant activities of the green coffee beans (Lee et al., 2016a).

The positive results that are presented in this paper induced this project's motion to carry out laboratory scale trials for the development of 'Rhizo Coffee' and they are partly the reason as to why the first trial was conducted.

### ***Yarrowia lypolytica* I**

There is one other research paper by Lee et al., (2016c) that informed the methodology for 'Rhizo Coffee' in the first laboratory trial. The aim of this paper was to evaluate the effects that *Yarrowia lypolytica* may have on green Arabica coffee beans volatile and non-volatile profiles, through their fermentation with this aerobic yeast. The results showed that the fermentation altered the volatile composition and aroma precursors of the green coffee beans, just as the previous study by Lee et al., (2016a) has showed, though the fermentation of green coffee beans with a food grade fungus, *R. oligosporus*. These alterations in the *R. oligosporus* fermented beans coincided with changes to the aroma and volatile profiles of the roasted coffee beans. However, as yeasts display different metabolic processes to moulds and secrete disparate extracellular enzymes during the course of fermentation, it was proposed that the extent to which the coffee aroma was modulated after roasting would be different (Lee et al., 2016c). This was evaluated in Part II of the study in the paper by Lee, Tay, Cheong and Curran (2017) (publicly available in July 2017) which was not available during the time of the first trial for 'Rhizo Coffee' which ended in December 2017.

## ***Yarrowia lypolytica* II**

The objective of the paper by Lee et. al., (2017) was to examine the effects of solid-state fermentation by an aerobic yeast, *Y. lypolytica* on the volatile and non-volatile profiles of roasted Arabica coffee beans through the characterisation of these profiles at three different roasting levels (light, medium and dark). The results showed that there were significant modifications to the volatiles in the roasted coffee, as a result of the fermentation of the green coffee beans by *Y. lypolytica*.

The *Y. lypolytica* fermented roasted coffee produced caramel, earthy, nutty and roasty aroma characteristics. The effects of *the Y. lypolytica* fermentation on the green coffee beans and consequently on the volatiles in the roasted coffees were most evident in the light roast level, as was the case for the *R. oligosporus* fermented roasted coffee beans.

The roasted coffee that was fermented by *Y. lypolytica* also had lower acidity levels, including that of amino acids which are precursors to proteins (Berg, Tymoczko, & Stryer, 2002). Lower levels of protein in coffee beans are associated with lower levels of bitterness as Marcone (2004) suggests. Lower acidity levels were also present in *R. oligosporus* fermented roasted coffee, suggesting that *Y. lypolytica* and *R. oligosporus* fermented roasted coffees are less bitter than regular coffees (Lee et al., 2016a, 2017). Black Ivory, Kopi Luwak and Cultured Coffee also produce fermented coffee products that contain similar attributes to those mentioned, in that their products are less bitter due to the lower protein levels in their fermented coffee (BICC 2018c; KLD 2017a; Watson 2016).

## Summary

As consumer interest is rising towards unique food and beverage products or products that use unconventional processing methods such as Black Ivory Coffee and Kopi Luwak Coffee, similar processing methods with other microorganisms should be further explored. The fermentation of green Arabica coffee beans with *R. oligosporus* and *Y. lipolytica* and the roasting processes that they follow in Lee et al., (2016a, 2016b, 2016c; 2017) indicate methods to modulate coffee aroma, offering greater consistency and controllability over the digestive processing of the coffee beans, then that of Kopi Luwak and Black Ivory Coffee's.

## **Introduction to the Proposed Fermented Coffee Product**

The proposed fermented coffee product will be labelled 'Rhizo Coffee' for the purpose of this thesis. Questions that are of interest for the development of the product and the opportunities presented are outlined below. The opportunities, strategy, business model and project objectives for the development of the MVP and beyond are also displayed below.

'Rhizo Coffee' has the potential to be a novel fermented coffee product that could contain positive flavour attributes that may be desirable to the specialty coffee consumer. It may also have a lower bitterness and caffeine content than regular coffee, as other fermented coffee products that use similar processes have these qualities (Eat Cultured, 2018; Marcone, 2004).

### **Questions to Consider**

The following questions were investigated for the development of 'Rhizo Coffee' to test for its potential viability in the specialty coffee marketplace:

- Is 'Rhizo Coffee' scientifically viable?
- Is there a market for fermented specialty coffee?
- How can the market be accessed if present?

These questions have been explored in the following chapters of the thesis.

The viability of 'Rhizo Coffee's' fermentation process is a critical success factor for the development of the product. However, over the span of this project its viability was unable to be confirmed through qualitative and quantitative research, but the papers by Lee L. W., Cheong, Curran, Yu, & Liu (2016b, 2016c) give a strong premise for the science to be able to be replicated to an extent in NZ.

The qualitative and quantitative research methods involved in this project included the distribution of a mass online survey, through the website called Qualtrics via an anonymous link to specialty coffee consumers and face-to-face interviews with specialty coffee organisations in Wellington. These interviews were conducted with individuals that could speak on behalf of the organisations they were representing. The data from the Qualtrics survey and face-to-face interviews have provided knowledge and key advice about the specialty coffee industry and the market for specialty coffee products in NZ, which have in turn, informed the business case for 'Rhizo Coffee'.

### **Opportunities that were present**

The synthesis of the project idea for the innovation of a novel fermented coffee beverage, came about during my undergraduate degree in Microbiology at the University of Otago in Dunedin. There was a group assignment in an Environmental Microbiology paper that required the creation of a business proposal for new product development. The paper by Lee et al. (2016), which identified a fermentation method to modulate the aroma of green coffee beans, was used as the basis of the business proposal. The resulting flavour profile of the coffee included caramel, nutty and buttery notes that may be desirable to a consumer. This method of coffee fermentation was explored further when the opportunity arose to enrol in the Master of Innovation and Commercialisation course at Victoria University.

# The Proposed Developmental Strategy and Business Model

## The Developmental Strategy

The developmental strategy for the project from a business perspective will be to create an MVP through laboratory scale trials, to prove the viability of the science. The development of the MVP will be conducted by a laboratory technician (preferably one that has at least a Master of Science) or a scientist, preferably in the Microbiology field so that those conducting the trials will have adequate knowledge about the science involved in them. The laboratory facility must be a Physical Containment 2 (PC2) facility (Laboratory Compliance New Zealand, 2018; Office of the Gene Technology Regulator, 2013) in order to work with *Rhizopus oligosporus*, which is restricted for use in NZ (Landcare Research, 2018b).

The developmental strategy from a business perspective will be to investigate potential sources of capital to fund the progression of the MVP. These stakeholders might include: Crowdfunding platforms and different types of partnerships including that with various investors, businesses, incubators and accelerators (Zwilling, 2015).

When a viable MVP has been developed, further research will be conducted into the products science and market viability on a larger scale. 'Rhizo Coffee' may be a part of the specialty coffee market, or there is potential for it to disrupt the marketplace through the creation of a novel fermented coffee market.

## Business Model

For the purpose of this thesis, the business model canvas was used from the website, Strategyzer (2018). This canvas was used for 'Rhizo Coffee's' business model as it covers most of the aspects that are involved in the running of a business. These include: customer segments, value propositions, channels (to influence customers), relationships, key resources, partners and activities, cost structures and revenue streams. Through the use of



this canvas, a clear and thorough picture of what 'Rhizo Coffee' may look like as a business can be actualised and displayed in an organised manner (Featherstone, 2018).

## Project Objectives

### Product Development Objectives

- To identify whether similar volatile and aroma profiles for the green fermented coffee beans and roasted fermented coffee beans by *R. oligosporus* and *Y. lipolytica* in Lee et. al's (2016a, 2016b, 2016c, 2017) research papers can be replicated to a degree in NZ with the resources that are available.
- To identify whether a combination of *R. oligosporus* and *Y. lipolytica* fermentation of green Arabica coffee beans might produce positive flavour and aroma profiles that may be desirable to the specialty coffee consumer after roasting. I.e. Sweet, roasty and buttery attributes.
- If the coffee beans are successfully fermented and roasted, analysis of the volatile and aroma profiles should be conducted to measure the acidity levels (including the presence of amino acids), caffeine levels, and aromatic attributes that are present that may increase or decrease the likelihood of a consumer purchasing the coffee based on the aroma and flavour of the product. These factors will be measured based off previous research into similar fermented coffee products such as Black Ivory Coffee, Kopi Luwak Coffee and Cultured Coffee (BICC 2018c; KLD 2017a; Watson 2016).
- The *Y. lipolytica* and *R. oligosporus* fermented coffee beans should be roasted at three different levels, including light, medium and dark roasts as was conducted in Lee et. al's, (2016a, 2017) papers. Their aroma and volatile profiles should then be analysed and compared between the levels, to find the roast level that may have the most desirable attributes. In the papers by Lee et. al., (2016a, 2017) the light roast level showed the most significant changes in the aroma and volatile profiles and displayed more positive attributes over the other roast levels

- If the MVP has a positive flavour profile as a result of testing, further research should be conducted into its quality prior to and post fermentation to view potential differences. Its quality can be determined through the use of a Quality Grader (Q Grader) which will use a cupping protocol to test the beans (regular roasted Arabica coffee beans against the fermented and roasted Arabica coffee beans) (SCAA, 2018a).

## **Business and Commercialisation Objectives**

### **Prior to MVP development:**

- To find a PC2 laboratory facility that can provide a sterile environment and access to a commercial oven, Gas Chromatography Mass Spectrometer (GC-MS), Liquid Chromatography Mass Spectrometer (LC-MS) and storage facilities.
- To find a laboratory facility and a scientist or postgraduate science student that can and is willing to conduct the fermentation trials to develop an MVP within an attainable budget.
- To carry out market research into the aroma and flavour profiles that a considerable portion of the NZ population of specialty coffee consumers find desirable in the coffee.
- To conduct further market research into the qualitative and quantitative methods and analysis and results in this thesis, with a larger proportion of the NZ population of specialty coffee consumers, in order to produce a greater representative sample of these consumers.

### **After the MVP is developed:**

- Seek potential investors or partners that may want to see the product developed further in subsequent trials on a larger scale.
- When enough capital is raised to scale up the MVP's production, look for:
  - Scientists that are willing and able to conduct these trials.
  - Laboratory space that can accommodate large scale fermentations.

- Larger roasting facilities that will allow fermented beans to be roasted there.
- Look into purchasing high quality, ethically sourced, specialty grade Arabica coffee beans and find the best supplier to achieve this.
- Create an updated version of the business model for 'Rhizo Coffee' on a larger scale.
- Make a one year and a five-year business plan and re-evaluate this every six months.

## Project Scope

The scope of this project includes that of the scientific trial that was conducted for the purpose of this project to validate the scientific methods of green coffee fermentation and roasting that were used in the Lee et al. (2016a, 2016b, 2016c, 2017) papers. It also includes qualitative and quantitative market research methods, analysis and discussions about specialty coffee consumers and the specialty coffee industry in NZ. Any results from this research that are not significant to this project have been excluded from this thesis.

Further research will be conducted in order to carry out subsequent laboratory trials successfully, for the development of 'Rhizo Coffee's' MVP. These trials will aim to validate the scientific methods designed by Lee et. al. (2016a, 2016b, 2016a, 2017), for coffee fermentation with *Y. lipolytica* and *R. oligosporus* and the coffee beans subsequent roasting.

Further research will also need to be conducted into the market validation for 'Rhizo Coffee' on a larger scale, so that the population sample size will be more representative of the NZ population of specialty coffee consumers than it was in this project.

## Structure of Thesis

Chapter one of this thesis gives an overall background of the specialty coffee industry, the market and scientific feasibility questions that were proposed, the opportunities that are present and an overview of the suggested developmental strategy and business model. It also includes the objectives for product development and the business and commercialisation of the potential product.

Chapter two gives an overview of the research methods and methodologies that have been used for the purpose of this thesis. It describes the proposed methods for product development, the assumptions made, data collection and analysis methods and the business model design process.

Chapters three and four describe the methods of data collection and analysis of the results from the face-to-face interviews that were conducted with specialty coffee companies in Wellington and the Qualtrics survey data respectively.

Chapter five discusses the results from the interviews with specialty coffee companies and the Qualtrics survey findings from specialty coffee consumers.

Chapter six presents the recommendations for a business case through evidence-based research which suggests a business model design, methods for market and product validation and development and resource requirements and returns.

Chapter seven presents the conclusions that have been made and course for future research due to the findings that have been presented in this thesis.

The structure of this thesis is sequentially designed in this format so that the reader can first look at an overview of the specialty coffee industry, then the methodologies that were carried out and then the key findings and discussion of the results, followed by the recommendations for the business case.

## Chapter 2: Research Methodology and Methods

### Scientific Product Development Research Methodology

The proposed methodology for the development of 'Rhizo Coffee's' MVP was to carry out solid-state fermentation on green coffee beans followed by roasting, in order to alter the aromatic composition of the beans, bringing out flavour attributes that may be desirable to the coffee consumer.

The laboratory trials were conducted from October 2017 until December 2017 by Cintya Del Río, a PhD in Science student, supervised by Dr Andrew Munkacsi to carry out the laboratory trials for the project. Del Río carried out 16 hours of paid work of which, 14 hours were spent conducting laboratory work and two hours were spent conducting background research. Del Río established a methodology for the development of 'Rhizo Coffee' based on the research papers by Lee et al. (2016b, 2016c). Shao Quan Liu was a researcher on the Lee et al papers and conversed with Del Río via email during this time.

*R. oligosporus* and *Y. lipolytica* cultures were used for the fermentations and were purchased through Landcare Research for their use toward the development of 'Rhizo Coffee's' MVP. Green Arabica coffee beans were obtained for use from Mojo Coffee's roastery in Wellington. PC2 laboratory facilities, equipment and substances at the Victoria University of Wellington were used to conduct the laboratory trials.

Four separate experiments were carried out in triplicate where 12 Petri dishes were covered with a layer of green Arabica coffee beans and inoculated with either *Y. lipolytica*, *R. oligosporus*, *Y. lipolytica* and *R. oligosporus* or H<sub>2</sub>O (water). These are displayed below.

The petri dishes contained coffee beans inoculated with:

1. *Y. lipolytica* x3
2. *R. oligosporus* x3
3. *Y. lipolytica* and *R. oligosporus* x3
4. H<sub>2</sub>O negative control, un-inoculated with microorganisms x3

These four experiments were carried out in parallel to one another. The first two experiments above were conducted with the methodology and substances that were as close to the conditions in the Lee et al. (2016b, 2016c) papers as possible to identify whether it was possible to create similar results in NZ (their research was conducted in Japan). As the papers by Lee et al. are available to the public and their methodologies can be replicated by many people, a third experiment was conducted that involved a mixture of *Y. lipolytica* and *R. oligosporus* cultures for the fermentation of green Arabica coffee beans. If the fermentation was successful, there was a chance that a process patent could be obtained. The final experiment involved the inoculation of the coffee beans with water as a negative control for the experiment which should have produced no response (no microbial growth on the sterile coffee beans after incubation). The use of a negative control allows the analyst to compare the known result (negative control) to that which is not known (sample). If the negative control is contaminated, the test and its results are nullified.

## **Solid-State Fermentation of Green Arabica Coffee Beans**

Subcultures were made from the *R. oligosporus* and *Y. lipolytica* samples from Landcare Research. *R. oligosporus* subcultures were made through the use of sterile Potato Dextrose Agar (PDA) and *Y. lipolytica* subcultures were made in sterile Yeast Extract-Peptone-Dextrose (YPD) broth. PDA and YPD agar plates were made and the subcultures were plated to measure the Colony Forming Units (CFU) per unit gram of *R. oligosporus* and *Y. lipolytica*, to make sure that the colony counts were high enough to ferment the coffee beans effectively. The total colony count was then made for the *R. oligosporus* and *Y. lipolytica* cultures. Both subcultures were harvested after centrifugation and washed and re-suspended in Phosphate-Buffered Saline (PBS) solution to be used as the inoculum. The green coffee beans were weighed and rehydrated through soaking in deionised water at 4°C for 24 hours. The rehydrated coffee beans were then steamed at 80°C for 40 minutes to inactivate microbial growth and sterilise the beans. Samples from the steamed beans were then plated on PDA to validate the treatment. The beans were then weighed and placed in the 12 Petri dishes. The suspensions ( $10^4$ CFU/g of *R. oligosporus* and  $10^5$  CFU/g of *Y. lipolytica*) were mixed with distilled H<sub>2</sub>O to make a total of five millilitres (ml) per inoculum

and they were then added separately, together, or not at all to the beans in the four separate experiments mentioned above. The petri dishes were then sealed and placed in an incubator at 30°C for six days. The petri dishes showed mixed microbial growth in all agar plates, including that of the control plates. This nullified the results and the experiment was not continued further.

If the fermentations were successful however (only *R. oligosporus* and/or *Y. lipolytica* and no microorganisms for the control plates were present), the fermented coffee beans would be steamed at 100°C for 10 minutes to inactivate microbial growth. They would then be dried in an oven at 70°C until the moisture content of the beans was  $\approx$  7%. The beans would then be stored in aluminium pouches at 20°C prior to their use for analysis. They would then be thawed for 90 minutes before any analysis could occur.

Lee et al. (2016a) and (Lee, Tay, Cheong, & Curran, 2017) also designed roasting processes for the *R. oligosporus* and *Y. lipolytica* fermented green coffee beans, to evaluate the solid-state fermentations effects on the aroma and volatile characteristics of roasted coffees, at three roast degrees: Light, medium and dark. These roasting methodologies will be investigated further when the coffee fermentations are successful in future trials.

## **Scientific Assumptions**

It is assumed that the fermentation and roasting methodologies described by Lee et al. (2016a, 2016b, 2016a, 2017) can be used to successfully create a MVP for 'Rhizo Coffee' through laboratory scale trials with the resources that are available in NZ. This assumption will be tested by sourcing the components needed for the project that are as close to the ingredients used in these research papers as possible, to improve the likelihood of obtaining similar results.

It is assumed that variables such as time, pH, temperature, sterility when needed and over or under fermentation of the coffee beans can be controlled to produce the best aroma and flavour profile possible on both a small scale and large scale.

When further small-scale laboratory trials have been conducted and an MVP is produced, it is assumed that the data obtained from the pilot scale trials can be used to prove that the product is reproducible in a factory setting. It is also assumed that commercial scale fermenters are available for use in NZ and they can be used for the purpose of 'Rhizo Coffee's' fermentation process.

It is assumed that the expected yields and cost data from the trials can be used for future production plans. The trials will need to be designed with these outcomes in mind and they must be implemented by laboratory technicians or scientists before these assumptions can be validated.

## **Data Collection**

The scientific data for this project was not collected as the laboratory scale trials were unsuccessful. However, a description of the methodology up until the point where the fermentations were unsuccessful had been recorded in a laboratory book in such detail, that another scientist could replicate the process precisely.

## **Development of the MVP: Laboratory Trial Analysis and Outcomes**

The laboratory scale trials concluded in December of 2017, as the control plates of un-inoculated beans and the fermented green coffee beans were contaminated with other microorganisms. Del Río suggested that this may have occurred due to inadequate sterile laboratory conditions, or because the coffee beans were not steamed at a high enough temperature (as described in the research papers) to inactivate microbial growth prior to inoculation of the coffee beans with *Y. lypolytica*, *R. oligosporus*, distilled H<sub>2</sub>O (suggested: >80°C) and post inoculation with these microorganisms (suggested: >100°C).

Future trials should enable access to more sterile working conditions. Highly sensitive parts of the process, including that of the inoculation of the coffee beans with *Y. lypolytica*, *R.*



*oligosporus*, a mixture of both cultures and distilled H<sub>2</sub>O (control) should be treated with great aseptic precaution. Higher steaming temperatures of the coffee beans to inactivate microbial growth (i.e. >80°C and >°100C) should be tested to increase the chances of producing sterile coffee beans at certain stages.

If the trials were to be successful during the development of an MVP, the petri dish coffee beans should have a sample removed prior to roasting and post fermentation for analysis. Samples would also be taken from the coffee beans prior to inoculation and fermentation and post fermentation and roasting for their flavour profile analysis with a GC-MS.

The caffeine content of the coffee beans should also be measured by a LC-MS, to analyse the difference in the caffeine content before and after the fermentation and roasting of the coffee beans. The caffeine content may be of interest to analyse, as A fineur claims that the caffeine in their fermented Cultured Coffee product is lower than it is in regular coffee. They claim that this makes their coffee easier to digest, particularly for those who are sensitive to caffeine, including those with Irritable Bowel Syndrome (IBS) (Watson, 2016). This is one of their point of differences from other coffee products and it may be a characteristic to take advantage of if the caffeine levels were significantly lower in the 'Rhizo Coffee' product.

The quality of the coffee beans post fermentation and roasting will also be measured and compared between the four experiments mentioned above. The coffee beans quality will be measured through the use of a qualified Q Grader that uses SCAA cupping protocols to ensure that the coffee beans remain specialty grade (80+ points) after their fermentation and roasting (SCAA, 2018). If the quality of the coffee beans decreases significantly with the fermentation, this could decrease the value of the product, potentially nullifying it as a specialty coffee product. If the quality of the coffee beans increases after fermentation and roasting, this could add value to the product in the sense that the flavour profile will be enhanced, unique flavour characteristics may develop and the product could be priced at a higher premium than it would have been prior to fermentation.

Black Ivory Coffee, Kopi Luwak Coffee, and A fineur with their Cultured Coffee have together claimed that their coffees are less bitter than regular coffee (BICC 2018c; KLD 2017a; Watson 2016) which can be attributed to the fermentation process breaking down the

proteins found in the coffee and leaching them from the beans. Lower protein levels in the coffee beans are associated with decreased levels of bitterness in coffee, as proteins act as precursors to certain bitter substances during roasting (Marccone , 2004). It would be interesting to see whether 'Rhizo Coffee's' fermentation process produces less bitter compounds in comparison to these coffee products and that of regular coffee, through GC-MS analysis coupled with sensory evaluation. If there are less bitter compounds produced in 'Rhizo Coffee' it would serve as another POD that could be used to its advantage.

It would also be interesting to compare the flavour profiles of the roasted coffee samples from the future laboratory trial (i.e. *R. oligosporus* versus *Y. lypolytica* fermentation, versus the *R. oligosporus* and *Y. lypolytica* combination of cultures for the fermentation of Arabica coffee beans) to identify which sample brings out the best aromatic profile for the potential MVP.

The next steps that need to be completed for the development of the MVP for 'Rhizo Coffee' are:

- To find a PC2 laboratory with access to sterile laboratory facilities, equipment, substances that can be used for the purpose of this project.
- Research into the best capital raising platforms and investment opportunities to fund the development of the MVP and seek to make it possible to:
  - Hire a scientist or postgraduate student to conduct the laboratory trials.
  - Hire a PC2 laboratory for two months if free access is not achievable.
  - Buy any extra equipment that may be needed for the experiments that cannot be sourced for free.

When the MVP for 'Rhizo Coffee' has been developed through multiple small-scale laboratory trials yielding positive results, the project will move onto its next phase of development which includes seeking further investment to validate the product on a larger scale. Market development research will also be conducted during this time to investigate whether there may be a potential market for the product.

# **Business and Commercialisation Research Methodology**

## **Qualitative Research Methodology**

Qualitative research was conducted through face-to-face interviews with the founders of specialty coffee companies and individuals that could speak on behalf of these companies in Wellington.

There was a total of 13 interview questions that could be used for the interviews with Flight Coffee, Ripe Coffee and Coffee Supreme. These can be found in Appendix C of this thesis. For each interview, questions were omitted if they were not appropriate for the organisation at hand or if they had already been answered in a previous line of questioning.

The purpose of the interview questions was to investigate specialty coffee organisations QC procedures, critical success factors for the prosperity of their businesses and their approach to new product development. They also aimed to identify these organisations willingness to partner with or licence a product from another entity, how they differentiate themselves from their competitors and any advice they would give to a new specialty coffee company.

## **Analysis**

These interview questions were developed to gather insight into the various market research methods these specialty coffee companies employed during the early stages of their company's growth. Some of the questions were also directed towards identifying the businesses models for these organisations in terms of their turnover rate for new products and their willingness to be open to new ideas and partnership opportunities. Other questions were more specific to their customer demographics, i.e. why they thought that their customers liked and bought their coffee and how they were able to maintain customer

loyalty for their brands. It was also of interest to identify how these organisations differentiated themselves from other specialty coffee organisations in NZ in such a saturated market (TRT, 2017).

One section of the interview questions focussed on the specialty coffee business thoughts and opinions about the fermented food and beverage trend that is currently occurring (Mellentin, 2017) and whether they would be open to trying a novel fermented coffee product. The last few questions were about how to approach potential shareholders for a new start-up company and any advice they could give to someone who might want to start a new specialty coffee organisation given what they know now.

The reason why this qualitative research was conducted, was to gather an understanding of the individuals that run specialty coffee businesses thoughts, motivations and opinions about the specialty coffee industry and to learn from them as much as possible so that their knowledge could inform the business case for 'Rhizo Coffee'.

## **Quantitative Research Methodology**

The Qualtrics survey website tool which allows individuals to create, distribute and analyse surveys (California State University Library , 2015), was used to carry out quantitative research in order to confirm that there is a market for specialty coffee and to determine whether there may potentially be a market for fermented coffee in NZ.

The Qualtrics survey that was made for this project was distributed in conjunction with Flight Coffee (Wellington) as a competition to win a months' worth of Flight Coffee and a \$50 Flight Coffee voucher. The prizes were provided by Flight Coffee. The survey was live at 3pm on the 30<sup>th</sup> January 2018 and closed at 3pm on the 13<sup>th</sup> February 2018, exactly two weeks after its initial post. There was a short window of opportunity for the participants to complete the survey and entries slowly decreased over this period.

The survey was composed of 22 questions, four of which were demographic questions and the remaining 18 were about regular coffee, specialty coffee and fermented products. These

questions can be found in Appendix D of this thesis. The survey was distributed to its participants through an anonymous link, which did not save any information that could be used to identify the respondents, such as an email address or name unless the survey specifically asked for it. In this case, the participants were able to add their email at the end of the survey, so that they could enter the competition (Qualtrics, 2018b).

The participants could only take the survey once, as the 'Prevent Ballot Box Stuffing' option was turned on. This option places a cookie on the respondent's browser, after they enter a response. When the respondent clicks the survey link again, Qualtrics will view the cookie and it will not allow them to take the survey once more (Qualtrics, 2018c).

Every question in the survey forced a response from the participants to move on to the next question, except for one question that had skip logic attached to it. The questions were: Have you tried Kopi Luwak 'civet cat poop' coffee or Black Ivory Thai elephant coffee before? If the respondent selected 'yes', they were directed to the question: What did you think of it? But if they selected 'no', they were directed to the question: Would you be willing to try it? The forced response allowed as much data to be collected from the respondents as possible and the skip logic allowed information to be gathered from different groups of respondents.

Qualtrics allows the user to select and compartmentalise data by adding filters so that specific subgroups may be analysed and outlying data can be removed. It also has different visualisation options in the reports section, including a simple table, bar chart, line chart, pie chart, breakdown bar, statistics table and a gauge chart that allows the user to visualise the data in a variety of ways (Qualtrics, 2018a). For the purpose of this thesis, bar charts were used to display the results.

## **Analysis**

Four demographic questions were added to the survey to differentiate between various subgroups of coffee consumers and to gather insight into data that could have been missed if only the broader aggregate data had been investigated.

The other 18 survey questions about the coffee industry were carefully crafted to identify coffee consumers thoughts motivations and opinions about the specialty coffee industry and novel fermented products. Some of which, aimed to identify specialty coffee consumers spending and frequency of consumption habits, what their favourite coffee brands were and reasons for their favouritism. They also aimed to recognise the respondent's willingness to try novel coffee products (specialty, regular and fermented) and what they wanted from a coffee brand.

The data collected from this survey has aided immensely in the development of 'Rhizo Coffee's' business case by providing evidence-based research to support the product in the NZ specialty coffee market.

## **Business and Commercialisation Assumptions**

Assuming that the specialty coffee niche will continue to expand over the next 30 years, there will still be a substantial target market for 'Rhizo Coffee' when it reaches its commercialisation phase. To test this, quantitative and qualitative research was carried out into small and large population studies on consumer behaviour in the specialty coffee niche. This was done in order to uncover what has spiked its growth so far and to potentially discover trends and patterns.

## Summary

The laboratory scale trial for the development of an MVP for 'Rhizo Coffee' was not successfully completed as the experiments were contaminated with other microorganisms. Future small-scale laboratory trials should seek a PC2 laboratory and they should trial the use of more sterile working conditions and a higher steaming temperature prior to and post fermentation of the green coffee beans, to increase the probability that it will sterilise them.

The qualitative and quantitative research methods employed through face-to-face interviews with specialty coffee organisations and an online Qualtrics survey for specialty coffee participants, have produced data that displays different perspectives on the specialty coffee industry. Some of the results have informed 'Rhizo Coffee's' business case.

## **Chapter 3: Findings and Analysis: Specialty Coffee**

### **Interviews with Specialty Coffee Organisations**

The 13 questions that were used in the interviews with Flight, Supreme and Ripe Coffee can be found in the appendix under: Appendix C. For the purpose of this thesis, the names of those who participated in the interviews were not mentioned in the data analysis section. As they spoke on behalf of their organisations, these names were used instead. The interview questions have not been outlined in the section below, but answers from the interview questions have been grouped according to the themes that presented themselves throughout the interviews.

The major themes include:

- Research and analysis methods employed by specialty coffee organisations
- Critical success factors for running a specialty coffee business
- Specialty coffee organisations and new product development
- Their willingness to licence or partner with another entity in the specialty coffee industry
- Differentiation from other specialty coffee companies in NZ
- Advice for new specialty coffee companies

### **Research and Analysis Methods Employed by Specialty Coffee Organisations**

#### **Quality Control: Origin and Beyond Part One**

Flight Coffee's business has evolved over time. They had always wanted to own a coffee farm at their coffee's source, but in the early stages they had no choice but to buy coffee from a green supplier. The way that the relationship traditionally worked was the buyer received a price list, then they chose a flavour profile and decided whether they wanted to



use it. In the early stages, Ripe Coffee had to choose from a limited coffee bean selection. They had worked with a broker in Auckland who had brought in 75-80% of all of the coffee beans in NZ and he supplied coffee to most of the roasters, so they were reliant on his selections. As the market changed and became more competitive, there were more roasters in the marketplace. Ripe Coffee developed direct trade relationships with Indonesia and Panama and they were working on developing another one with Colombia, so that they could tell their own stories. They had their own connections to their suppliers at origin (the source of their coffee beans).

Flight Coffee used to be Fairtrade. One of the reasons that they don't use Fairtrade beans any longer is that the consistency and the quality of coffee that came into NZ at the time was not good. It was quite common to see the same sort of coffee being used by a lot of different roasters because they used the same imported beans. Fortunately, it isn't a problem that Flight regularly faces because they use a lot of their own beans from their farm.

## **Analysis**

These findings suggest that it is hard to create a POD (e.g. to be able to purchase unique varieties of coffee or high-quality coffee beans) in the early stages of a company's evolution when the business is still small and purchasing options are limited. Specialty coffee is generally more expensive (due to its higher quality) and new start up coffee companies often have limited funds to use at their leisure. In the early stages, a new start-up company must be clear about exactly who they are and what they specialise in so as to direct capital to the appropriate areas. If they are wanting to be a specialty coffee-based brand, then they would need to raise a lot of capital prior to the products development to be able to afford premium priced beans. If the quality of the beans is not as important to the company, then a new start-up might want to purchase lower quality beans to save money in this area, so that their funds may be distributed elsewhere.

## Quality Control: Origin and Beyond Part Two

Flight Coffee's QC procedures ranged from the steps that they took at origin to their freshly brewed cup of coffee. They had travelled overseas (e.g. Columbia and Rwanda) and tasted coffee in other countries. For example, before they agreed to buy it, they were sent samples to make sure that the coffee tasted as it did at origin. Coffee producers at origin charged their buyers at a base rate. Any coffee that scored higher than 84 points (after Q grading) came at a higher price and it was determined on a qualitative scale. They generally used an 84 or 85-point coffee at Flight. The official score is made after the coffee is cupped by Q graders. In general, three Q graders create an official score. There were only about four or five Q graders in the country at the time of this interview and an employee from Flight Coffee was one of them.

Quality grading was based on the cupper's perception, but that perception was trained. There was usually more than one Q grader at any given cupping event and they had to be in calibration with one another. There was a certain amount of subjectivity, but each had something like a cellar palate. For example, if a vintner was drinking their own wines, they would be able to recognise the flavour attributes that were present in a good tasting wine. There were three Q Graders that came into the Flight Coffee Hangar regularly for cupping and out of 100 points their cupping scores would only be out of calibration from one another by 0.5 points.

When Flight's coffee came into NZ, they would run another post ship analysis on the coffee to make sure the quality was up to a suitable standard. It was then sorted and roasted to produce the optimum profile and once this was achieved, they then ran QC on every batch. It was then tasted to see that the quality was consistent and free of defects. Flight tasted the coffee for its raw attributes through the SCAA cupping form (Coffee Strategies , 2017), which had categories like acidity, sweetness and aroma and these were all graded out of 100. Anything that scored above 80 points was considered specialty coffee.

The SCAA cupping form is a standard QC form that removes subjectivity and allows Flight Coffee to grade every coffee types attribute on its own merit. On the cupping form the quality scale ranges from a 6-10 (six being good quality, 10 being outstanding quality) (SCAA, 2018a) as shown in Table 2 below.

**Table 2. Specialty Coffee Association of America Quality Scale**

Quality Scale			
6.00 - Good	7.00 - Very Good	8.00 - Excellent	9.00 - Outstanding
6.25	7.25	8.25	9.25
6.5	7.5	8.5	9.5
6.75	7.75	8.75	9.75

*Note.* Retrieved from (SCAA, 2018a).

The cupping form allows the cupper to record important flavour characteristics in coffee. These include: Flavour, Fragrance and Aroma, Acidity, Body, Aftertaste, Uniformity, Balance, Defects, Clean Cup and Sweetness. The presence of these attributes are positive scores that reflect the judgement of the cupper. Defects carry negative scores that denote an unpleasant flavour perception and the overall score is made by the cupper based on their overall flavour experience. The scale theoretically ranges from 0-10 points, with the lower end of the scale being below specialty grade (SCAA, 2018a).

The 'Final Score' is determined by adding the sum of the individual scores that were made for each of the attributes in the box labelled 'Total Score' on the SCAA cupping form. Defects are then deducted from the 'Total Score' and the result is the 'Final Score'. The total scores for different ranges of coffee quality are presented in Table 3 below (SCAA, 2018a).

**Table 3. Specialty Coffee Associate of America Total Score Quality Classification**

Total Score Quality Classification		
90-100	Outstanding	Specialty
85-89.99	Excellent	
80-84.99	Very Good	
<80.0	Below Specialty Quality	Not Specialty

*Note.* Retrieved from (SCAA, 2018a).

Flight Coffee did not use any coffee that fell below a seven on the quality scale and below an 80 on the final score. They employed this cupping method when they were buying coffee at origin and they used this as a scale to determine whether they were going to buy very expensive coffees for use in NZ. It gave them an international tool that provided them with a language to communicate with others in the industry.

From a brewing perspective, every week at the Flight Hangar Café an employee from their roasting team would check all of the parameters of their espresso machines, to make sure that things were tasting as they should, in accordance to what went out of the factory. That information was relayed to all their customers through a weekly update via inter-company communications and any issues were reported back to their management team for QC.

Flight Coffee is interested to see what 'Rhizo Coffee' would score prior to and post fermentation after it had been Q graded. If the coffee were to increase in quality post fermentation (e.g. from an 82 to an 85 score), it would increase its value.

Coffee Supreme sells the majority of their coffee through cafe's, so the training department and the technology team that run the machinery for example, are also key variables to regulate, as they do not have a lot control over the way that people brew their coffee. Approximately 250 cafes' sell Supremes' beans and use their coffee, which is one of the largest variables out there. Of all this coffee, approximately 90% of it is going to be consumed with milk as this is how people like to drink it. However, in the industry there is a

very purist view that milk should not be consumed with coffee as it dilutes the flavour profile. At the end of the day, coffee is a hot beverage and if Supreme can make a good one and it satisfies people, then they are happy with that.

## **Analysis**

Flights use of the SCAA cupping form and Q Graders allows them to make non-bias decisions when looking at buying new varieties of coffee overseas and within NZ. This allows them to compare their coffee to others internationally, as the tool is widely used. Q graders have trained palates which takes the subjectivity out of the buying process. This and the guidelines they measure against (SCAA cupping form) allow the buyer to make a purchase based on the coffee's flavour, aroma, quality and other attributes. Flight's testimonial and evidence from the literature review in this thesis about the use of Q Graders and the SCAA cupping form, have made a strong case for their use as QC tools for 'Rhizo Coffee'.

The data collected from the interviews mentioned above have made a solid argument for the importance of QC along the entirety of the value chain from the green coffee beans origin to its eventual brewing. There are so many variables along the value chain that can alter the taste, quality and aroma of the eventual product. Some of these include factors affecting the coffee beans at origin, after they are imported into the country and during the brewing process. These factors can be harder to control in larger companies such as Coffee Supreme. Milk can also change the taste and aroma of the brewed coffee and as Supreme mentioned, a large proportion of the NZ population consumes coffee with milk, therefore it would be wise to consider this when designing a new coffee product.

## **Quality Control: Laser and Moisture Testing**

Flight's coffee is more expensive than some of the other specialty coffee businesses in Wellington, as they use a machine with an in-built laser for QC during the coffee sorting process at origin. During the milling process, their green coffee is sorted by a machine with a laser in it that can identify whether the beans are defected in any way. If the machine

recognises that the beans are outside of a predetermined range of attributes, a gate of compressed air opens and flicks the coffee off to the side, only allowing the green beans within the specified range to pass through. These are the beans of the highest quality.

Flight's coffee is also moisture tested. There is a finite window for the moisture range allowed for dried (and roasted) coffee beans prior to export (and import), which is between 11%-12%. The moisture content can be measured with a moisture meter. If the coffee beans moisture content is too high, the quality decreases and mould can grow on them. If the coffee beans are over dried and the moisture content falls below 10%, acidity, aroma and freshness start to fade and below 8% it has disappeared completely. Over-dried coffee also weighs less and hence costs the business money, as more of the product is needed to make up for the lost water mass. If the moisture content of the beans is too high or low, their quality and value decreases (International Trade Centre (ITC), 2018).

Flight tests the moisture content of its beans prior to export, as the regulations mentioned above must be adhered to. The coffee could be sitting on the water in a ship for two months on its way to the desired country (which happens from time to time) and the moisture content in the coffee beans can be affected. This is why the coffee is also tested when it arrives. Like any ingredient, the moisture content is variable within the coffee product.

## **Analysis**

Quality Control procedures such as machine laser techniques and moisture testing of the coffee beans prior to and post shipment are examples of good practice employed by Flight Coffee.

Flight's machine with an in-built laser recognises and discards the defected green coffee beans and allows the highest quality beans to pass through for further processing. This reduces labour costs associated with hand sorting the coffee beans. It also increases the efficiency of the process and saves the business money that could be spent in other areas.

The same goes for moisture testing, firstly to adhere to regulations, but also to increase the probability that a more consistent, quality and cost-efficient product can be made.

## **Know Your Market: Customer Feedback and Sales Data**

Ripe Coffee's customer market research is carried out on a day to day basis in their cafés when their staff are face-to-face with their customers. They can see their customer's instant reactions to the product and the brewing processes that people enjoy. They reflect on customer feedback and the statistics fuelled by the products that are selling. Ripe finds that a lot of their customers are interested in trying something new, but they generally do not deviate from what they purchase on a regular basis. They find it hard to help people to adapt and change from their usual coffee product to a new coffee product long term. Taste is the most important conversion factor that Ripe considers, as their customers generally do not commit to a new product unless it tastes better, regardless of the amount of marketing that goes into it. Ripe Coffee believes that the relationships they have with their customers, staff, their partners and the people at origin are important. All of Ripe Coffee's cafes are distinctive. They have a range of café's in their wholesale business and each of them looks a little different from the next. Each café concentrates on different parts of the market, as the market is diverse in every part of Wellington.

Coffee Supreme pro-actively looks at sales data to help them with their buying selections and to help them choose which products they should take to the market. They have a Managing Product Development (MPD) team that manages this area. They are looking at opportunities within the market that they can capitalise on or do differently. Coffee Supreme is quite good at making coffee approachable to their customers. They rely on customer feedback from their cafes. If their customers want to talk about their coffee, Supreme are happy to do that and if their customers just want to enjoy the best possible cup of coffee in peace, they're happy with that too. Every cafe that they sell to comes in to Supreme for coffee training and they have their own coffee training in their stores. Supreme believes that customer service is a critical ingredient that contributes to building loyalty and a consistently high-quality product.

## **Analysis**

This research shows that customer feedback is a good form of market research for Ripe and Supreme as they are able to receive this feedback in real time. Coffee businesses could consider this when purchasing new coffee varieties. Looking at sales data could also be important for market research and something to consider when making new purchasing decisions or determining whether or not to keep a product on the market. This data could also aid in the development of new products, as the company could get a feel for what their customers want and then produce it if it is not currently available. Customer feedback could also aid a company in identifying trends within the industry, including consumer practices and preferences. This may contribute to the business staying ahead of the curve and its competitors.

This research also confirms that the better a business knows their market and can identify trends and behaviours within the specialty coffee industry (by having a team working in this area for example), the greater the chance that they are able to give their current and new customers what they want; giving them a competitive edge in the specialty coffee market.

## **Critical Success Factors for Running a Specialty Coffee Business**

### **Quality and Brand Point of Difference**

Flight Coffee saw their POD early on. They wanted to sell specialty coffee and nothing else for various reasons. From that point, they only bought coffee that scored 80 points and above (specialty grade) after Q Grading. They then navigated the market to find the 80+ coffee varieties that were out there. Flight Coffee decided that they wanted to make quality their focus. They saw a big gaping hole between where they were and where they wanted to be and then the opportunity. They developed systems and QC procedures out of the need to be better. Initially, they relied on traditional importers, but even then, their QC procedures were at least minimal.



Flight Coffee understands that one of the most important critical success factors when running a specialty coffee business is brand to a degree. The industry is incredibly trend driven, for instance having great coffee is not everything, but those in marketing are becoming more and more aware of specialty coffee and what it is, to the point that they can tell whether a cup is 80+ quality or not. Flight were quick to discover what quality coffee is and how it became synonymous with different brew methods, such as filtered coffee and pour overs for example. Having a good quality product is the basis of what they do and any peripheral accessories such as machinery comes later. The Flight Coffee brand not only involves the creation of the product, but the story behind it, which becomes the entity that people can associate themselves with. It becomes the customer's story when they buy into it and when this happens, the customers do the selling for them.

Flight Coffee has always tried to stay ahead of the curve. One way that they have achieved this in the past, is through owning their own coffee farm in Colombia. They differentiate themselves from others through having unique raw materials and sourcing practices. They add champagne yeast to their coffee in Colombia to ferment their beans. This is what they are bringing to the industry to create a POD for themselves and it is the reason why they are interested in 'Rhizo Coffee'. In addition, it helps to be great at telling their story too.

One of the major critical success factors for running Coffee Supreme is quality of product and their POD. They are selling to both wholesale customers (using their own machinery) and to end consumers. The coffee market in general and the wholesale coffee market in particular are incredibly over saturated. The companies that they see doing well are those that have a good understanding of who they are as a brand and the product they are selling. Businesses that are unsure about these things and those that have tried a bit of everything are the ones that struggle.

They invest a reasonable amount of time and money into confirming the quality of their products. This includes physically being there at origin to buy their coffee. They visit all their suppliers on a yearly basis. Supreme evaluates the industry, any new products that are out there and the challenges that they have faced that year. This process has been a success for

them. They also spend a lot of time developing their brand, as they realise the importance of brand too.

Ripe Coffee understands that to attract more customers, they need to have a variety of products and good content on their website. They believe that coffee businesses should share the company's story, provide tastings, train their staff and use social media to create an experience. This allows people to be exposed to the coffee across many different platforms as opposed to experiencing it in a café alone.

## **Analysis**

Flight Coffee was clear about what they wanted to do with the company in its early stages and they have stayed true to many of their initial plans. One of these was only selling high-quality specialty coffee. Their clear vision about what they wanted to do and their ability to deliver, has saved Flight money and it has aided in setting them up for success.

The findings from this data suggest that new specialty coffee companies should have a clear scope of works. They should not deviate from the plan unless there is strong evidence to suggest that they should do so and in this instance, the scope of works should be reviewed and a contingency plan should be implemented.

One of Flight Coffee's POD's is controlling all aspects of the value chain from their farm in Colombia to the final brewed coffee product. This enables the brand to be transparent about where their product is sourced and the sustainable and ethical methods they carry out in order to create a high-quality product. They are able to share their unique coffee story with their customers, dating back to its origin. Flight Coffee tries to stay ahead of the curve, though using new fermentation techniques to create unique varieties of coffee.

One of Supremes' critical success factors is the quality of their products. They are clear about who they are and what they want to achieve and this works for their business. They spend a lot of time at origin, trying the coffee products and carrying out procedures to confirm its quality before making a purchase. Supreme also evaluates the specialty coffee

market and the challenges they face each year. Their brand is an important aspect of their company that they re-evaluate too.

Ripe Coffee also understands the importance their brand, their origin story, the values they represent and how this is perceived by their customers. They want their customers to feel as though they are a part of something bigger than themselves. Ripe has an entire team of people that are involved in the creation of their coffee product from the country of origin, to the final brewed cup of coffee. When their customers feel as though they are a part of something bigger than themselves, they are more likely to purchase the same coffee product again, increasing the possibility of brand loyalty and a higher customer retention rate. Ripe Coffee also suggests that it is good to have a variety of products, as so many people have access to social media, where new products are continuously arising. They believe that companies should use social media platforms to their advantage.

## **Know Your Value Chain**

Coffee Supreme does not want to own their own coffee farms. They leave the farming to the families that have done it for generations, those that are experts in their fields. They do however, work closely with the coffee farmers, which makes them a part of the process from start to finish. Ripe Coffee has a similar approach, involved in various parts of the process from bean to cup. They believe that it is important for everyone to have the same vision at each stage of the process. Supreme does not believe in certifications and purchasing them. They want to have traceability and know where their coffee comes from. They also want to know that the coffee is grown sustainably. As mentioned before, a part of Flight Coffee's product offering is traceability from bean to cup, as they own and look after their own coffee farm in Colombia. They also carry out thorough research before making coffee purchasing decisions.

## **Analysis**

These findings suggest that it is important to be honest with the coffee consumer.

Traceability and transparency are important and they can be weaved into the company's

product and brand story. There are many steps that come before the final product and many people are involved at each step. Ethical and sustainable methods can be good for the business and the environment long term and they can make people feel better about their purchasing decisions.

# Specialty Coffee Organisations and New Product Development

## New Products

Flight Coffee's best seller is their Bomber Blend. They launched this new product line as they realised that they were going to miss a part of the market. It made about 40% of their customer base very satisfied. They identified a large problem, created the product to solve it and then launched it. It was very successful. The Bomber Blend is their house blend and it is made up of three different origins. The blends roast profile is a bit more developed for espresso, as it is generally more acidic and somewhat bitter. What makes specialty coffee specialty most of the time is those unique nuances.

Flight has a medium roast profile which means that in a 160ml cup, their flat white tastes great, but in the provinces and rural NZ, people do not want a 160ml cup of coffee, they want a large takeaway cup. The problem is, with that roast profile, acidity and milk, the coffee breaks out and it is almost flavourless, there is no punch. These consumers would then say: "You don't have strong coffee!" Flight then created the 'Bomber 2' (B2) blend which is the same roast as the Bomber Blend, except it is developed 2% further, to create a darker consistency. B2 is made up of beans from Rwanda, Colombia and Brazil. In comparison to the Bomber blend, the sweetness and body spikes, acidity drops and there is a higher solubility in the espresso machine. There are also more flavours in the cup to appeal to rural NZ and a few places that felt like Flight Coffee was a bit weak. It had converted a few of their customers from the Bomber blend to the B2 blend, so they had done a good thing. When coffee farmers use best practice, different washing stations and they grow rare varieties of coffee, it can fetch a higher price. Understanding the value of rarer coffee varieties and adjusting practices to suit them, in order to provide a unique and higher quality product is pivotal.

Flight Coffee imports seasonal blends and single origin coffees. Innovation is happening all of the time, especially now, when more and more people are able to access information and markets through technology. In terms of specialty coffee itself, what was trending a year ago is not necessarily trending anymore. Staying ahead of the curve is important. Having the

raw material to access unique coffee varieties is also key for them. They are currently working to exclusively access producers that grow these varieties. Flight also aims to get better at telling their story, which will aid in developing a stronger presence for themselves in the specialty coffee market.

Coffee Supreme have some coffees that they regularly buy every season and they have new coffees too. There are maybe 50 different coffees that they use per year. Their offer is broken into two parts, a consistent offer and a revolving offer, but even within the consistent offer, the ingredients within those blends are constantly changing, however, they do try to keep the flavours the same. The coffee products ingredients also differ, depending on the time of year.

Supreme removes coffee from their menu for quality reasons. As coffee gets older it does not taste as good. Generally, they do the groundwork before they buy the coffee so that they have confidence in its quality. They then release it to market and it remains on the menu until it is sold out. Supreme has software to keep track of all of this, so they can predict when something is going to run out and then replace it with another product.

Ripe Coffee sells filter coffee but it is a small part of their market. They have retail filter single origin coffee, but they find that they are transitioning towards espresso single origin coffee. Cold brews have been trending for the last three or four years (2013-2016) and they are still trending in 2017. Ripe believes that they are going to see a lot more innovation around them over the next few years. It is an easier product to get to market, without the labour costs associated with hot brewed single origin coffees.

## **Analysis**

The data from the interviews above suggests that specialty coffee businesses should invest in understanding what their markets wants and needs are. This could be achieved through looking at their sales data and customer feedback. It suggests that companies should develop an offering that reflects what their customers want if feasible.

The findings also suggest that regularly testing the company's products in the marketplace, can also be important. Developing practices to make sure that the product is all around consistent (e.g. brewing methods, packaging) could save the company money in the long run.

These interviews have shown that the specialty coffee industry is evolving fast and there is always something new to compete with. Transitioning from one product to the next and dropping new products into the marketplace is expensive. Therefore, new businesses could find it wise to have a consistent offer and a revolving offer like Coffee Supreme. It could give the company a more secure form of income, as the consistent offer would likely continue to sell and the revolving offer could be developed, based upon past sales data. They would be able to gauge what their customers like through market research. There is always a bit of risk involved.

## **Willingness to Licence or Partner with another Entity**

Flight Coffee suggests that if 'Rhizo Coffee' can show that there is value added to the coffee product post fermentation, for instance, if the quality of the coffee bean increases and the product adds value to their company, they would be very keen to discuss it further. Coffee Supreme is open to looking at ideas. They would never just say no, it would be based on the merits of what it was. They think that it is hard to say without trying it, but they are willing to try it. Whether it is a retail product or a coffee bean, it has to fit in with their strategies and values. Ripe Coffee is reasonably unlikely to consider licencing or partnering with

another specialty coffee entity in the industry, considering where they are in the marketplace at the moment. They are a small family owned business. They want to remain in control of their company and their direction and they do not want to have investors or other shareholders dictating the direction of their business in the future. All three companies: Ripe, Supreme and Flight Coffee are willing to try 'Rhizo Coffee'.

## **Analysis**

The companies that are big enough to afford to licence an idea or partner with another business (Supreme and Flight) are interested in 'Rhizo Coffee', if a business case can be made for the product that creates value for their company. The product would need to taste good and assimilate with what they are offering. Ripe Coffee would not be a good organisation to pitch to for a potential partnership or licencing deal as they want to remain a family owned company with creative control. All three organisations are willing to try 'Rhizo Coffee', making the prospect of a potential relationship more promising.

## **Differentiation from Other Specialty Coffee Companies in New Zealand**

### **Old Company, Large Coffee Offering**

Coffee Supreme is one of the original coffee companies in NZ. They also roast their coffee domestically and have one of the largest coffee offerings in NZ, this is their point of difference. It sets them apart from their competitors as far as their coffee's availability to the people.



## **Consistency**

Supreme likes that they have remained predominantly café based. They want to help people make better coffee at home too, but they do not sell their coffee in supermarkets as they cannot control its quality.

## **Unique Coffee Varietals**

Ripe has a unique range of coffee varietals that no one else has in NZ. They have coffee from one farm in Panama and they buy almost all of the coffee from that farm, no one else has that coffee in NZ. They also have the Geisha varietal from that farm which is highly sort after by coffee roasters because it is in short demand, but it is not highly sought after by their customers because it is expensive, so it is very niche. Ripe Coffee has their own style. When they created their brand, they created a look and feel about what the brand was, offering unique experiences that no one else was offering, like home roasting and tasting events that were happening within the store.

## **Analysis**

Consistency, a large coffee offering and unique coffee varietals are some of the things that sets Ripe Coffee and Coffee Supreme apart from their competitors. Unique coffee varietals have been a recurring theme amongst these interviews, suggesting its importance amongst these three specialty coffee companies and the specialty coffee market that they contribute to. This suggests that Rhizo Coffee's unique fermentation process could also be a selling point within the specialty coffee market.

## **Advice for New Specialty Coffee Companies**

### **Have as Much Start-Up Capital as Possible**

Flight Coffee suggests that new start-up companies should go into business with as much money as possible. They should also understand the market and the costs involved in the coffee industry; it is expensive. Coffee plant is not cheap, input costs are high and the barrier to entry is not high or low, it is somewhere in the middle.

Supreme reiterated that NZ has one of the highest coffee roasteries per capita in the world. They said that new coffee businesses should look at how they want to sell their coffee. If they want to sell to cafes, they would have to work the coffee machines and carry out training, which is an expensive model with a large wage bill. They said that it might be possible to sell products at select retailers, or online only, but that can be hard too as the company's brand has to be strong. Selling the product in supermarkets could be an option, but the company's margin would be small and they would be tied to those supermarkets. There is always a compromise. Supermarkets look at the product that best suits their buying profile and whether they recognise the brand.

### **Analysis**

Both Supreme and Flight Coffee agree that having as much money to invest in the company before the products launch is important, as there are many costs associated with the different channels for its commercialisation. They also mention that companies should understand the market and the costs involved. They suggest that they should be smart about the channels they choose to use and to devise a plan and stick to it as mistakes can cost the business a lot.

## **Keep it Simple Know Your Market**

Ripe Coffee believes that it is important to educate specialty coffee companies with what customers want and to find their market and stick to it. They say to focus on one thing and try to create relationships with coffee drinkers through your company's story, this is almost as important as the actual product itself, as it is what people buy into. Ripe Coffee has made changes in their company to try to appeal to their future audience as well as their current audience. They are aware of where the new coffee drinkers are coming from and what they want as coffee consumers get older. The older coffee drinkers are more interested in making connections with the staff behind the counter, who ensure that the product that they love and have become used to over the years is consistent. Whereas, the new coffee drinkers want to know where their products were coming from, including any information that was new or different about those products and the social connections and certifications that they might have. They want a lot more detail.

Flight Coffee suggested that new businesses need to know their market and be clear about what they want to do. They said to understand that the specialty coffee market is very crowded but that is not to say new coffee businesses cannot do well. When new businesses create a brand or a product, it is about how it is sold and if it is well marketed and advertised to the consumers.

Supreme is a company that is trying to increase the quality of their coffee and its popularity amongst consumers. Instead of looking down at people who consume coffee with milk thinking they should be doing so without it, they accept that people like to drink coffee that way and they embrace the fact that they might be persuaded to try something new in the future. They try to make sure that their customer's get what they want from the interaction and that their experience is a good one.

## **Analysis**

The findings above suggest that specialty coffee companies should adapt to new consumer behaviours as consensus and trends change. They suggest that these companies should target a market and be consistent in their offering. Consumers like what they are comfortable with, but if they give any indication that they might like to try something new that is not currently offered, specialty coffee companies should consider their proposal as a form of data collection for new product development.

This data suggests that good relationships between a specialty coffee company and its customers are key. Their loyalties may lie in creating consistently good high-quality products that have interesting stories to back them. Strong marketing could allow the product to gain a wider reach and potentially supply new customers. The data also suggests that specialty coffee companies should conduct research into what their customers want with the intention of trying to make it a reality.

## **Certifications: Not as Important as Many Other Things**

Quality graders can give a coffee company a certification. In a way, this does not mean a lot to Ripe Coffee as they buy their coffee based off of its quality, whether they like it or not, the relationships they can make and the story behind it. Quality grading is more beneficial at the grower's end of things because they can issue a certificate on the coffee, which gives it a certain value. Coffee can also be Q graded in NZ, if it scores above 80 points, a premium price can be attached to it and it can be classed as specialty. However, in the value chain in NZ, Ripe does not see a lot of use for certifications as the customers are only going to buy the coffee if they like it. The customers dictate what they want as a product and what they want to spend their money on. Some of Ripe's coffees are Fairtrade certified and Rainforest Alliance certified but they would rather tell stories about the make-up of their coffee and its origins.

## **Analysis**

Ripe Coffee suggests that certifications are only important if consumers give them value. They are not one of the most important qualities needed to sell a product. Good taste, quality of product and the stories behind the coffee, are more important than a certification for Ripe Coffee and their consumers. They are suggesting that certifications are not necessary and there are more important areas to focus on in a specialty coffee business.

## **Suggestions for Rhizo Coffee**

Supreme and Ripe Coffee suggest that 'Rhizo Coffee' could sit outside of the specialty coffee roasters to a degree. It could be set up as a consumer ready product like a cold beverage. The products POD might be its reported health benefits (if there are any), or the novelty of the fermented coffee process. Supreme finds it hard to see where it would sit in their offering as it is quite different and it seems like it would need a strong story to support it. They believe that this is 'Rhizo Coffee's' unique selling point, so it almost needs to be a standalone product and have the packaging to display it.

## **Analysis**

The findings above suggest that 'Rhizo Coffee' could be a stand-alone product, such as a cold beverage, as it is completely different to anything that is selling in the NZ coffee market today. Supreme and Ripe Coffee also reiterate that the story behind 'Rhizo Coffee's' fermentation process is its POD. This is considered in the business model for 'Rhizo Coffee' in the following chapters.

## **Plan Ahead be Consistent**

Flight Coffee suggests that a new specialty coffee company should be as forward thinking as they can be and have an idea of where they want to be in five years. They suggest setting up a plan and finding facilities to match that. Flight Coffee has been in the industry for about 10 years and during this time, they have gone through four different roasters as they have grown. They are already looking to find their next roaster and they are constantly upgrading. They advise sitting down with someone that knows a lot about business and to have a plan, which should be reverted back to every six months.

Ripe Coffee advises that a new start up specialty coffee company should seek advice about running a successful business, for example, advice about partnerships and cash flow. They also suggest that these companies should have a business structure and clear ethos from the beginning. They should follow through with it and be consistent, as a lot of NZ businesses do not have a strong business plan when they start off and it does not turn out well for them a lot of the time. It can be hard to change direction when they have already started on their path, so Ripe believes that a clear vision and mental push from the beginning are very important for a successful business.

## **Analysis**

The findings suggest that planning ahead can be very important. Things can change unexpectedly and there needs to be a plan in place to deal with these changes. These organisations suggest that businesses should re-evaluate their plans every six months, to look at whether they are still valid and the best form of action to take, regarding where the company is in the marketplace at the time.

The findings also suggest that if those working in the company are uncertain or do not have a lot of knowledge in an area, they should seek an experts' opinion. It is worth the investment. Having a strong business plan from the very beginning ideal. Flight and Ripe also

suggest that a company should be clear about their goals and intentions and they should strive for them as much as possible.

## **Confidence in data**

The participants that were interviewed for this thesis can speak on behalf of the companies that they own or work for. In order to be able to do this, they have to have extensive knowledge about their companies' business and practices. Therefore, the data presented above is viable for the purpose of this thesis.

## **Impact**

The advice that Flight, Supreme and Ripe Coffee have provided from the interviews above, has been taken into consideration during the development of 'Rhizo Coffee's' business model, which is presented in successive chapters below.

## Conclusions

Flight, Supreme and Ripe Coffee have given some great advice about the specialty coffee industry, what has worked and what has not for their organisations in the past and what they believe makes a successful coffee business.

The most important conclusions drawn from the interviews conducted for the purpose of this thesis, are that a specialty coffee company should have a strong plan for its future and it should also have strong quality control practices, as there are a lot of variables involved in the coffee's sourcing, processing and production that can alter the final product. Knowing your market and what your consumers want is also important. Market research also needs to be carried out.

Having a strong POD from your company's competitors is critical to its success, in a market that is very saturated in NZ. This POD can be presented in the form of unique coffee varieties, high quality coffee beans, a variety of products, a unique and interesting story and a strong brand that is sure about its values and what it does.

For new specialty coffee companies, having as much capital as possible in the early stages of development can make everything to come so much easier, as the specialty coffee industry is an expensive industry to be a part of.



## Chapter 4: Findings and Analysis Qualtrics Survey Data

The overall data from the Qualtrics survey, that is titled 'Rhizo Coffee', is displayed below. Only the data that is relevant to this project is discussed in this chapter. There is 15 out of 22 questions from this survey that have been used in this data analysis section. The survey questions that are presented in the Qualtrics survey can be found in Appendix D.

There are also three subgroups presented below, where demographic data from the Qualtrics survey has been cross tabulated with data from some of the questions that have been asked within it. These include:

- The demographic of students that earn <\$30,000 p.a. in the age range between 18-24 years old
- The demographic that earns between \$50,000 - \$99,999 p.a.
- The demographic between the age range of 25-34

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range between 18-24 Years Old Subgroup Data**

There are 54 students (20.51%) within the age range of 18-24 that earn <\$30,000 p.a. The reason why these three demographics were chosen to look at as a combined subgroup was because they contain the largest or second largest respondent sizes in the survey data. 'Student' is the largest demographic subgroup (62p, 22.79%) amongst all of the participant's occupations. The age range between 18-24 is the largest subgroup in the age demographic (120p, 43.96%). The demographic that earns <\$30,000 p.a. is the second largest subgroup (93p, 34.44%) behind those that earn between \$50,000-\$99,000 p.a. (97p, 35.93%). This subgroup was chosen, as students generally earn less income than the majority of the working population (Gee, 2017). Therefore, combining students between the ages of 18-24 with those who earn <\$30,000 p.a. might have created a larger population size based on this fact, then if they were paired with the demographic that earn between \$50,000-\$99,000 p.a.

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 97 participants that earn between \$50,000 - \$99,999 p.a. (35.93%) which contains the largest number of respondents for the income demographic in the survey. This subgroup was chosen as they potentially have the means to be able to afford a premium coffee product and it would be of interest for the development of 'Rhizo Coffee's business proposal, to further explore their thoughts and opinions about specialty coffee and fermented beverages.

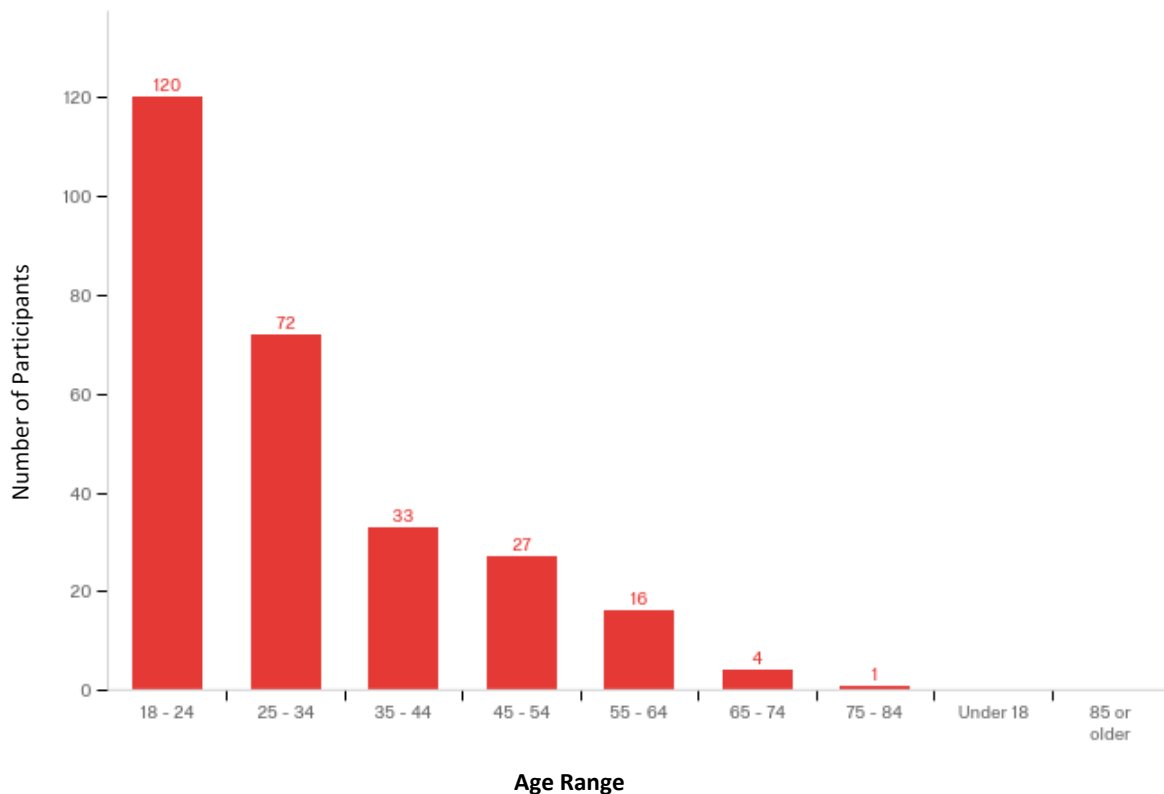
### **Demographic Between the Age Range of 25-34 Subgroup Data:**

The subgroup whose ages range between 25-34 (72 p, 26.37%), is the second largest age demographic, following the age range between 18-24 (120 p, 43.96%). They were chosen as a subgroup, because 25-34-year olds are generally further along in their careers than 18-24-year olds due to the amount of time spent in the workplace. It was hypothesised that they this subgroup earns more money per annum, so they could afford to pay for a premium product, such as 'Rhizo Coffee'.

### **Data Grouping**

There are some participants from two or more age and income ranges that have the same opinions. If the age or income ranges follow immediately after one another, their data is grouped together and presented as one. For example, if the participants whose ages range between 18-24 and 25-34 believe that taste is the most important quality to look for when buying a new brand of coffee, the data would be displayed as 18-34-year olds believe taste is the most important factor when deciding which brand of coffee to buy.

## Question 1 (Q1) What is your age?



Out of a total of 273 participants that took the survey and answered this question, there are 120 participants between the age range of 18-24 (43.96%), which makes up the majority. The second largest group of participants is between the ages of 25-34 (72 participants (p), 26.37%). The third largest participant age group is between 35-44 (33p, 12.09%).

### Analysis

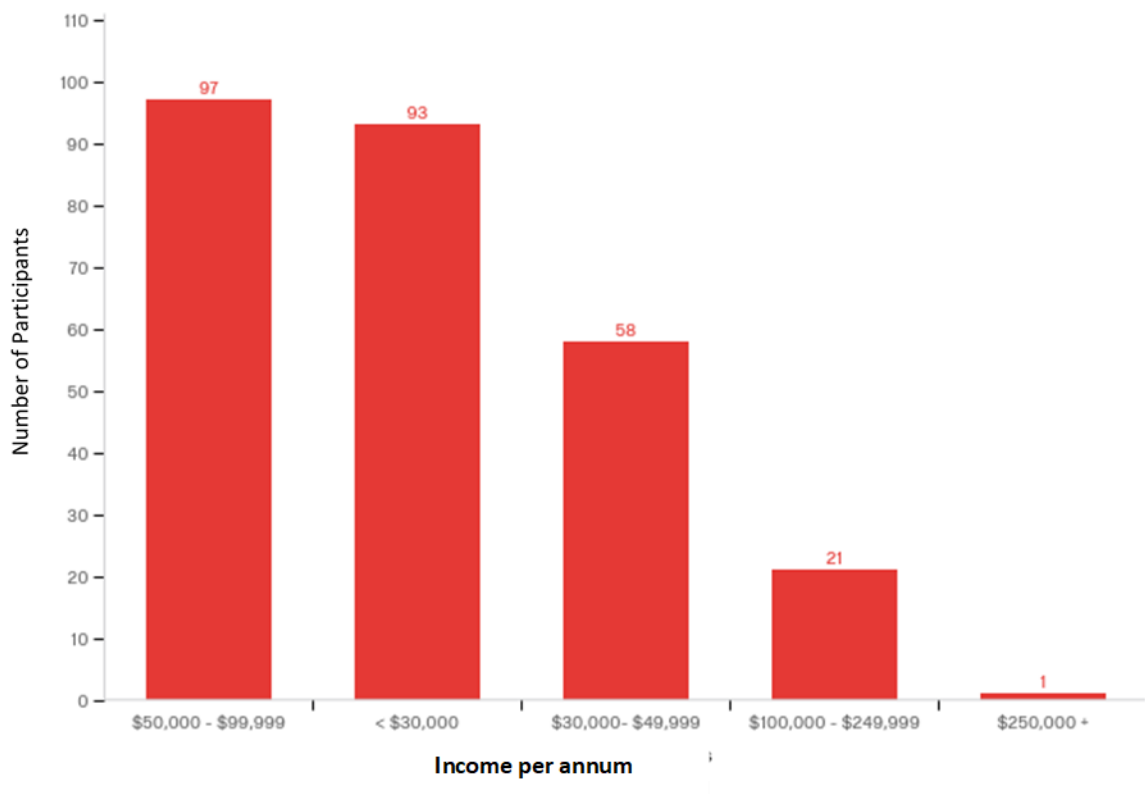
The largest participant age group is in the youngest age range (18-24) with groupings decreasing in size as the participants get older. This might be because Flight Coffee, who distributed the Qualtrics survey has a younger customer base and it could also be because two of the people that shared the survey on Facebook are between the ages of 18-24 and their friends are mostly between the ages of 18-34, or a combination the two.

## Subgroup Data Results

### Demographic Between the Age Range of 25-34 Subgroup Data:

There are 72 participants that are in the age range between 25-34. Of these participants, 41 (56.94%) of them earn between \$50,000-\$99,999 p.a. The next most popular selection was \$30,000-\$49,999 p.a. (14p, 19.44%) and then <\$30,000 p.a. (12p, 16.67%).

## Q2 What is your income per annum?



There are 270 participants that answered this question in total. Most of these participants earn between \$50,000 - \$99,000 p.a. (97p, 35.93%), the second largest group earn <\$30,000 p.a. (93p, 34.44%) and the third largest group earn between \$30,000- \$49,999 p.a. (58p, 21.48%). Most of the participants earn <\$30,000 p.a. and between \$50,000 - \$99,000 p.a. (70.37%). There is a smaller proportion of the population that earn between \$30,000- \$250,000+ (29.63%).

## **Analysis**

The \$50,000 - \$99,000 p.a. participant subgroup above, is only greater than the subgroup that earn less than <\$30,000 p.a. by four participants or 1.49%. Therefore, both subgroups carry much of the demographic and they have contributed to the development of 'Rhizo Coffee's' business model.

## **Subgroup Data Results**

### **Demographic Between the Age Range of 25-34 Subgroup Data:**

There are 72 participants that are between the ages of 25-34 that answered this question. Most participants in this subgroup earn between \$50,000-\$99,999 (41p, 56.94%), then \$30,000-49,999 (14p, 19.44%), followed by <\$30,000 (12p, 16.67%).

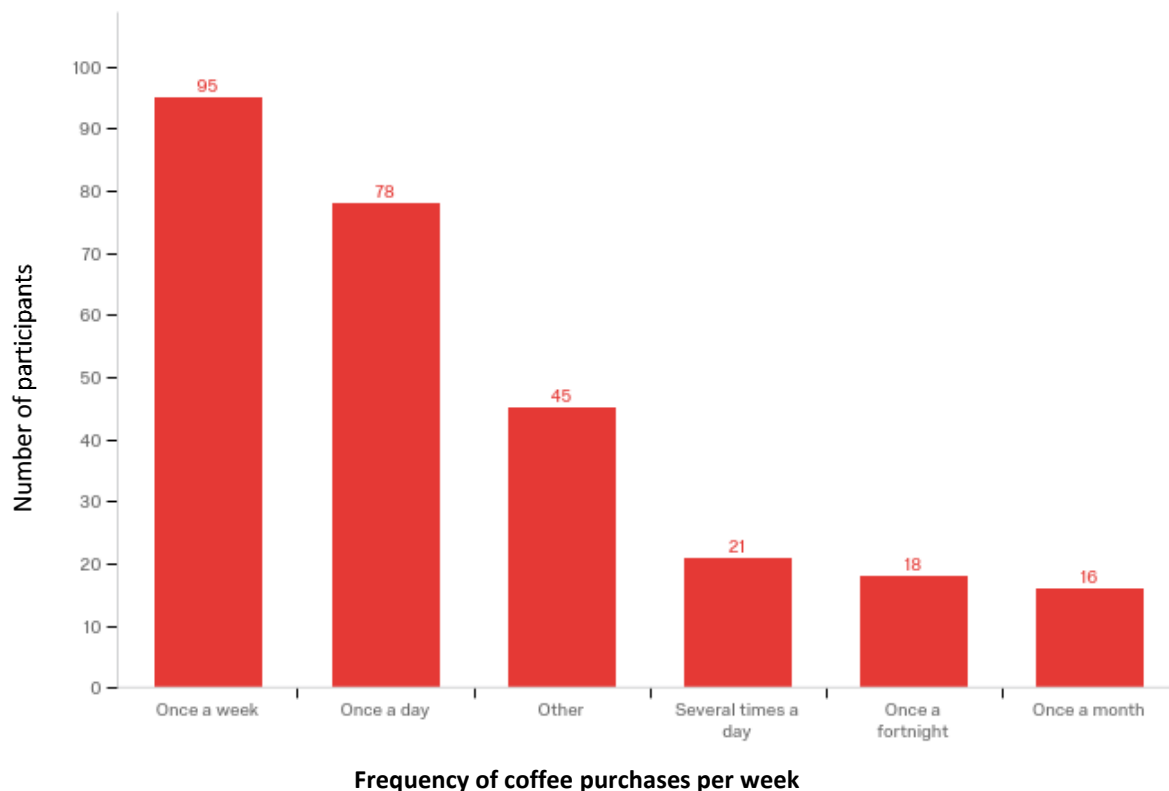
## **Q3 What is your occupation?**

There are 272 participants that answered this question. The most popular occupation that participants selected was 'Student' (62p, 22.79%), then 'Teacher' (20p, 7.35%) and then 'People who Worked in the Coffee Industry' (15p, 5.51%).

## Analysis

Most of the participants that answered the question above are students. This makes sense as one of the people that shared the Qualtrics survey on their Facebook page is a student and has a lot of friends that are students. Another person that shared the Qualtrics survey on their Facebook page is a teacher and may have a lot of friends on Facebook that are teachers. The Qualtrics survey was also shared by Flight Coffee on their Instagram and Facebook pages and it is likely that they are connected to others in the industry that follow their social media profiles and they might have completed their survey.

### Q4 How often do you buy coffee at cafes or coffee carts per week?



There are 273 participants that answered this question. Most people selected that they buy coffee from cafes and/or coffee carts 'Once a Week' (95p, 34.8%), then 'Once a Day' (78p,

28.57%), then 'Several Times a Day' (21p, 7.69%). The most popular written response under 'Other' is 2-3 times per day (14p, 5.13%).

## **Analysis**

There are two large subgroups that have different coffee consuming routines: Those respondents who consume coffee 'Once a Week' and those who consume coffee 'Once a Day'.

The majority of people consume coffee 'Several Times a Day' (21p, 7.69%) and there are 14 participants (5.13%) in the 'Other' subgroup that consume coffee 2-3 times a day. If these two groups are combined, they would make up a total of 35 participants or 12.82% of the total number of participants that answered this question. Although the combined 35 participants is quite a lot smaller as a subgroup than those people that selected that they consume coffee 'Once a Week' (95p, 34.8%) and 'Once a Day' (78p, 28.57%), it still suggests that a large subgroup of participants consume coffee once to several times a day.

If the subgroups of those who consume coffee 'Once a Day', '2-3 Times per Day' and 'Several Times a Day' are combined (113p), they would make up 41.39% of the total sample population for this question.

These results suggest that overall, out of the 273 participants that answered this question, most of them consume coffee quite frequently. It makes sense as NZ has one of the highest coffee roasteries per capita in the world (TRT, 2017). From a business perspective for specialty coffee companies, the more coffee that people consume the better.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 Years**

#### **Old Subgroup Data:**

There are 56 respondents that are a part of this demographic that answered this survey question. The majority of these participants buy coffee 'Once a day' (20p, 35.71%), then 'Once a Week' (11p, 19.64%) and finally 'Once a Month' (9p, 16.07%).

#### **Demographic that Earn Between \$50,000 - \$99,999 p.a. Subgroup Data:**

There are 97 respondents that earn between \$50,000 - \$99,999 p.a. that are a part of this demographic. Most of these participants buy coffee 'Once a Week' (38p, 39.18%), then 'Once a Day' (26p, 36.11%) and then 'Several Times a Day' (8p, 8.25%). The next most popular answer is 'Other' (16p, 16.49%) in which the majority of people wrote that they consume coffee 2-3 times a week (6p, 6.12%).

#### **Demographic Between the Age Range of 25-34 Subgroup Data:**

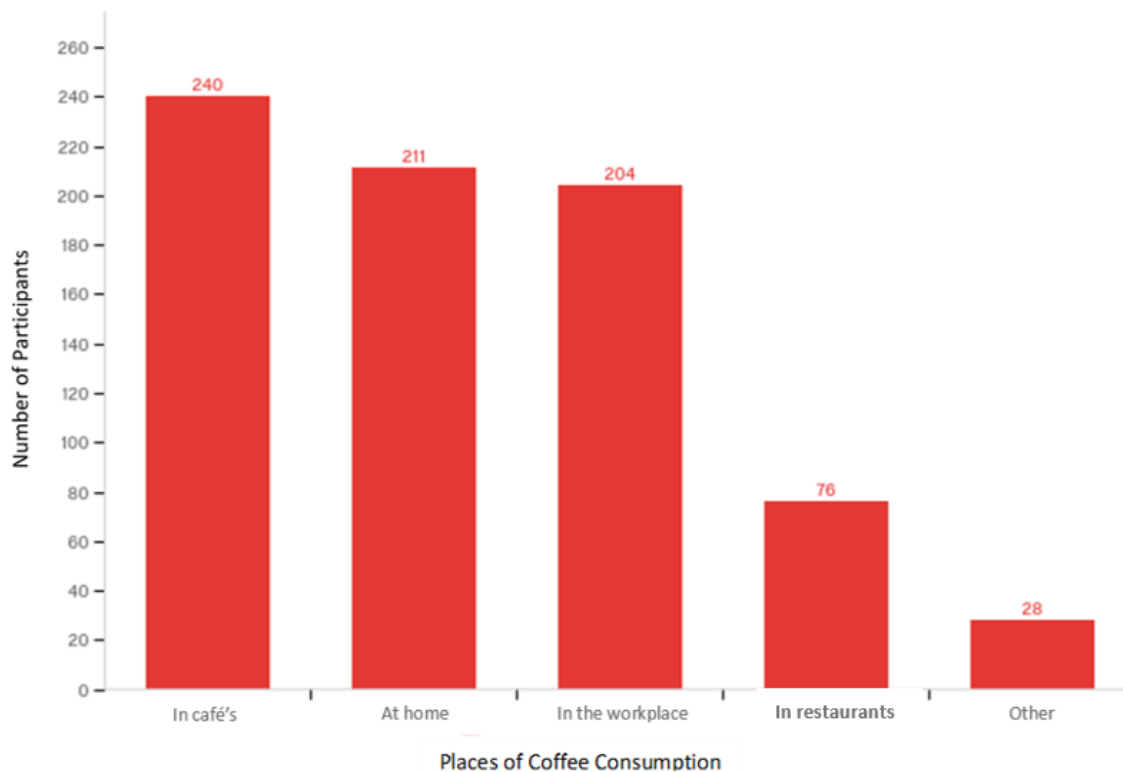
There are 72 participants between the ages of 25-34 that are a part of this demographic. Most of these participants buy coffee 'Once a Week' (26p, 36.11%), then 'Once a Day' (21p, 29.17%) then 'Several Times a Day' (5p, 6.94%). The most popular written answer under 'Other' (14p, 19.44%) is 2-3 times per week (4p, 5.56%).

### **Analysis**

All three demographic subgroups above, selected that they consume coffee 'Once a Week' and 'Once a Day'. These are in the top two selections for the majority of these participants. These results are similar to that of the overall participant votes, which place 'Once a Week' and 'Once a Day' as the two most common categories. Other selections are 'Once a Month', 'Several Times Per Day' and '2-3 Times Per Week'.



## Q5 Where do you drink coffee?



The respondents could select more than one answer for this question. The percentages were calculated for the total number of participants that selected that answer, as is true for all of the percentages calculated in this chapter. There are 273 participants and a total of 759 responses for this question. The most popular place that people consume coffee is 'In Cafes' (240 responses (r), 87.91% p). The second most popular answer is 'At Home' (211r, 77.29% p), followed by 'In the Workplace' (204r, 74.73% p).

### Analysis

This question aims to identify where people drink coffee the most. The results show that 'In Cafes' is the respondent's first choice, then 'At Home' and then 'In the Workplace'. This data could aid in the development of 'Rhizo Coffee's' business model, as targeting cafes and creating a brewing method that allows individuals to drink coffee at home and in the

workplace may be channels to build a case around, due to their popularity as places of coffee consumption (combined total of: 86.3% responses).

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There is a total of 150 responses and 56 respondents in this subgroup. Most of these participants consume coffee 'In the Workplace' (50r, 89.29% p), then 'In Cafes' (47r, 83.93% p) and then 'At Home' (43r, 76.79% p).

### **Demographic that Earn Between \$50,000 - \$99,999 p.a. Subgroup Data**

There is a total of 278 responses and 97 participants in this subgroup. Most of these respondents consume coffee 'In Cafes' (85r, 87.63% p), then 'At Home' (79r, 81.44% p) then 'In the Workplace' (76r, 78.35% p).

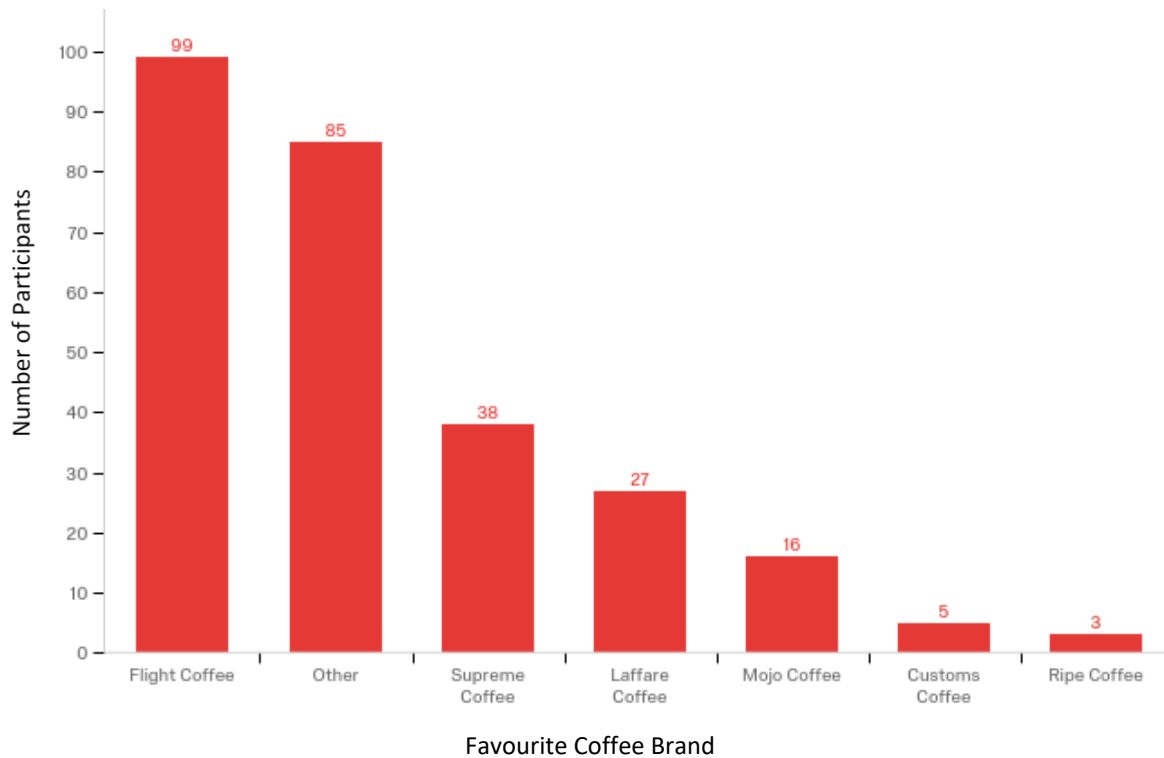
### **Demographic Between the Age Range of 25-34 Subgroup Data**

There are 72 respondents that gave 198 responses for this question. Most of these participants consume coffee 'In Cafes' (62r, 86.11% p) then 'In the Workplace' (56r, 77.78% p) and then 'At Home' (55r, 76.39% p).

## **Analysis**

All three subgroups selected that they consume coffee 'In the Workplace', 'In Cafes' and 'At Home' in various orders. These were also selected in the top three answers for the overall data.

## Q6 What is your favourite coffee brand?



There are 273 responses for this question. The majority of the participants favourite coffee brand is 'Flight Coffee' (99p, 36.26%), then 'Coffee Supreme' (38p, 13.92%) and then L'affare Coffee (27p, 9.89%). The 'Other' subgroup is also quite large (85p, 31.14%), of which, respondents selected Havana as the most popular answer (21p, 7.69%).

### Analysis

Flight Coffee is the participants favourite coffee brand in Wellington, therefore, it would be wise to seek their advice as to what they do to maintain their customers support. They might also be good to reach out to so as to see whether they might want to seek a partnership with or purchase the licence for 'Rhizo Coffee' in the future. The results for this question may be skewed however, as Flight Coffee sponsored and distributed this survey to their audience via their social media outlets, so it would make sense that the majority of the participants are Flight Coffee fans. As Supreme and L'affare are the next favourite specialty

coffee brands, their advice about the specialty coffee industry and their companies should be sought out as well.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There are 56 participants in this demographic. Most participants chose 'Flight Coffee' (25p, 44.64%) as their favourite coffee brand, then 'Supreme' (9p, 16.07%) then 'Mojo' (5p, 8.93%).

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 97 participants that answered this question. Most of these participants favourite coffee brand is 'Flight Coffee' (29p, 29.89%) then 'Supreme' (11p, 11.34%), then 'Havana' (10p, 10.31%) with 'L'affare' (9p, 9.28%) close behind.

### **Demographic Between the Age Range of 25-34 Subgroup Data:**

Of the 72 participants in this grouping, most of the participants favourite brand is 'Flight Coffee' (32p, 44.44%), then 'Supreme' (14p, 19.44%) and then L'affare Coffee (6p, 8.33%). 'Other' (17p, 23.61%) is another large subgroup out of which 'Peoples Coffee' (4p, 5.56%) is the most popular written answer.

## **Analysis**

All three of these subgroups have 'Flight Coffee' as their most popular answer with 'Coffee Supreme' coming in second. The entire sample population data suggests the same. The subgroup between 25-34 years old have 'L'affare' as its third most popular coffee brand,

which it has in common with the entire sample population. The demographic that earns between \$50,000 - \$99,999 p.a. selected 'Havana' as their third most popular choice and 'L'affare' was close behind. In the subgroup of students that earn <\$30,000 p.a. in the age range between 18-24 years old, 'Mojo' is their third favourite coffee brand, which it doesn't have in common with any other subgroup or the overall responses.

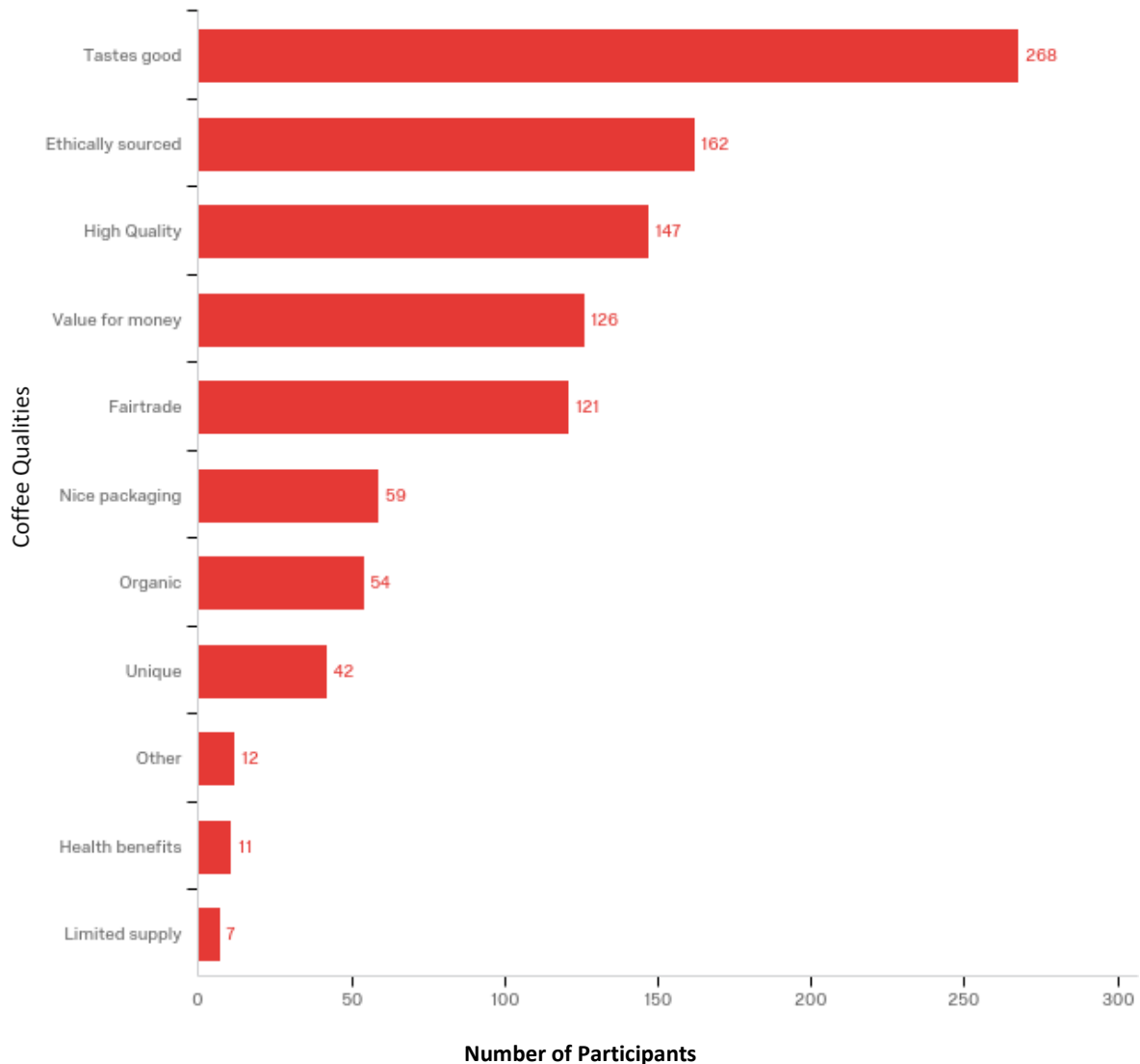
## **Q7 Why is this your favourite coffee brand?**

There are 273 participants that answered this question. The question requires a written response, enabling the participants to write more than one answer. There are 111 participants (40.67%) who wrote that 'Good Taste and Flavour' are the top reasons for a coffee brand being their favourite. The second most popular reason is the 'Variety and Range' of coffee blends offered (18p, 6.59%) and the third is the 'Consistency' of product (14p, 5.13%). In succession, 13 participants (4.76%) think that locality and convenience are a draw card for their favourite coffee brands.

### **Analysis**

'Good Taste and Flavour' is the most popular reason for most participant's favourite coffee brands being their favourite (111p, 40.67%). This has influenced 'Rhizo Coffee's' business model, in that the taste of the coffee must be a fundamental part of its brand. The 'Consistency' of product is also important to the participants and these factors will be tested for during the development of the MVP for 'Rhizo Coffee' on small and larger scales.

## Q8 What qualities do you look for in the brand of coffee you regularly buy?



The participants could select all answers that applied for this question. There are 273 respondents and 1009 responses. The quality that the participants look for the most in a brand of coffee that they regularly buy is 'Good Taste' (268r, 98.17% p). The second quality is that it is 'Ethically Sourced' (162r, 59.34% p) and the third favourite is that it is of 'High Quality' (147r, 53.85% p). Other qualities participants deem important are 'Value for Money' (126r, 46.15% p) and that the product is 'Fairtrade' (121r, 44.32% p).

## **Analysis**

When the participants were given 11 qualities to choose from, 'Good Taste' was the most popular selection by a large majority. The next most popular answers were 'Ethically Sourced' and 'High Quality', with 'Value for Money' and 'Fairtrade' not far behind.

One of these findings supports the previous questions findings, in that taste is the most important quality that these participants look for in a brand that they regularly buy. It reiterates the importance of the presence of good flavour attributes in new coffee products that have proved to be desirable to coffee consumers.

Given a selection of attributes that may appeal to consumer's coffee purchasing decisions, their answers may be less representative of their actual thoughts and opinions, as they may have selected the qualities that they believed the survey creator wanted to hear. This contrasts with the previous question, where they were able to type their answer without any prompting.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data:**

There are 56 participants in this subgroup that gave 214 responses for this question. The qualities that most participants look for in a new specialty coffee brand are that it 'Tastes Good' (54r, 96.43% p), that it is 'Ethically Sourced' (35r, 62.5% p) and that it provides 'Value for Money' (32r, 57.14% p).

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data:**

There are 97 respondents and 341 responses for this question. Most participants selected 'Tastes Good' (96r, 98.97% p), as the most important quality they look for when selecting a

coffee to buy. Next, it is that it is 'Ethically Sourced' (58r, 59.79% p) and then that the coffee is of 'High Quality' (54r, 55.67% p).

### **Demographic Between the Age Range of 25-34 Subgroup Data:**

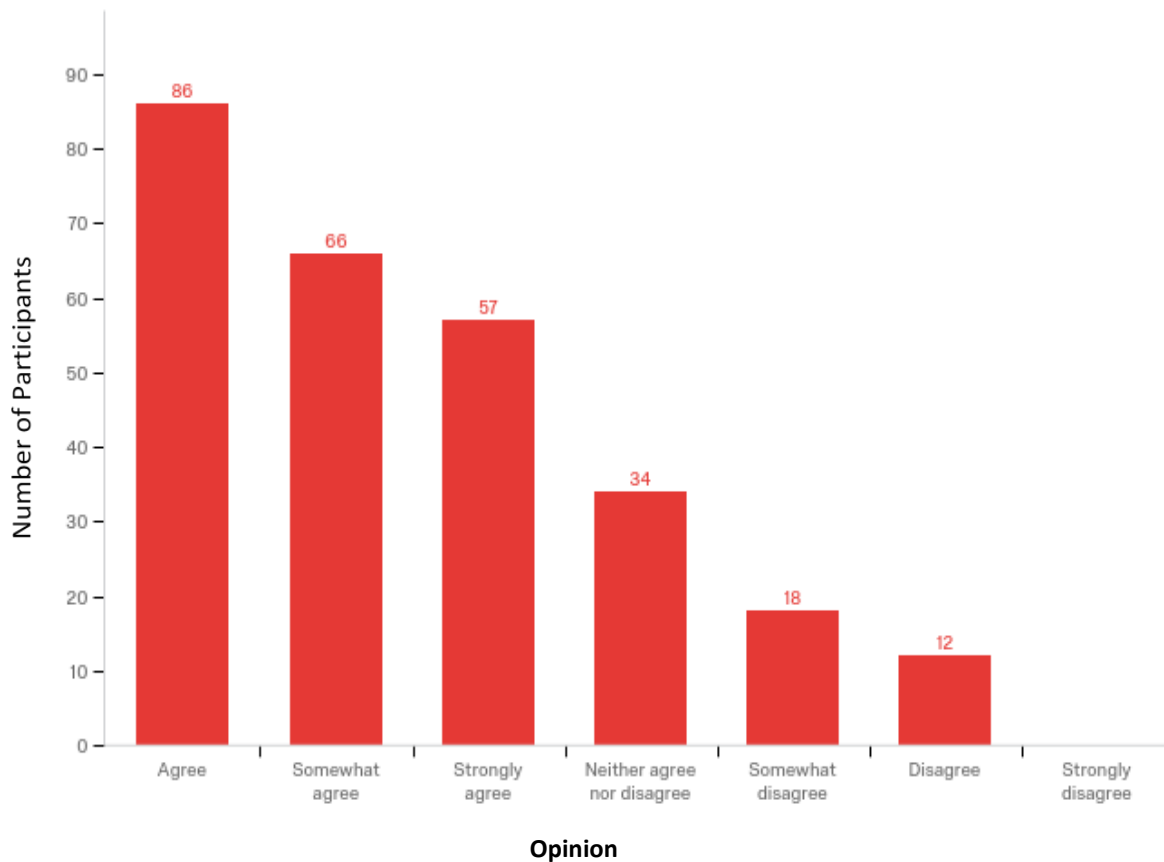
There are 72 participants and 266 responses for this question in this subgroup. Most participants selected 'Tastes Good' (70r, 97.22% p), as the most important quality they look for when selecting a coffee to buy. Next, it is that it is 'Ethically Sourced' (45r, 62.5% p) and then that it is of 'High Quality' (43r, 59.72% p).

### **Analysis**

Each of the three subgroups selected 'Tastes Good' and 'Ethically Sourced' as the top two qualities they look for in a coffee brand that they regularly buy. The last two subgroups selected 'High Quality' as their third most popular choice. The subgroup of students that earn <\$30,000 p.a. in the age range between 18-24 years old selected 'Value for Money' as their third most popular answer as a quality they look for when buying a coffee brand. This makes sense, as this subgroup is within the lowest income bracket, therefore they have to take more precautions to budget than any other income range and it could be why this quality is important to them. 'High Quality' is the third most important factor for the subgroups between the ages of 24-35 and those who earn between \$50,000 - \$99,999 p.a. Developing a high-quality product could be something to investigate further if 'Rhizo Coffee' was to target these demographics.



## Q9 Would you say that you like to experiment with your coffee?



There are 273 participants that answered this question in the survey.

The categories 'Strongly Agree' and 'Agree' have been grouped as one under 'Agree'. The categories 'Somewhat Agree', 'Neither Agree or Disagree' and 'Somewhat Disagree' have been grouped together under 'Indecisive'. The categories 'Disagree' and 'Strongly Disagree' have been grouped together under 'Disagree'. All of the data from these categories have been grouped into three categories: 'Agree', 'Indecisive' and 'Disagree' to make the data easier to comprehend.

Most of these participants selected 'Agree' which means that they like to experiment with their coffee (143p, 52.38%). There are 118 participants (43.22%) that are 'Indecisive' about whether they like to experiment with their coffee or not. There are 12 participants (4.40%) that selected 'Disagree' which means that they do not like to experiment with their coffee.

## **Analysis**

The findings suggest that most participants like to experiment with their coffee (143p, 52.38%). This is good for new products in the coffee market as it suggests that people are willing to adopt and try new coffee products, which is associated with an increase the probability of making coffee sales.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There are 56 participants in this subgroup that answered this question. Most of these participants are 'Indecisive' about experimenting with their coffee (30p, 53.57%) the next most popular answer is 'Agree' (24p, 42.86%) and then 'Disagree' (2p, 3.57%).

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 97 participants in this subgroup that answered this question. Most of these participants selected that they 'Agree' (49p, 50.52%) that they like to experiment with their coffee, the next most popular choice is 'Indecisive' (39p, 40.20%) and then 'Disagree' (6p, 6.19%).

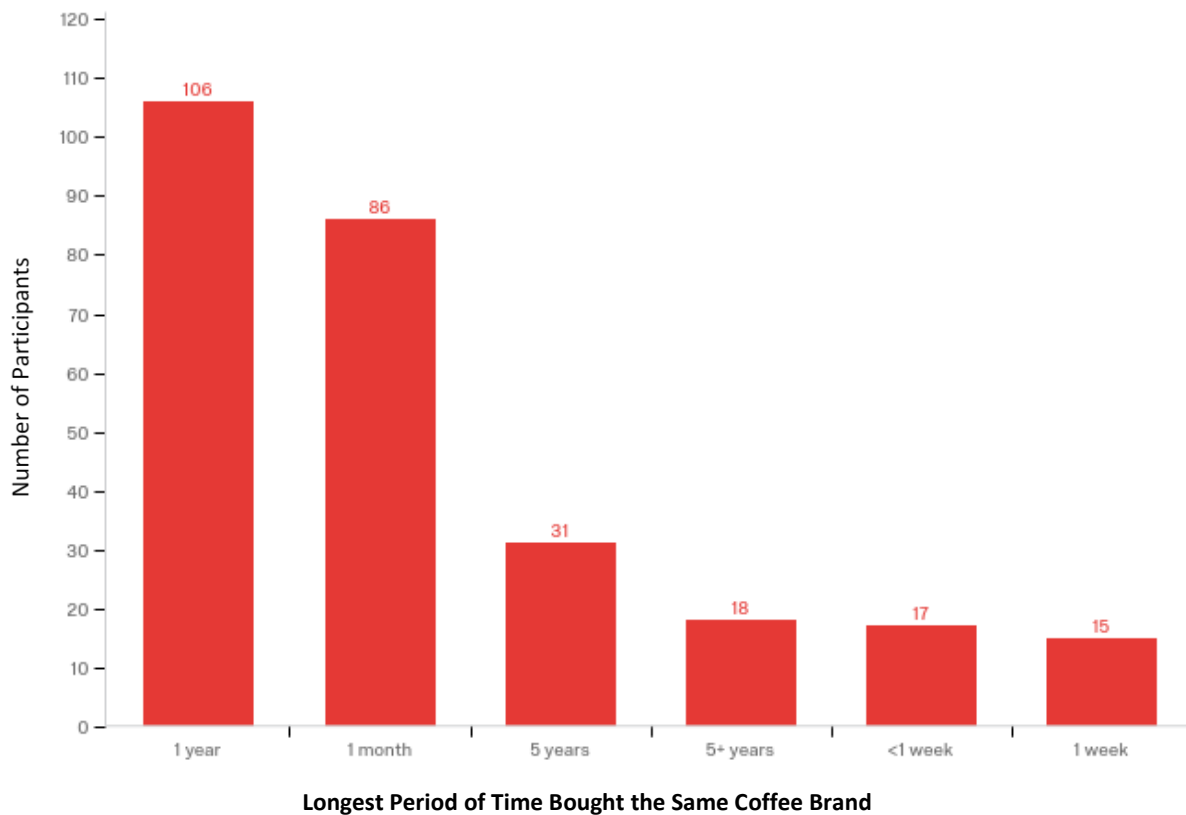
### **Demographic Between the Age Range of 25-34 Subgroup Data:**

There are 72 participants in this subgroup that answered this question. Most of these participants selected 'Agree' (44p, 61.11%) when talking about whether they experiment with coffee. The second most popular choice was 'Indecisive' (24p, 33.33%) and then 'Disagree' (4p, 5.56%).

## Analysis

Most of the participants in the last two subgroups selected that they 'Agree' with liking to experiment with their coffee. 'Indecisive' is these subgroups next most popular answer and then 'Disagree' is the third most popular answer. Most of the subgroup of students that earn <\$30,000 p.a. in the age range between 18-24 years old are 'Indecisive' when asked whether they like to experiment with coffee, the next most popular answer is 'Agree' and then 'Disagree'. The respondents in this subgroup may have primarily been 'Indecisive', as in Q7 some of these respondents selected that a quality they look for in a coffee brand they regularly buy is 'Value for Money'. These results may correlate with their indecisiveness when looking at trying a new coffee brand as they may not be able to afford to experiment too much with their coffee, being in the lowest income band.

## Q10 What is the longest period of time that you have bought the same brand of coffee for?



There are 273 people that answered this question. The longest period of time that most participants have bought the same brand of coffee for is 'One Year' (106p, 38.83%). The second and the third most popular answers are 'One Month' (86p, 31.50%) and 'Five Years' (31p, 11.36%).

### Analysis

Most people seem to remain loyal to their brands for long periods of time (1-5 years: 137p, 50.18%) if they truly like them. There is, however, a smaller subset of the population that buys the same coffee brand for '1 month' at most (86p, 31.50%). These results show that there must be other factors that influence customer's loyalty to a coffee brand and they should be investigated further.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There are 56 participants in this subgroup that answered this question. Most of these participants selected '1 Year' (26p, 46.43%) as the longest period of time that they buy the same brand of coffee for. The second highest answer in this subgroup is '1 Month' (14p, 25%) and then '<1 Week' (8p, 14.29%).

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 97 participants in this subgroup that answered this question. The longest time that most of these participants buy the same coffee for is '1 Year' (33p, 45.83%), the second highest answer is '1 Month' (29p, 40.28%) and then '5 Years' (18p, 25%).

### **Demographic Between the Age Range of 25-34 Subgroup Data**

There are 72 participants in this subgroup that answered this question. Most of these participants selected '1 Year' (31p, 43.06%) as the longest time that they buy the same coffee for, the second highest answer is '1 Month' (24p, 33.33%) and then '1 Week' (6p, 8.33%).

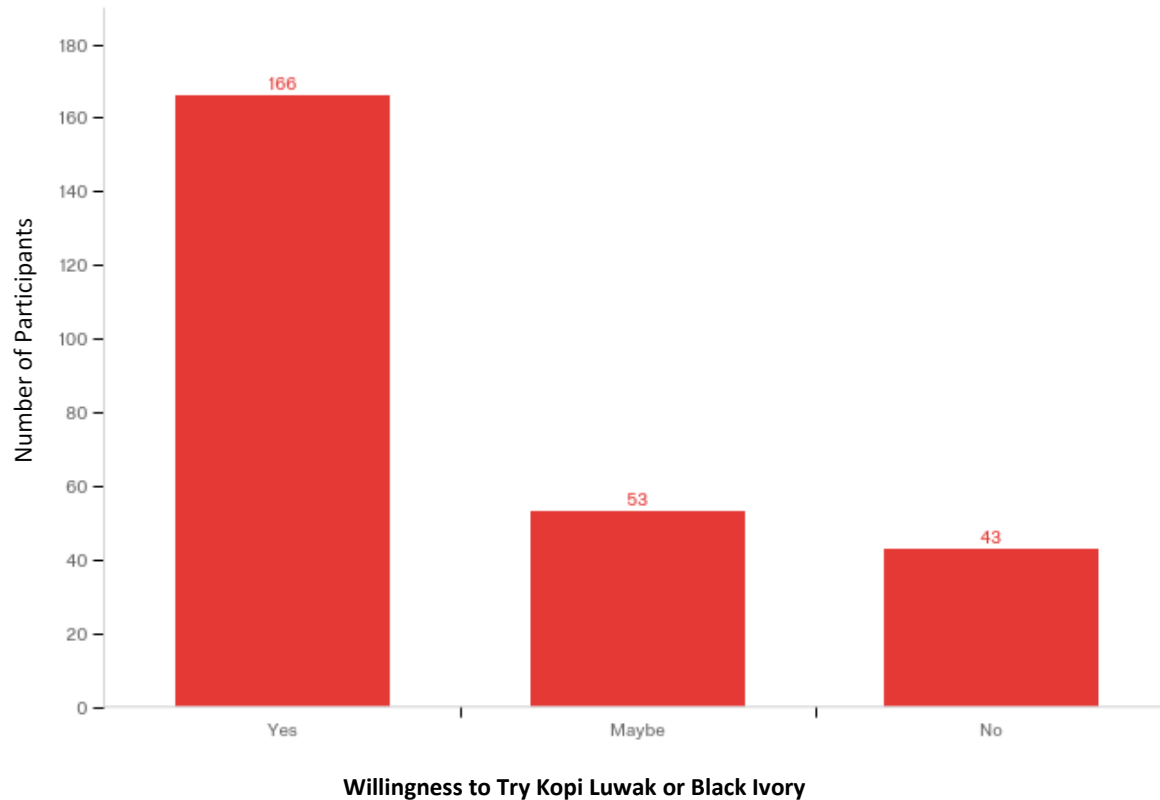
## **Analysis**

All subgroups selected '1 Year' as the longest period of time that they buy the same brand of coffee for and '1 Month' is the second most popular answer. Other selections are '5 Years', '1 Week' and '<1 Week'.

One year is a long time to remain loyal to one coffee brand, which is good for business. It may however, make it harder for people to convert from a different brand to the brand you are trying to sell. One month is the length of time that some participants are able to remain

loyal to a coffee brand. Most of the respondents for the survey also agree that they like to experiment with their coffee (143p, 52.38%), as shown in the analysis section under question seven. This might be their reasoning for wanting to change their coffee brand selection. These respondents may have grown tired of the varieties offered within that brand and they wanted to try something new. In this case, good branding and marketing is key. New product offerings and a variety of products may also keep customers coming back for more, increasing the chance that they will remain loyal to the brand.

## Q11 Would you be willing to try Black Ivory Coffee or Kopi Luwak Coffee?



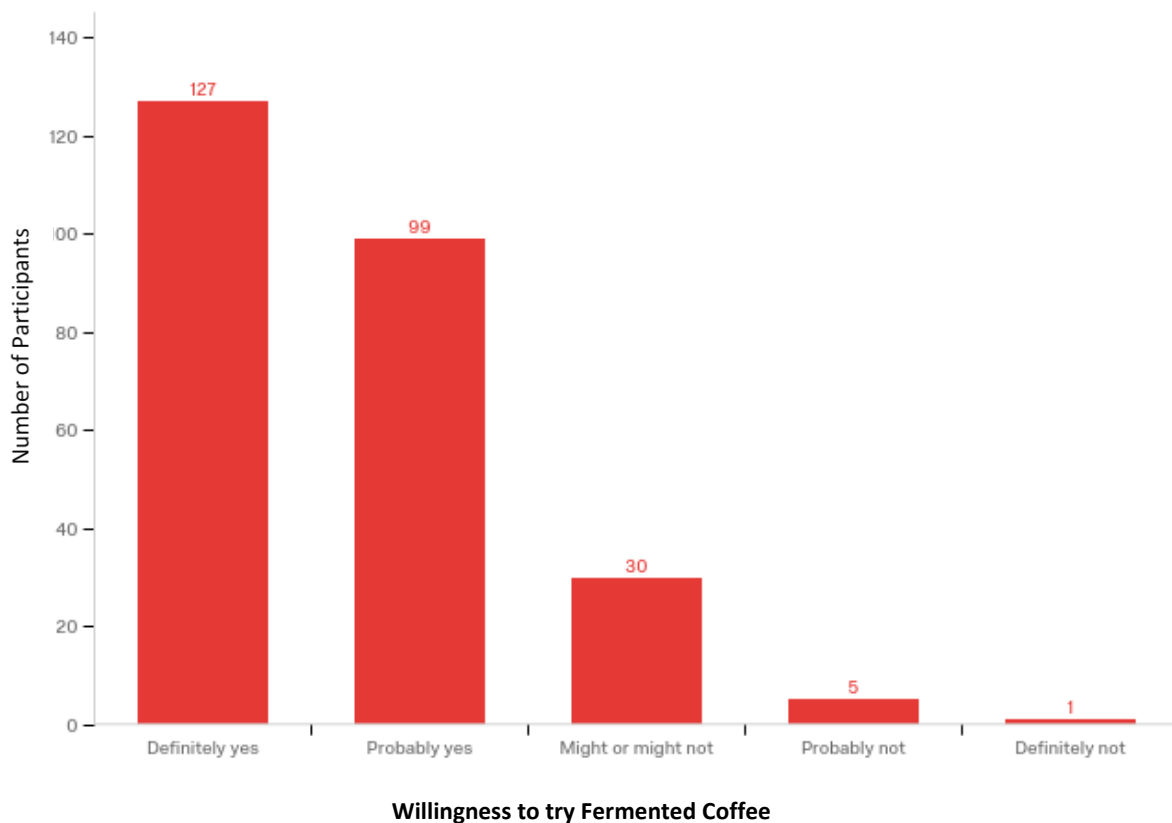
There are 262 participants that responded to this question. All participants were able to answer this question even if they had only tried one of the coffee brands in question (Kopi Luwak Civet Coffee or Black Ivory Coffee) as they may not have tried both brands. The question was not compulsory and the participants could skip to the next question if, for example, they had already tried both of the coffee brands and this question did not apply to them.

The majority of the participants are willing to try these brands of fermented coffee. There are 166 participants (63.36%) that selected 'Yes' for this question. The second most popular answer is 'Maybe' (53p, 20.23%) and the remaining minority selected 'No' (43p, 16.41%).

## Analysis

The findings from this question suggest that most of the participants are willing or could be persuaded to try a new fermented coffee beverage, which suggests that most of these participants could be willing to try 'Rhizo Coffee'.

### Q12 Would you be willing to try a new brand of coffee that uses a fermentation process to ferment high-quality coffee beans prior to roasting?



The categories 'Probably Yes', 'Might or Might Not' and 'Probably Not' have been grouped together under 'Indecisive'. All of the data from these categories have been grouped into one category to make it easier to comprehend.



There is a total of 262 people that answered this question in the survey. Most of the people that answered this question are 'Indecisive' (134p, 51.15%) about their willingness to try a new brand of fermented coffee. The second most popular answer is 'Definitely Yes' with 127 participants (48.47%) selecting this. There is one participant (0.38%) that selected 'Definitely Not', as they are not willing to try a new fermented coffee beverage.

## **Analysis**

Most participants in this survey are 'Indecisive' (134p, 51.15%) about trying a new fermented coffee beverage. These participants might be persuaded to try this beverage if the fermented coffee product tastes good and uses ethically sourced, high-quality beans as these qualities have been shown to be popular amongst these respondents in the results under question seven. The second most popular answer selected by the participants is 'Definitely Yes', (127p, 48.47%) which suggests that they would be willing to try a new fermented coffee product such as 'Rhizo Coffee'. As the number of participants that selected 'Indecisive' and 'Definitely Yes' are so close, overall this gives an inclination that there may be a market for fermented coffee beverages.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There are 56 participants in this subgroup that answered this question. Most of these participants selected 'Definitely Yes' (30p, 53.57%) for their willingness to try a fermented coffee product. The second most popular answer is 'Indecisive' (26p, 46.43%). There are no participants that are 'Definitely Not' willing to try a fermented coffee product.

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 92 participants in this subgroup that answered this question. Most of these participants selected 'Definitely Yes' (76p, 82.60%) when they were asked whether they would try a fermented coffee beverage, 'Indecisive' (50p, 54.35%) is the next most popular answer. There are no participants that definitely did not want to try a new fermented coffee beverage.

#### **Demographic Between the Age Range of 25-34 Subgroup Data:**

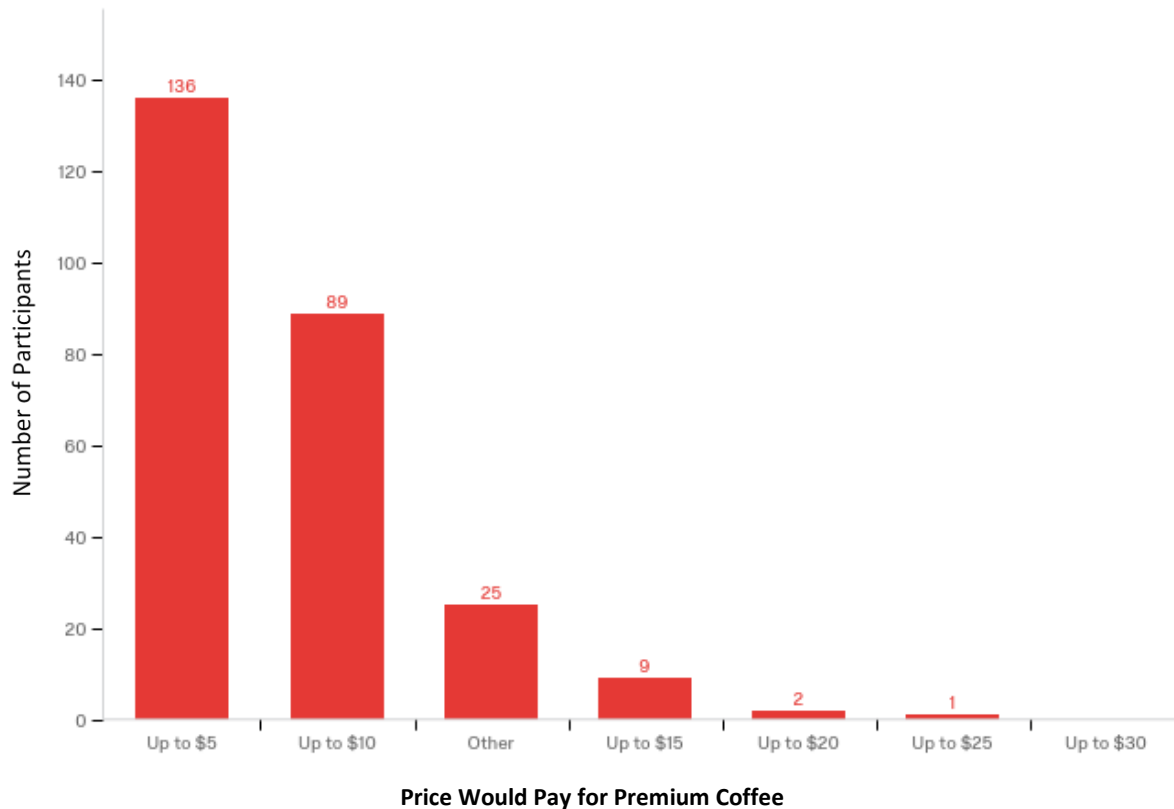
There are 70 participants in this subgroup that answered this question. Most of these participants selected 'Definitely Yes' for their willingness to try a fermented coffee beverage (38p, 54.29%), 'Indecisive' is the second most popular answer (32p, 45.71%). There are no participants that are 'Definitely Not' willing to try a fermented coffee beverage.

#### **Analysis**

Each of the three subgroups participants selected 'Definitely Yes' as the most popular answer and 'Indecisive' is the second most popular answer across all subgroups. There are no participants that are 'Definitely Not' willing to try a new fermented coffee beverage.

Most participants in each of these subgroups are willing or could be persuaded to try a new fermented coffee beverage. There are no participants that are 'Definitely Not' willing to try it. This could suggest that the market for fermented coffee beverages is promising, as mentioned above.

## Q13 How much are you willing to pay for a cup of premium high-quality coffee? (250ml, NZD)



There are 262 participants that answered this question. The majority of the participants that answered this survey are willing to pay 'Up to \$5' for a premium cup of high-quality coffee (136p, 51.91%). The second most popular answer is 'Up to \$10' (89p, 33.97%). The third most popular answer is 'Up to \$15' (9p, 3.44%). 'Other' was also selected by some respondents (25p, 9.54%), with 'Up to \$6' (5p, 1.90%) being the most popular written answer in this category.

### Analysis

The majority of the participants (51.91%) are willing to pay up to \$5 for a premium cup of coffee, but there is still a large subset of the population (33.97%) who are willing to pay up to \$10. There is a smaller subset (3.44%) of the population that are willing to pay 'Up to \$15'

for a premium cup of coffee. The reason that the majority of the respondents are willing to pay 'Up to \$5' for a standard cup of coffee, could be because that is what they pay for it at the moment. The cost of a standard cup of coffee in NZ in 2018 is \$4.00-\$4.50 (My Tax , 2018).

These findings give an indication of what should be tested further, such as whether it might be feasible to make the 'Rhizo Coffee' product for under \$5 per cup (as the majority of participants in the subgroup selected this) on both a small and large scale. There is still a large subset of the population (33.97%) that are willing to pay up to \$10 for a premium coffee product. This sits in the premium specialty coffee price range (Transparent Trade Coffee, 2018). If it is not possible to sell 'Rhizo Coffee' for less than \$5 per cup, it would be a good idea to investigate options that could keep the price as low as possible, as the majority of these participants are not willing to pay more than \$10 for a premium cup of coffee.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There are 56 participants in this subgroup that answered this question. Most of these participants are willing to pay 'Up to \$5' (30p, 53.57%), the second most popular answer is 'Up to \$10' (25p, 44.64%) and the third is 'Up to \$15' (1p, 1.79%) for a premium cup of coffee.

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 92 participants in this subgroup that answered this question. When these participants were asked how much they are willing to pay for a premium cup of coffee, the most popular answer was 'Up to \$5' (49p, 53.26%), then 'Up to \$10' (31p, 33.70%) and then 'Up to \$15' (3p, 3.26%).

### **Demographic Between the Age Range of 25-34 Subgroup Data:**

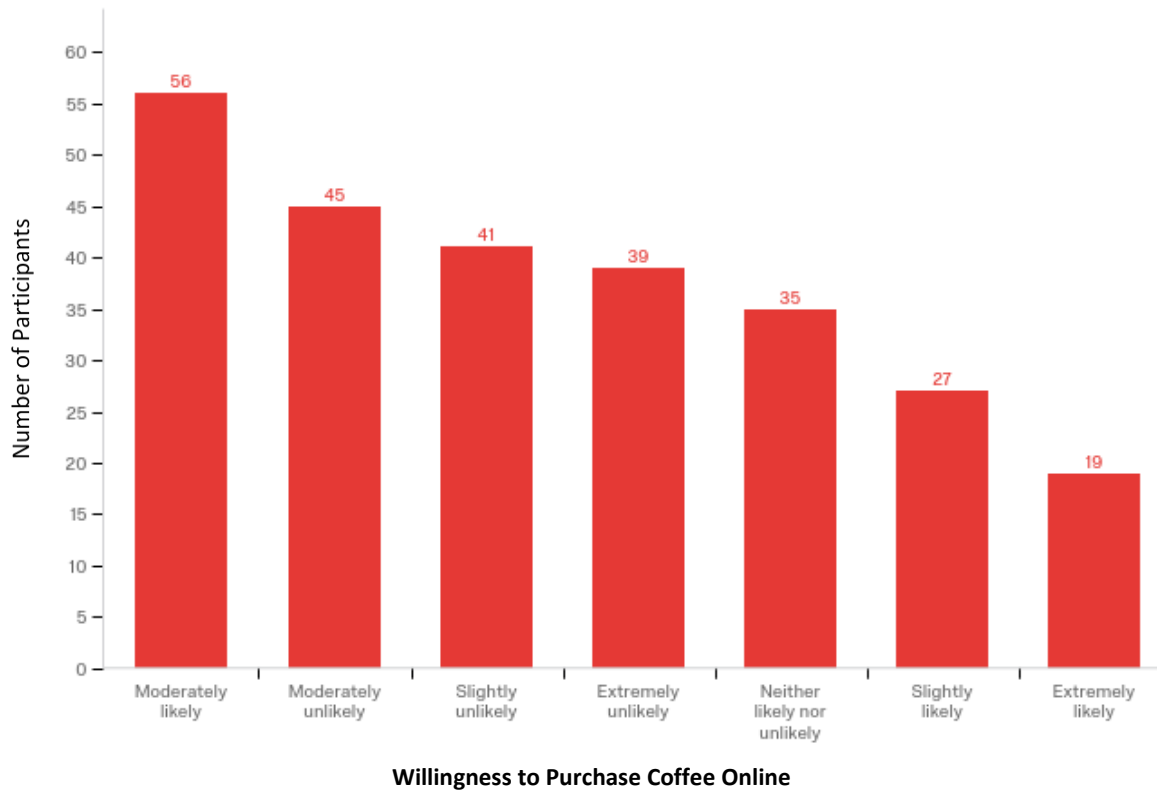
There are 70 participants in this subgroup that answered this question. Most of these participants are willing to pay 'Up to \$5' for a premium coffee beverage (28p, 40%), the next most popular answer is 'Up to \$10' (32p, 45.71%) and the next is 'Other' (7p, 10%) where the majority of participants wrote 'Up to \$7' in this category (3p, 4.29%). There is also 3 respondents (4.29%) that are willing to pay 'Up to \$15' for a premium cup of coffee.

### **Analysis**

Out of all the price ranges in the three subgroups above, most participants selected that they would pay 'Up to \$5' for a premium high-quality coffee. The next most popular answer is 'Up to \$10'. Other participants in these three subgroups are willing to pay between '\$10-\$15' and 'Up to \$7' for a premium cup of coffee.

The subgroup data above, indicates the same results as the overall data, which shows that most participants in each data set are willing to pay less than \$5 and no more than \$10 for a premium cup of coffee. This may be the price range that the respondents are willing to pay today, as the cost of the average cup of coffee in NZ is currently between \$4.00-\$4.50 (My Tax , 2018).

## Q14 How likely are you to purchase coffee online versus at other outlets?



There are 262 participants that answered this question.

The categories 'Extremely Likely' and 'Moderately Likely' have been grouped as one, under 'Likely'. The categories, 'Slightly Likely', 'Neither Likely nor Unlikely' and 'Slightly Unlikely' have been grouped together under 'Indecisive'. The categories 'Extremely Unlikely' and 'Moderately Unlikely' have been grouped together under 'Unlikely'. All of the data from these categories have been grouped into three categories: 'Likely', 'Indecisive' and 'Unlikely' to make the data easier to comprehend.

There are 103 (39.32%) participants in total that are 'Indecisive' about whether they want to buy coffee online as their preferred method to purchase their coffee. The next most popular answer is 'Unlikely' (84p, 37.07%) and then 'Likely' (75p, 28.62%) to purchase coffee online versus other outlets.

## **Analysis**

Most of the participants that answered this question are ambivalent about whether they prefer to buy coffee online or in other coffee outlets such as cafés. These participants might be persuaded to purchase coffee online more easily than those who are unlikely to purchase their coffee online, if that were to be the preferred sales channel for a product such as 'Rhizo Coffee'. The second most popular answer to this question is 'Unlikely' (84p, 37.07%), these participants are unlikely to purchase coffee online. The smallest number of participants are 'Likely' (75p, 28.62%) to purchase coffee online. As there is such a small difference between the number of participants that selected 'Likely' and 'Unlikely' (9p, 8.45%, P value = 0.0397), it suggests the participants are nearly equally as likely to purchase coffee online versus in a coffee outlet. Therefore, more research has been carried out below into subgroup demographics, to see whether there is a more pronounced difference in those participants that are likely versus unlikely to purchase coffee online.

## **Subgroup Data Results**

### **Demographic of Students that Earn <\$30,000 p.a. in the Age Range Between 18-24 years old Subgroup Data**

There are 56 participants in this subgroup that answered this question. When they were asked how often they bought coffee online versus at other coffee outlets, the majority of participants selected that they are 'Unlikely' (25p, 44.64%), then 'Indecisive' (21p, 37.50%) and then 'Likely' (10p, 17.86%) to buy coffee online in that order.

### **Demographic that Earns Between \$50,000 - \$99,999 p.a. Subgroup Data**

There are 92 participants in this subgroup that answered this question. Most of these participants, when asked whether participants prefer to buy coffee online versus other outlets, selected 'Likely' (34p, 36.96%), then 'Indecisive' (27p, 29.35%) and then 'Unlikely' (22p, 23.91%).

### **Demographic Between the Age Range of 25-34 Subgroup Data:**

There are 70 participants in this subgroup that answered this question. Most of these participants selected that they are 'Indecisive' (29p, 41.43%) about whether they prefer shopping for coffee online versus other outlets, the second most popular answer is 'Likely' (27p, 38.5%) and then 'Unlikely' (14p, 20%).

### **Analysis**

All three subgroups have quite different answers to the question regarding their likeliness to purchase coffee online as opposed to other coffee outlets. Most participants in the first subgroup selected: 'Unlikely', then 'Indecisive' and then 'Likely' in that order. The majority of the second subgroup selected 'Likely' then 'Indecisive' and then 'Unlikely' and most of the third subgroup selected 'Indecisive' then 'Likely' then 'Unlikely' to purchase coffee online. This suggests that the data is too varied to draw any conclusions from at this stage and that bigger and wider cast data sets could aid in drawing more valid conclusions.

If a business plan is made for any one of these subgroup demographics, it would evolve as new data comes in, as the sample grows and each of the participant's thoughts and opinions about their purchasing decisions varies and fluctuates. If a large majority of the population purchases coffee online, as a part of the business plan, a website that sells the specialty coffee product should be considered. For those subgroup participants that are unlikely to purchase coffee online, alternatives to this channel should be considered.



## **Q15 Enter your email below to go into the draw to win a \$50 Flight Coffee voucher and 200g of Flight Coffee for a month!**

There are 251 participants that left their emails to go into the draw to win the competition. The Flight Coffee voucher and the 200g of Flight Coffee for the survey prize, were supplied by this brand.

### **Confidence in data**

This data has been sourced through the use of an online survey tool called Qualtrics. It was live on this website for approximately two weeks and there was a total of 273 respondents that completed this survey. The data was then divided into three subgroups which included: 54 student participants within the age range of 18-24 that earn <\$30,000 p.a. 97 participants that earn between \$50,000 - \$99,999 p.a. and 72 participants whose ages range between 25-34. Each of these subgroups were carefully chosen because they were the demographics with the largest or second largest population size and therefore, their responses should be more representative of the data set, than the demographics that represent a smaller portion of the population.

The Qualtrics survey was distributed to its participants through an anonymous link, that does not save any information that can be used to identify the respondents, such as an email address or name, unless the survey specifically asks for it (in this case, an email was added at the end by the participants if they wanted to enter the competition) (Qualtrics, 2018b).

The participants could only take the survey once, as the 'Prevent Ballot Box Stuffing' option was turned on. This option places a cookie on the respondent's browser, after they enter a response. When the respondent clicks the survey link again, Qualtrics will view the cookie and it will not allow them to take the survey again (Qualtrics, 2018c).

To establish confidence that the survey size for this project was representative of the true population average, the Margin of Error (MOE) and Confidence Intervals (CI) were

calculated for the data obtained from the Qualtrics survey. The MOE measures the maximum amount that the results from the sample are expected to vary from the results of the actual population (Rumsey, 2018). Confidence Intervals are used to measure uncertainty. They show the “probability that a value will fall between an upper and lower bound of a probability distribution”. When a CI has a higher probability, it means that there is a larger degree of certainty that the limit lies within the confinements of the interval (Investopedia, 2018). If a random sample is drawn many times, a percentage of the CI’s will include a mean for the population. This percentage is called the confidence level (Minitab, 2015). The confidence level of 95% is generally used in statistics, but in some instances, a 90% level is adequate. These are usually cases where the sample size is smaller. At a 95% level of confidence, 5% of the survey data will not be representative of the actual population. In most cases, researchers do not concern themselves with this 5% as they are generally not restating the same question, so probability suggests that they will gather results within the 95% confidence level (Rumsey, 2018).

For the purpose of this thesis, a 95% confidence level was used to see whether the sample results reflected the actual population results inside the margin of error. The margin of error was calculated for the 138 Qualtrics survey data results that have been presented in this chapter. Generally, a margin of error that is less than  $\pm 5\%$  (~95% confidence level) is considered low. However, a margin of error that is less than  $\pm 10\%$  (~90% confidence level) is still considered adequate, especially in cases with smaller sample sizes, as mentioned above.

The Margin of Error calculation that was used:

$$z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

The Confidence Intervals were calculated by dividing the population sample by the total population e.g. 120/273 and then multiplying by 100 to calculate the percentage e.g. 43.96%. The MOE percentage (e.g.  $\pm 5.0\%$ ) was then added to this value and subtracted from

this value (e.g. 38.96%, 48.96%) to give the range for the true population parameter. The true mean of the actual population lies between these two values.

The results for the Qualtrics survey data are as follows:

- 43 calculations had a MOE <  $\pm 5\%$
- 65 calculations had a MOE <  $\pm 10\%$
- 30 calculations had a MOE between  $\pm 10\%$  and  $\pm 13.06\%$
- Max MOE:  $\pm 13.06$  Confidence Interval: (40.51%, 66.63%)
- Min MOE:  $\pm 1.66$  Confidence Interval: (5.98%, 13.1%)

There were 138 calculations in total and 30 of them were slightly outside of the desired margin of error (<  $\pm 10\%$ ). This means that only 21.74% of the calculations were outside of the desired range. Therefore, this data suggests that most of the sample data (78.26%) is representative of the true population size and therefore representative of coffee consumers in NZ (to an extent, as not all NZ coffee consumers have Facebook or Instagram profiles, where the survey was distributed). The results from the calculations can be found in Appendix E.

## Conclusions

Given that the sample size was relatively small (273p), compared to the entire population size of coffee consumers in NZ, a larger population should be sampled in the future to get a more accurate indication of the thoughts, motivations and opinions of NZ's coffee consumers. This could be established by channelling the survey on a larger social media platform where the reach is greater and prolonging the length of time that the survey is active. The results obtained from this study have given a preliminary indication of the research that should be conducted further. Areas of interest include: Qualities the participants look for in a specialty coffee brand, how much they are willing to pay for a premium cup of coffee, the location where they consume coffee the most, how experimental they are with their coffee selections and the longest period of time that they have bought the same brand of coffee for in the past.

## Chapter 5: Discussion

There are two large subgroups that have different coffee consuming routines: Those respondents who consume coffee 'Once a Week' and those who consume coffee 'Once a Day'. If the subgroups of those who consume coffee 'Once a Day', '2-3 Times per Day' and 'Several Times a Day' are combined (113p), they would make up 41.39% of the total sample population for this question. The results from this question suggest that overall, most of the respondents consume coffee quite frequently (41.39%, once – several times per day) and 34.80% of the respondents consume coffee 'Once a Week'. This suggests that 76.19% of the participants consume coffee up to 'Once a Week'. This data makes sense as NZ has one of the highest coffee roasteries per capita in the world (TRT, 2017).

The respondents generally consume coffee in cafes, at home and in the workplace. These responses from the participants produce a combined total of 86.3% of all of the data for this question. They give three areas to focus on during the development of the business model for 'Rhizo Coffee' due to their popularity as places of coffee consumption.

When the participants were asked why their favourite coffee brand was their favourite, the majority of them wrote that the coffee had 'Good Taste and Flavour' (40.67%). This suggests that the taste of the coffee must be a priority for a new specialty coffee brand to consider during the products development. The variety of coffee that is offered, the location and convenience of the product to the consumer and the consistency of product are also important to the respondents. The taste and the consistency of product will be tested for during the development of the MVP for 'Rhizo Coffee' on the small and larger scales.

The participants were asked about the qualities they look for in a brand that they regularly purchase. There were 11 selections to choose from and each respondent could choose more than one answer. Therefore, the following percentages were calculated for the number of participants that selected each answer. The respondent's favourite quality that they look for in a coffee brand they purchase is 'Good Taste' (98.17%) Other qualities include ethical sourcing of the beans (59.34%), 'High Quality' (53.85%), 'Value for Money' (46.15%) and that they are 'Fairtrade' (44.32%). The quality of a good tasting product is displayed in the

majority of the respondent's answers from the previous question and the question above, reiterating the importance of the presence of good flavour attributes, in new coffee products that have proven to be desirable to coffee consumers.

The findings suggest that most participants like to experiment with their coffee (143p, 52.38%). There is also a large group of respondents that are willing to try fermented beverages such as: Kopi Luwak and Black Ivory Coffee (63.36%). This is good for businesses that want to commercialise new coffee products as it implies that specialty coffee consumers are willing to try them and hence, it may increase the probability of making coffee sales.

When the participants were asked whether they would be willing to try a new brand of coffee that uses a fermentation process, to ferment high-quality coffee beans prior to roasting, most of the respondents were 'Indecisive' (51.15%) about trying this beverage. These participants could be persuaded to try this beverage, if it is made from ethically sourced, high-quality beans, as these attributes are selected by the majority of the respondents as qualities that they look for in a coffee brand that they regularly buy. However, there was also 48.47% of the population that are definitely willing to try this fermented beverage, which suggests that they would be willing to try a new fermented product such as 'Rhizo Coffee'.

The longest period of time that most of the respondents have remained loyal to a coffee brand, is 'One Year' (38.83%), with the majority of the respondents selecting between 1-5 years (50.18%). However, a smaller subset of the population selected '1 Month' (31.50%). This shows that there must be other factors that influence the customers loyalty to a coffee brand, of which should be investigated in further research.

When participants were asked how much they were willing to pay for a premium cup of coffee, most of them responded with: 'Up to \$5' (51.91%) and the second most popular answer was 'Up to \$10' (33.97%). The reason that most of the participants are willing to pay 'Up to \$5' for a premium coffee, could be because the average cup of coffee in NZ sells for \$4.00-\$4.50 (My Tax , 2018) and this is the price that the respondents likely pay for their coffee.

These findings suggest that an area to look into further is whether 'Rhizo Coffee's' product can be produced for a retail price of \$5.00 per cup, both on a small scale and a large scale. There is still a large group of respondents that are willing to pay 'Up to \$10 for a premium cup of coffee, which lies in the specialty coffee price range (Transparent Trade Coffee, 2018). If it is not feasible to sell the 'Rhizo Coffee' product for less than \$5.00, the subgroup that are willing to pay 'Up to \$10' should be further questioned to gauge their thoughts and opinions about the coffee they buy. It would also be wise to look into as many options as possible to keep the price down, as most of the respondents are not willing to pay more than \$10.

The results from the question: "How likely are you to purchase coffee online versus at other outlets?" In the Qualtrics survey are inconclusive, as the number of respondents that are decisive about whether they purchase coffee online versus other outlets is relatively even. Future research should be carried out with a larger population sample, to increase the chance of seeing a more pronounced difference in the results.

The subgroup data suggested that those respondents between the age ranges of 18-24 and 25-34 have similar opinions about the specialty coffee they consume and the brands they purchase from. These two subgroups top two choices when asked how often they consume coffee, are 'Once a Day' and 'Once a Week'. They also use similar locations for their coffee consumption, the most popular places being 'In Cafes' and 'At the Workplace'. They have 'Flight Coffee' and 'Supreme' in common as their favourite coffee brands. The qualities they look for in a coffee brand they regularly buy is that it 'Tastes Good' and it is 'Ethically Sourced'. The longest period of time these demographics have remained loyal to a brand is '1 year'. They are both willing to try a novel fermented coffee beverage, the majority selecting 'Definitely Yes' on both sides. Each subgroup is willing to pay 'Up to \$5' for a premium cup of coffee and their second favourite choice is 'Up to \$10'.

These results suggest that those respondents that are in the age range between 18-34, have similar thoughts and opinions about the specialty coffee industry and fermented beverages. As they make up a large proportion of the total population size (192 p, 70.33%) and they are both in favour of trying a new fermented coffee beverage such as 'Rhizo Coffee', a case could be made to look at them as a target market for the proposed product.

The subgroup that earns between \$50,000 - \$99,999 p.a. also has similar thoughts and opinions to that of the participants that are in age range between 18-35. These respondents also by majority consume coffee 'Once a week' and 'Once a Day'. The most popular place that they consume coffee is 'In Cafes' like that of some of the majority in the age group between 18-35. Their favourite coffee brands are also 'Flight' and 'Supreme' and the qualities they look for in a brand are that its products 'Taste Good', they are 'Ethically Sourced' and they are of 'High Quality'. They agree that they like to experiment with their coffee. The longest period of time that they have remained loyal to the same coffee brand is also '1 Year'. They are definitely willing to try a new fermented coffee beverage and they are willing to pay 'Up to \$5' for premium cup of coffee, followed by their second most popular answer, which is 'Up to \$10'.

As the respondents for the Qualtrics survey that are in the age range between 18-34 have similar answers to those participants that earn between \$50,000 - \$99,999 p.a. for expressing an interest in trying new fermented coffee beverages and being experimental with their coffee, this age range and income range should be combined and looked into further as a target market for 'Rhizo Coffee' in future research.

The findings from the face to face interviews with specialty coffee organisations suggest that these businesses prioritise QC Practices, which are important as they ensure the quality of the end product for the consumer. Other factors that are important for the running of a specialty coffee organisation, are knowing the product market and evaluating the data of the products that sell and do not sell. If the product market is known, the business can focus their marketing and advertising strategies into channels that pursue that market, in the hope that it will bring new customers and current customers will remain loyal to the brand. The collection and evaluation of the data that suggests which products are selling and which are not selling, enables a business to phase out products that have not been selling for a period of time to replace them with another product, which can increase the variety of products a company has to offer. Variety of product is a quality of interest for the specialty coffee consumers that took the Qualtrics survey, as displayed in the data above. Having the ability to know which products are selling well is also important for businesses, as their



marketing and sales team can focus on those products and discuss ways in which they can capitalise on that investment.

Market validation and development through customer feedback is another important factor for the businesses that were interviewed. They can get real time, over the counter feedback and it allows them to interact with their customers. During these interactions, they can answer any questions that the consumers might have about their coffee, allowing them to connect with the companies brand further.

Critical success factors that are important for the running of specialty coffee businesses are a strong brand and a POD displayed in the brand and its products. The organisations that were interviewed suggested some POD's that they have, which include the use of high quality coffee beans, unique coffee varieties, a large and varied product offering, unique nuances and flavour characteristics in the coffee beans and original stories behind the product and brand. Consistency of product is also important to these businesses and their customers.

One of these companies suggested that a portion of their customers like some variety in their coffee. This is why the company developed a consistent and a revolving offer, which enables some new products to be introduced to the market relatively quickly, while their consistent offer brings in a steady revenue stream.

The specialty coffee organisations that were interviewed, also recommended that new start-up companies should have as much capital before the products commercialisation as possible. They also suggested that they should plan ahead and revert back to that plan every six months.

Flight Coffee seems to be the most interested in 'Rhizo Coffee' and Flight and Supreme are both willing to discuss licencing the idea, or developing a partnership if the final product fits in with their brand and adds value to their product offering. Ripe Coffee is a smaller family owned company and due to where they are in the market at the moment, it seems unlikely that they would be in a position to licence or partner with 'Rhizo Coffee'.

# Chapter 6: Recommendations: Business Case

## Executive Summary

This business case is for the proposed product 'Rhizo Coffee', which is a fermented coffee beverage. It outlines a business plan to create an MVP on a small scale to prove its viability and if successful, the further steps to be taken. This project is based off two research papers that outline methodologies to ferment green coffee beans (Lee et al., 2016b, 2016c). Their methodologies have been adapted to suit the conditions and resources available for production in NZ after a preliminary trial has been carried out.

The business case will assume that the science is feasible, the quality of product after the fermentation of the coffee beans is high enough to be classed as 'specialty coffee' (80 points and above) and the resulting coffee beans will contain flavour attributes that have been shown to be desirable to many people in the NZ specialty coffee market.

Given that the specialty coffee market is highly saturated and NZ has the highest number of coffee roasters per capita worldwide (TRT, 2017), there is value in having a strong brand, a unique story, a point of difference and consistently good products in a new start-up company, as previous research into specialty coffee consumers and organisations has shown.

## Projected Goals for Rhizo Coffee's Development

### Product Development Goals

- To identify whether similar volatile and aroma profiles for the green fermented coffee beans and roasted fermented coffee beans by *R. oligosporus* and *Y. lipolytica* in Lee et. al's (2016a, 2016b, 2016a, 2017) research papers can be replicated to a degree in NZ with the resources that are available.

- To identify whether a combination of *R. oligosporus* and *Y. lypolytica* fermentation of green Arabica coffee beans might produce positive flavour and aroma profiles that may be desirable to the specialty coffee consumer after roasting, i.e. sweet, roasty and buttery attributes.
- If the coffee beans are successfully fermented and roasted, analysis of the volatile and aroma profiles should be conducted to measure the acidity levels (including the presence of amino acids), caffeine levels, and aromatic attributes that are present that may increase or decrease the likelihood of a consumer purchasing the coffee based on the aroma and flavour of the product. These factors will be measured based off previous research into similar fermented coffee products such as Black Ivory Coffee, Kopi Luwak Coffee and Cultured Coffee (BICC 2018c; KLD 2017a; Watson 2016).
- The *Y. lypolytica* and *R. oligosporus* fermented coffee beans should be roasted to three different levels, including light, medium and dark roasts as was conducted in Lee et. al's, (2016a, 2017) papers. Their aroma and volatile profiles should then be analysed and compared between the levels, to find the roast level that may have the most desirable attributes. In the papers by Lee et. al. (2016a, 2017) the light roast level showed the most significant changes in the aroma and volatile profiles and displayed more positive attributes over the other roast levels.
- If the MVP has a positive flavour profile as a result of testing, further research should be conducted into its quality prior to and post fermentation to look at potential differences. Its quality can be determined through the use of a Q Grader which will use a cupping protocol to test the beans (regular roasted Arabica coffee beans against the fermented and roasted Arabica coffee beans) (SCAA, 2018a).

## **Business and Commercialisation Goals**

### **Prior to MVP development:**

- To find a PC2 laboratory facility that can provide a sterile environment and access to a commercial oven, GC-MS, LC-MS and storage facilities.

- To find a laboratory facility and a scientist or postgraduate science student that can and is willing to conduct the fermentation trials to develop an MVP within an attainable budget.
- To carry out market research into the aroma and flavour profiles that a considerable portion of the NZ population of specialty coffee consumers find desirable in specialty coffee.
- To conduct further market research into the qualitative and quantitative methods and analysis and results in this thesis with a larger proportion of the NZ population of specialty coffee consumers, in order to produce a more representative sample of these consumers.

#### **After the MVP is developed:**

- Seek potential investors or partners that may want to see the product developed further in subsequent trials on a larger scale.
- When enough capital is raised to scale up the MVP's production:
  - Look for scientists that are willing and able to conduct these trials
  - Look for laboratory space that can accommodate large scale fermentations
  - Find larger roasting facilities that will allow fermented beans to be roasted there
  - Look into purchasing high quality, ethically sourced, specialty grade Arabica coffee beans and find the best supplier to achieve this
  - Create an updated version of the business model for 'Rhizo Coffee' on a larger scale
  - Make a one year and a five-year plan and re-evaluate it every six months

#### **Consider:**

- Licensing the idea to a well-established speciality coffee company

- Partnering with another entity that has strong knowledge and experience in the speciality coffee industry or food and beverage business
- Looking at investors that may want to contribute to developing the idea further

## **Vision for the Project**

The vision for this project is to see that 'Rhizo Coffee' can be reproduced consistently on a large scale to the point where its commercialisation is actualised. In this case, if the idea for the product is not licenced to another company and creative direction permits, the 'Rhizo Coffee' product will be made with high quality specialty grade Arabica coffee beans that are ethically and sustainably sourced, as these are attributes that are important to the specialty coffee consumers in NZ which previous research in this thesis has elaborated on.

'Rhizo Coffee' should also have positive flavours and aromatic attributes that are desirable to coffee consumers. The premium product will be more expensive than the average cup of coffee in NZ, but most consumers should be able to afford to purchase the product.

## **Opportunities and Constraints for Development and Commercialisation**

### **Opportunities**

There is the opportunity to disrupt the specialty coffee marketplace with 'Rhizo Coffee', as the market for fermented foods and beverages continues to grow worldwide. There are currently only three other fermented coffee products in the global specialty coffee marketplace. One of these products, Kopi Luwak Coffee, uses unethical sourcing methods for its coffee processes, it is priced at a premium and the quality of the coffee beans that are produced is generally of low quality (Kubota, 2011). Black Ivory Coffee uses sustainable practices and ethical sourcing methods, however the price of their coffee beans is extraordinarily high (creating an exclusive culture around the product) (BIIC, 2018b, 2018c). Cultured Coffee uses a similar fermentation process to that of 'Rhizo Coffee', however it is

still in the beginning stages of its growth (Watson, 2016) and this brings about the opportunity to look at their business models and to view how specialty coffee consumers and the industry react to their product in the marketplace.

This competitive analysis can and has aided in the development of a business case for 'Rhizo Coffee' based on these company's successes and failures in the industry.

## **Constraints**

There are some constraints for the development of the 'Rhizo Coffee' product. These include:

- Being able to create an MVP. This cannot be determined until a scientist is hired to carry out the laboratory scale trials on a small scale and they are successful. The trials will most likely require funding which needs to be sourced from a third party.
- The inability to confidently predict whether there will still be a market for the product by the time it reaches the commercialisation stage. The transition between the scale up from an MVP to a large-scale production should be as efficient as possible, so as to get the product to the commercialisation stage while there is still a substantial specialty coffee market.

## **Market Needs and Industry Analysis**

The global coffee market is said to be estimated at \$68 billion NZD, with the specialty coffee niche making up a 55% share value (SCAA, 2017). This market is highly saturated, particularly in NZ as the country has more roasters per capita than any other country in the world. In 2017, it was ranked the 13th highest coffee consuming country per capita ahead of the United States and Australia (TRT, 2017). According to experts in the coffee industry, the total coffee retail sales for 2016 were close to \$150 million. This did not include café sales (TRT, 2017).

In NZ, most freshly roasted coffee is of specialty grade. Nationally, the quality of the coffee it produces is exceptionally high. Nearly all of its cafes sell espresso coffee which demands a certain level of quality. This sets NZ apart from other countries such as the United States, which is on average about 80% filtered coffee based (Anthony, 2014).

The above findings suggest that there is a market need for specialty coffee that is driving coffee sales globally and within NZ. This provides the opportunity for 'Rhizo Coffee' to disrupt the marketplace with its product, potentially driving the creation of a new fermented coffee market, which may convince regular specialty coffee consumers to try something a little more unique.

## **Assumptions Tested**

### **Scientific Assumptions Tested**

It is assumed that the fermentation and roasting methodologies described by Lee et al. (2016a, 2016b, 2016c, 2017) can be used to successfully create a MVP for 'Rhizo Coffee' through laboratory scale trials with the resources that are available in NZ. The trial that was carried out in 2017 was not successful. The ingredients that were sourced for the laboratory trials were similar to that of the papers mentioned above's trials, but the experiments were unsuccessful due to a range of possible factors. Therefore, the assumption was tested but not validated.

It is assumed that variables such as time, pH, temperature, sterility when needed and over or under fermentation of the coffee beans can be controlled, in order to produce the best aroma and flavour profile possible on a small scale and a large scale. This assumption was tested during the small-scale laboratory trials that were conducted for this project; however, it was not validated as the fermented coffee bean samples were contaminated. This could be due to a range of the variables mentioned above being out of alignment with the environmental factors and the methods conducted in Lee et. al's (2016a, 2016b, 2016c, 2017) research papers.

The scientific assumptions that the data from the pilot scale trials after the MVP is developed, could be used to prove that the product is reproducible in a factory setup and the expected yields and the cost data can be used for future production plans, will not be able to be validated until successful lab scale trials have been accomplished. The trials will be designed with these outcomes in mind.

It was assumed that commercial scale fermenters are available for us in this project in order for it to be reproduced on a large scale. Further investigation showed that commercial brewers can be purchased in NZ and they are primarily used to ferment beer, spirits, wine and cider beverages (Braumeister , 2018). The fermentation of the coffee beans could potentially be carried out in one of these brewers. It would have to be explored in further research when the MVP has been developed.

## **Business Assumptions Tested**

It is assumed that the specialty coffee industry will continue to grow over the next 30 years so that there will still be a substantial market to go into for the commercialisation of 'Rhizo Coffee'. Research was carried out to test this which found that Technavio's research analysts have estimated that the market for specialty coffee shops will grow at a compound annual growth rate of 10.23% over the period 2017-2021 (Cision PR Newswire, 2017). Other research suggests that the United Kingdom should be expecting a 13% growth in the specialty coffee industry per annum up until the year 2020 (Brown, 2015). Data on the NZ projected specialty coffee market growth was not available at the time. This shows that there may still potentially be a market for specialty coffee beverages over the next three years, but further growth projections have not been calculated at this time.

## **Business Model Design**

The business model design for 'Rhizo Coffee' was developed from evidence-based literature in the form of a competitive analysis of other specialty coffee companies in the industry and



that of other fermented foods and beverages, including fermented coffee products. The design was also based off the results from the qualitative and quantitative research and analysis that was carried out with specialty coffee organisations and consumers for the purpose of this thesis. The business model canvas for 'Rhizo Coffee' can be found in Appendix F.

## **Market Validation and Development**

### **Data Collection Methodology**

The qualitative and quantitative research that was carried out for the purpose of this thesis with specialty coffee organisations and consumers revealed that there may potentially be a market for fermented coffee beverages. The target market for 'Rhizo Coffee' in NZ could be those consumers who earn between \$50,000-\$99,999 NZD p.a. in the age range between 18-34 based on this research. This range could be expanded to those who earn \$50,000+ NZD p.a. and it could target millennials (born between 1980 and 2000 or 18-38 years old as of 2018) (Goldman Sachs, 2018). Those who earn more the \$50,000+ p.a. NZD could theoretically afford a premium specialty coffee beverage and by increasing the age range to target millennials between the ages of 18-38 years old, a broader data set could be established.

'Rhizo Coffee's' ideal target market will be coffee consumers that are willing to be experimental with their coffee, try new fermented products and those that are able and willing to pay a premium price for 80+ point specialty coffee based off this research.

Evidence based research in this thesis suggests that further investigation should be conducted into the specialty coffee consumers buying patterns, the qualities they look for in a specialty coffee brand that they regularly buy and their coffee consumption locations. Further interviews with specialty coffee organisations should contain questions that relate to their QC practices, critical success factors and new product development. Their

willingness to licence new products or to partner with another organisation would be interesting points to investigate, along with how they differentiate themselves from their competitors and any advice they would give to a new specialty coffee company.

Further market development and validation research should seek larger population sizes than the ones that were sampled for this thesis (273p for the Qualtrics survey data and 3 organisations for the Face-to Face interviews), so as to increase the confidence in the data by gathering a sample that is more representative of the true population of NZ coffee drinkers (only a NZ sample is needed as this is where 'Rhizo Coffee' would first be commercialised).

If another competition was going to be carried out, where the participants could win goods if they answered survey questions about the proposed product and the specialty coffee market, the length of time that it is active and accessible to the consumers should be longer than two weeks (as was conducted in this study). This is because a longer competition period will increase the chances that more individuals will complete the survey. If the prizes for the competition are larger and it is advertised multiple times throughout the competition period, it may also convince more people to fill out the survey, providing a larger data set.

The collection of a larger sample size could also be established if the survey was to be distributed to the participants through a range of Social Media advertising platforms such as Facebook and Instagram. These advertising platforms provide access to large, engaged audiences and can target a specific population of consumers, enabling the right people to see the content at the right time (Swant, 2015). Therefore, these platforms would be ideal channels to use for the market development and validation of 'Rhizo Coffee'.

'Rhizo Coffee' would add value to the specialty coffee market through its POD, which is its unique fermentation process and the story behind the origin of its coffee beans, all the way up to the final brewed cup of coffee. The commercialised product will be specialty grade (80+ points) (SCAA, 2018a) and use high quality Arabica coffee beans that are sustainably and ethically sourced.

There is also potential for 'Rhizo Coffee' to provide health benefits to the consumer such as a lower caffeine content, which Afeineur's product called Cultured Coffee has shown makes it easier to digest than regular coffee (Eat Cultured, 2018). As 'Rhizo Coffee' will be secondarily fermented in a similar process to Cultured Coffee, the same characteristics may be found in this product. If the science is validated for this attribute, it will add value to the product and potentially some consumer's lives.

## Competition

When 'Rhizo Coffee' reaches the commercialisation stage, its main competitors will be those specialty coffee companies that are within close proximity to it. Ideally, the product will be launched in NZ and as the coffee capital of the country is Wellington, it would make sense to base the business there (100% Pure NZ, 2018). Past research into the Qualtrics survey participant's favourite coffee brands in this thesis has labelled Flight, Supreme and L'affare Coffee as some of the most popular coffee brands in Wellington. Havana, People's and Mojo Coffee were also amongst the top brands for the respondents. These specialty coffee companies are well established in Wellington, some being founded as far back as 1990 (L'affare) (100% Pure NZ, 2018). Therefore, they would be strong competitors to contend with if 'Rhizo Coffee' were to be commercialised, possibly due to their strong brands, clear direction and large customer bases as found in the research conducted for this thesis. These coffee organisations are currently meeting the specialty coffee markets needs in Wellington and NZ with their products.

The fermented coffee beverages that are currently on the market include: Cultured Coffee, Kopi Luwak Coffee and Black Ivory Coffee. However, as mentioned in the opportunities section above, these products are either in their early stages of growth (Watson, 2016), have negative associations attached to their product due to their unethical practices (Kubota, 2011), or they are astronomically expensive (BIIC, 2018a, 2018c; Kubota, 2011). At the current stage, none of these companies sell their products through retail stores in NZ. They are available to purchase online, but the market in NZ is not large enough for them, for

the above reasons. Therefore, they may not be as big of a competitor as other popular specialty coffee brands in NZ such as those listed above.

## **Impact in the Specialty Coffee Industry**

If 'Rhizo Coffee' were to be commercialised, it would disrupt the specialty coffee marketplace with its invention. 'Disruption' in business depicts a process that smaller companies with minute resources go thorough to successfully challenge well established businesses. Disruptive innovations arise from new-market or low-end footholds. New-market footholds are established by disrupters when they create a market that did not exist before, the resulting consequence is that non-consumers are turned into consumers (Christensen, Raynor, & McDona, 2015).

The market for fermented coffee beverages is very small, as there are only three competing companies that are currently in the industry (Kopi Luwak, Black Ivory and Cultured Coffee). This provides the opportunity for 'Rhizo Coffee' to create a larger competitive market for fermented coffees. If the MVP analysis shows that it contains any health benefits, it could provide a healthier alternative to regular coffee.

## **Barriers to Change Existing Behaviours**

During the interview that was conducted with Ripe Coffee for the purpose of this thesis, the findings suggested that it is generally quite hard to get their customers to adopt new products, as they are comfortable with the varietals of coffee that they regularly buy. This may reflect many cases of coffee consumers in NZ. It could be challenging to find new customers that are willing to try and adopt such a disruptive innovation that is in the higher specialty coffee price range.

Other respondents to the 'Rhizo Coffee' Qualtrics survey look at the fermented food and beverage industry as a FAD that will eventually pass. However, research shows that more

and more people are beginning to care about their health (Mellentin, 2017), which could aid in the establishment of a target market by means of creative brand storytelling and sufficient marketing.

There are methods to avoid barriers to change from the existing specialty coffee market to a more refined fermented coffee market. These include the use of market development strategies that target the specific demographic subgroups, that are more willing to experiment with their coffee and try new coffee products, such as that of the subgroup that earn between \$50,000 - \$99,999 p.a. NZD and those in the age range between 18-24 as the Qualtrics findings suggest.

Barriers to change may be lowered if the new start-up company is transparent about their coffee's origins and processes. One way to be transparent with their potential and existing customers is by educating them about their company's story. Channels that can provide a platform for this are Social Media websites and a company website. Instructional videos could be provided on these platforms to show the brands coffee processes, from its farming to the final brewed cup. Testimonials on a company's website from happy customers may also aid in the adoption of new customers (Clark, 2016).

## **Marketing and Distribution of Rhizo Coffee**

Research that was carried out for the purpose of this thesis indicates that there is potentially a market in NZ for fermented coffee products. All three of the specialty coffee organisations that were interviewed are willing to try 'Rhizo Coffee' when the MVP is developed. Each of them is interested in the process of the coffee's fermentation. The Qualtrics survey that was designed for specialty coffee consumer's results showed that 65% of 273 participants are willing to try Kopi Luwak Coffee and Black Ivory Coffee if they have not already and 48.47% of the 262 respondents that answered the question are willing to try a new fermented coffee beverage such as that of 'Rhizo Coffee'. Some of the reasons that a portion of the respondents are indecisive about trying a new fermented coffee product, is that they do not know enough information about it to decide. This could be

countered though the use of social media channels and website platforms to educate and engage the audience about the new product. The data obtained from the interviews and Qualtrics survey mentioned above, shows that there is a potential market for fermented coffee beverages in NZ.

'Rhizo Coffee' could be positioned as a premium product in NZ's specialty coffee market which is saturated due to the country being one of the highest coffee consumers per capita in the world (TRT, 2017). However, 'Rhizo Coffee' would distinguish itself from other specialty coffees through its POD's which include: It's unique coffee fermentation process, the story behind the origin of its coffee beans to the final cup, its use of high quality specialty grade Arabica coffee beans (sustainably and ethically sourced) and the potentially unique flavour characteristics and health benefits associated with the coffee, which can only be confirmed after future laboratory scale trials are conducted.

## **Product Validation and Development**

### **Development Testing and Performance Assessment**

Future laboratory scale trials will be conducted for the development of the MVP for 'Rhizo Coffee'. The scientific processes will be validated when there is no observed contamination of the fermented coffee samples and the roasting process kills all remaining microorganisms including those that are used to ferment the coffee beans, so that the product will be safe for consumption. Pure *R. oligosporus* and *Y. lypolytica* species will be used in the fermentation process so as to decrease the chances of other microorganisms interfering with their fermentation of the coffee beans. The scientist working on the trial will also perform tests on the samples to confirm the coffee beans purity (i.e. only *Y. lypolytica* and/or *R. oligosporus* are present on the coffee beans) in the fermentation stage and these tests will confirm that the final product is sterile after roasting.

The equipment necessary for the small-scale development of the MVP and that needed on a larger scale will be trialled and tested so that the best possible methodology for the fermentation process can be carried out efficiently and consistently.

The fermented coffee product's flavour profile and composition will be analysed through the use of gas chromatography mass spectrometry and liquid chromatography mass spectrometry, which identify substances and elements within a sample including any foreign material and contamination that may be present. These forms of spectrometry are highly accurate and can be used to identify positive traits within the coffee bean that may be of use for the branding and marketing of the product. These might include lower caffeine, bitterness and acidity levels and desired flavour and aroma characteristics based off past research that has already been conducted on fermented coffees (Eat Cultured, 2018; Marcone, 2004).

Multiple laboratory trials will be carried out to confirm that the fermented coffee product can be produced consistently during the development of the MVP and on a larger scale in successive trial runs.

The quality of fermented coffee product will also be tested by a Q grader through the use of the SCAA cupping protocols to ensure that the coffee beans remain specialty grade (80+ points) after fermentation (SCAA, 2018a).

## **Regulatory Processes: Standards and Product Verification**

### **Standards**

SCAA quality standards will be upheld after the development of the MVP for 'Rhizo Coffee'. The fermented coffee will be Q graded to ensure that the coffee is of specialty grade (80+ points) (SCAA, 2018a).

Quality control procedures will be employed where possible, ranging from the purchase of Arabica coffee specialty grade green beans from a supplier at origin, to its exportation to NZ,

in the fermentation and roasting process, packaging and potential retail distribution and the brewing of the final cup of coffee. If possible, every individual that is a part of this process will be educated about how their contribution adds to the value chain.

Ethical and sustainable practice methods will be carried out to the highest standard and best practice will be applied during the coffees production.

## **Product Verification**

The proposed product will comply with the regulations and requirements for food and beverage safety that are determined by the NZ government. This includes adhering to the Food Act (2014), which was created to update and advance NZ's food safety rules. As 'Rhizo Coffee' is a fermented coffee beverage, it would also need to adhere to the guidance under National Programme 2 (NP2) for safe food handling.

## **Projected Cost: Product Development**

### **Projected Cost of the MVP development:**

The average projected cost for specialty grade green Arabica coffee beans in NZ has not been determined by any studies as of yet. However, one green bean supplier called the Green Coffee House in NZ sells their beans for between \$14– \$27 NZD per kg (Green Bean House, 2018). No more than 100g of coffee beans were used in the first laboratory trial. Therefore, for successive trials there is no need to seek more than this amount, which adds up to about \$1.40 - \$2.70 per 100g. In the first laboratory trials however, 1kg of green Arabica coffee beans were sourced from Mojo Coffee for free and they might be able to be sourced in this way once more.

The *Y. lipolytica* and *R. oligosporus* species needed in 'Rhizo Coffees' fermentation process were purchased from Landcare Research at \$120 and \$150 NZD per sample respectively



(Landcare Research, 2018a). These samples can be used to make many more fresh cultures. For the development of the MVP, these species could be purchased from Landcare once more.

There is the potential cost of laboratory hire for the development of an MVP. In the previous trial, laboratory use was free due to the connections that were known at Victoria University. There was no evidence online that suggested the cost of laboratory hire for commercial use in NZ. However, the cost will most likely be high. If a partnership can be made with an organisation that works with a university (such as Viclink) and has access to laboratory technicians, scientists and laboratories then the cost for these factors may be free or negotiable.

However, if a partnership cannot be made, a laboratory technician (e.g. a postgraduate student) or a scientist will need to be hired. There was only one individual needed to carry out the laboratory experiments in the previous trials, a science PhD student was hired for \$25.00 per hour (ph.) for about 16 hours work over two months. The average salary range for laboratory technicians in NZ are: \$36,000-\$56,500 p.a. which works out to be about \$17.00- \$27.00ph (PayScale, 2018a). Microbiologist's average salary range in NZ is between: \$38,000-\$79,000 p.a. which is about \$18- \$38 ph. (PayScale, 2018b). Therefore, for about 20 hours of laboratory work, a laboratory technician could charge between \$340- \$540 NZD and a microbiologist could charge between \$360 - \$760 NZD in total.

The average costs for the product development of 'Rhizo Coffee' at an MVP level are displayed below in Table 4.

**Table 4**

***Projected Cost of Rhizo Coffee's Minimum Viable Product development***

MVP development costs	Average Cost (NZD) (1 decimal point)
Specialty Grade Arabica Coffee Beans	Per 100g: \$1.40-\$2.70
<i>Y. lypolytica</i> species	\$120
<i>R. oligosporus</i> species	\$150
Laboratory Hire	Unknown
Science Laboratory Technician hire	20 hours work: \$340- \$540
Microbiologist (Scientist)	20 hours work: \$360 - \$760
Total Including Laboratory Technician	\$611.40- \$811.40
Total Including Microbiologist	\$631.40- \$1032.70

*Note.* Retrieved from: (Green Bean House, 2018; Landcare Research, 2018, PayScale, 2018a, 2018b)

Cost projections for the development of a 'Rhizo Coffee' on a larger scale will not be able to be forecasted until an MVP has been developed. This is attributed to potential changes in the methodologies and processes carried out to produce the fermented coffee product throughout the course of the trials. The resulting MVP process may also need specific machinery that is able to control certain conditions that are essential for the coffees fermentation which will not be established until the MVP is developed. Therefore, costs associated with larger scale production, such as development, production, distribution, packaging, staff hire, machinery maintenance and improvement and marketing and branding costs will not be identified until 'Rhizo Coffee' is further along in its development.

### **Can the Intellectual Property be Protected?**

The Intellectual Property (IP) might be able to be protected through the use of a process patent if the methodologies carried out for the fermentation of the coffee beans are markedly different to those methodologies that were developed by Lee et. al (2016, 2017).

Process patents give their owner the rights to a specific manufacturing process. However, in order to sue another entity for patent infringement, their product would have to be reverse engineered to show that they used the exact same manufacturing process as the patented product, which can be hard to prove. Patents are also momentarily expensive and can only be held for a specified period of time before they have to be renewed again. These are the reasons for which 'Rhizo Coffee's' fermentation and roasting methodologies and manufacturing processes should be kept as a trade secret (UpCounsel, 2018).

Trade secrets can protect a business by holding those persons that acquire its secrets accountable for damages. It does need to be validated as a trade secret by ensuring that the knowledge of its existence is limited to a limited selection of employees, it is not known outside the business and strong steps have been taken to assure the secret remains that way. The cost to procure a case for a trade secret is much lower than that of a patent. There are also many large organisations who are successful in the use of trade secrets in their businesses (UpCounsel, 2018). Some of which include: The Google search algorithm, Coca-Cola and Listerine (Vethan Law Firm , 2016). As this has been a successful process protection method for these successful businesses in the past and given the points about process patents mentioned above, it makes a case for the use of trade secrets for 'Rhizo Coffee'.

## **Rhizo Coffee: Features**

'Rhizo Coffee' will be a novel fermented coffee product with features that includes the use of specialty grade green Arabica coffee beans that are sourced ethically and sustainably. It is predicted that its flavour profile will contain low acidity, caffeine content and bitterness, with high levels of sweetness. There may be health benefits associated with the product, which are to be confirmed in subsequent laboratory trials.

## **Resource Requirements and Returns**

### **The Development Team: Skills Required**

The team required for the development of the MVP for 'Rhizo Coffee', includes that of a laboratory technician or scientist to conduct the trials. The skillset that will be required of this person includes:

Creative problem solving and strategic thinking skills in order to deal with problems that they may face, as scientific research is relatively unpredictable.

Recording and data analysis skills that will allow the scientist to interpret the composition of the fermented coffee bean samples, resulting from the use of machines such as the GC-MS and LC-MS.

The ability to conduct laboratory trials, using aseptic techniques to prevent contamination of the coffee samples from other microorganisms and pathogens.

The ability to present and communicate research to those who are non-scientists that may have an evolving vision for the direction of the project.

Keeping up to date with relevant scientific literature to potentially aid in the development of new methodologies that could improve the efficiency of the fermentation process and consistency of product.

Confidence in networking, if the scientist or laboratory technician is seeking advice from other scientists, this skill can allow the individual to gather new insights into potential problems and opportunities for product development.

### **Equipment Required for the Manufacturing Process**

**The equipment required for the manufacturing process on a small scale for MVP development:**

- Storage facilities for:
  - The ingredients and equipment required for the fermentation process
  - The green Arabica coffee beans
- Refrigeration system needed for the storage of sample plates in laboratory trials
- Refrigeration system needed for 'Rhizo Coffee's' storage if it were to be a ready-made product such as a cold brew. Freezer system may be needed for longer periods of storage time
- Containers for coffee bean storage
- Laboratory space
- Laboratory equipment needed:
  - Steamer
  - Moisture meter
  - 500ml beaker
  - Centrifuge
  - Analytical scale
  - Hot plate
  - Shaker
  - Test tubes, test tube racks
  - Pipettes and pipette tips
  - 500ml measuring cylinder
  - Autoclave to sterilise equipment
  - Commercial oven
  - GC-MS and LC-MS

**The equipment required for the manufacturing process on a large scale:**

- Fermentation vats that allow for the measurement of controlled conditions
- Commercial scale coffee roaster (could be leased for use at a roastery)

- Moisture meter
- Laboratory space
- Storage facilities for:
  - The ingredients and equipment required for the fermentation process
  - The green Arabica coffee beans
  - 'Rhizo Coffee' Packaging
  - Packaged 'Rhizo Coffee' (e.g. shelving)
- Packaging and labelling machines
- An industrial coffee grinder needed so that the final product can be brewed
- High quality espresso machine on the site of roastery to try the final product
- Refrigeration system needed for the storage of sample plates in laboratory trials
- Refrigeration system needed for 'Rhizo Coffee's' storage if it were to be a ready-made product such as a cold brew. Freezer system may be needed for longer periods of storage time
- Containers for coffee bean storage
- GC-MS and LC-MS for flavour profile analysis and quality control

## **Funding Required**

The funding for the development of the MVP for 'Rhizo Coffee' is equal to between \$611.80 NZD- \$1032.70NZD for 20 hours work, depending on whether a Laboratory Technician or a Microbiologist (scientist) is used for the trials. The data calculations for these figures can be found in Table 4. *Projected Cost of Rhizo Coffee's Minimum Viable Product development.*

This funding might be obtained through crowd sourcing platforms such as Snowball Effect, PledgeMe Projects and Equitise Australia and NZ. These companies allow businesses to crowdfund through equity which allows investors to support private businesses and own shares in them. PledgeMe Projects, Kickstarter and Givealittle are social based crowdfunding platforms, which raise capital through donations or reward-based incentives (Consumer, 2015). The use of social based crowdfunding may be a better way to raise capital for the

development of 'Rhizo Coffee's' MVP then the equity based crowdfunding platforms, as they are simpler and lower risk platforms to begin raising capital with, especially since 'Rhizo Coffee' does not have any equity to give in the beginning stages before the development of the MVP.

Viclink is a part of the Victoria University of Wellington's commercialisation sector and it is owned by the university. They assist businesses to secure investment and funding and they aid in the development of partnerships within the companies industry to bring innovation to fruition. As this thesis has been completed for a Victoria University course, Viclink may be a good business to look into for the development of 'Rhizo Coffee's' MVP for the above reasons.

## Timeline for all Activities: Rhizo Coffee

The timeline for all activities for 'Rhizo Coffee' has been established for a period of one and a half years and two months from Jun 2019- Jan 2020.

The first round of funding applications will be made from Jun 2018- Aug 2018 to commence the development of the MVP for 'Rhizo Coffee'. If the laboratory scale trials for the fermented coffee are successfully funded, a scientist or a laboratory technician will be hired to carry out these trials from Aug 2018- Sept 2018. There is a two-month period for these trials as this was the length of time that they took to complete in the previous trial. The second round of funding applications will begin when the MVP is developed, if that is in Sept of 2018, then applications for the funding of a larger scale trial will be initiated from Oct 2018-Jan 2019. The reason that this funding period will be longer than the first funding period is because more capital will be needed to fund the larger trials. Commencement of market development research will be conducted from Dec 2018- Mar 2019, which overlaps with the second round of capital raising, as funding could be found relatively quickly and at least part of the market development research should be conducted by then. When the second round of funding is secured, larger scale trials will begin which are estimated to be between Mar 2019 – Aug 2019. If these trials are successful on a larger scale, 'Rhizo Coffee' will commence production and trials for an evidence-based target market in Sept 2019-Oct 2019. Target market validation for 'Rhizo Coffee' will be carried out in the months following these trials (Nov 2019-Dec 2019). Finally, normal operations will commence in Jan 2020. The timeline for 'Rhizo Coffee' activities between June 2018- January 2020 can be found under Figure 2 below.



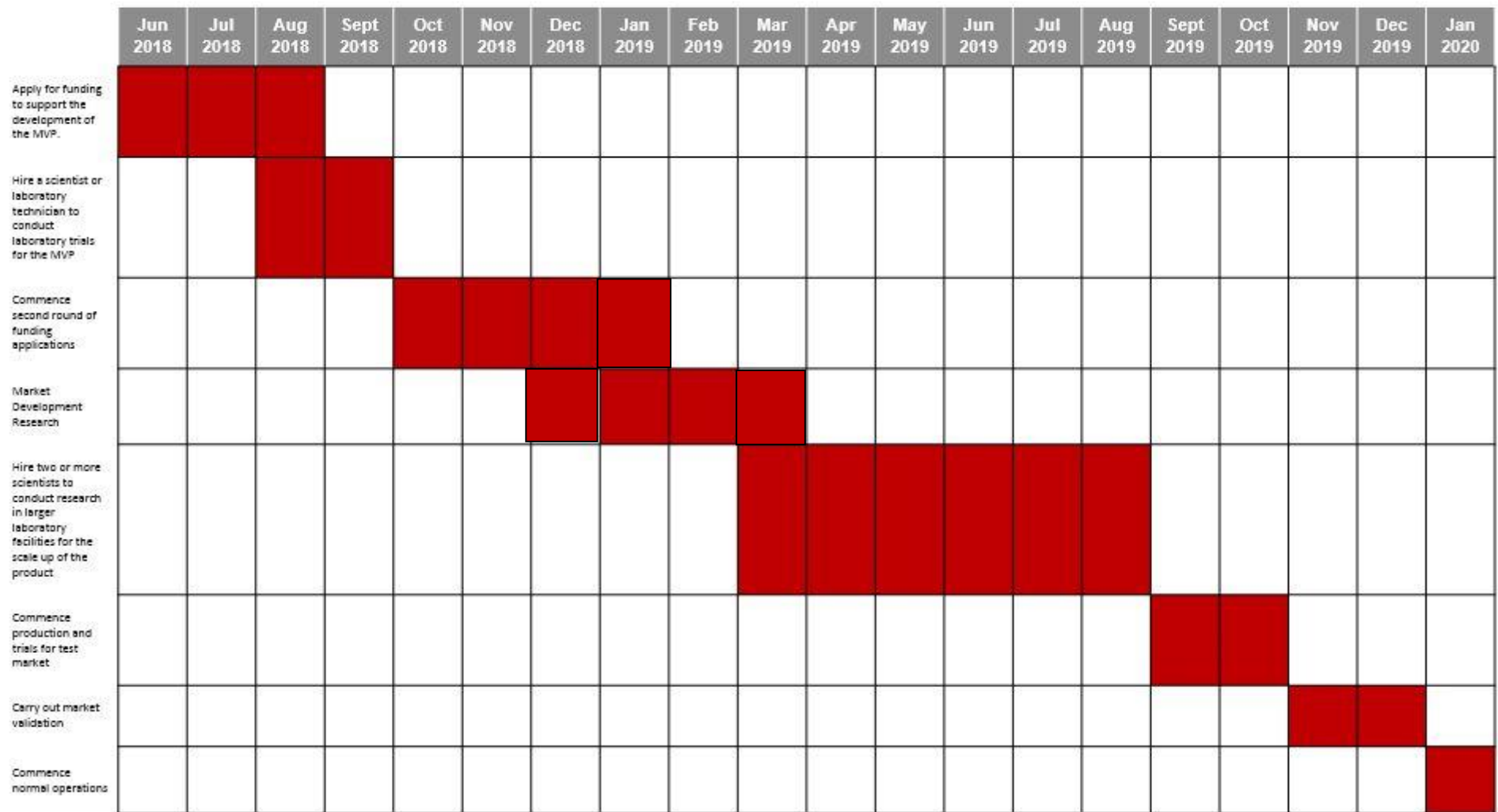


Figure 2. Timeline for all Activities: Rhizo Coffee

## Summary

This chapter outlines a business case for the development of the MVP for 'Rhizo Coffee' and recommendations for its development on a larger scale. During the advancement of the business case, it showed that the fermented coffee beverages that are currently in the market are scarce, the market for fermented beverages is trending and the specialty coffee market is on the rise. This brings about the opportunity to disrupt the marketplace with 'Rhizo Coffee'.

Based on the research that was conducted into Intellectual Property, it was concluded that a patent is not the best option for the protection of 'Rhizo Coffee's' fermentation process. The application of the trade secret process is more feasible.

The total projected costs for the development of the MVP were calculated and estimated to range between \$611.40-\$1032.70 NZD. Research suggests that crowdfunding platforms such as Givealittle may provide a suitable capital raising source for the project's further development to begin with. Another supply of capital and resources may be found in a partnership with another entity such as Viclink, who could potentially provide access to scientists and laboratory space at Victoria University.

## Chapter 7: Conclusions

The findings that are displayed in this thesis suggest that there may be a substantial market for fermented coffee, which would allow 'Rhizo Coffee' to disrupt the specialty coffee marketplace with its product. There are currently only three distinct fermented coffee companies worldwide. These include: Cultured Coffee, Black Ivory Coffee and Kopi Luwak Coffee. However, both Black Ivory and Kopi Luwak Coffees fetch extremely high prices that may not be affordable to everyday consumers; Cultured Coffee is priced at a premium but not as high as these company's products (Newage Consulting, 2015; BICC, 2018a; Watson, 2016). These findings have influenced 'Rhizo Coffee's' business model in that the final products retail price should be as low as possible in order to reach the majority of the NZ population. Larger target markets also increase the probability of new product adoption (Minnesota Libraries, 2018).

Evidence from the quantitative analysis of data from the Qualtrics survey shows that 'Rhizo Coffee's' potential target market could be those coffee consumers that earn a salary between \$50,000-\$99,999 NZD p.a. in the age range between 18-34 years old. Future research conducted in this area could expand this subgroup to those who earn \$50,000+ NZD p.a. and target millennials (born between 1980 and 2000 or 18-38 years) (Goldman Sachs, 2018), as this subgroup would earn enough to be able to afford the premium price associated with 'Rhizo Coffee'. Those in the majority of this age range in the Qualtrics survey results have shown to be the most experimental with their coffee and are willing to try fermented coffee beverages.

The findings from the qualitative research that was produced for this thesis indicate that a large proportion of specialty coffee consumers primarily look for good flavour, high quality coffee beans and ethical sourcing of products in a coffee brand that they regularly purchase. This has influenced the business case for 'Rhizo Coffee' as prior assumptions that suggested that these factors were important to the specialty coffee consumer have been confirmed and this product will now be tested for the coffees flavour attributes and quality level. The coffee beans used in the laboratory trials will also be ethically sourced and 'Rhizo Coffee'

will adhere to ethical and sustainable practices throughout its development and commercialisation stages.

Other findings suggested that well-defined branding and a strong POD is needed in order for specialty coffee businesses to differentiate themselves from their competitors in a very crowded market. This has influenced 'Rhizo Coffee's' value proposition in that its POD's lie in its unique fermentation process, the story behind it and in the potentially distinct flavour characteristics and health benefits that could be found in this coffee.

The business case that has been developed for 'Rhizo Coffee' was established from evidence-based research. It includes a business model design, market and product validation development methods and the resource requirements and returns that are needed for the products development including a timeline for all activities.

Subsequent laboratory trials will be conducted in order to validate the scientific method of coffee bean fermentation and to create an MVP. Funding could be sourced through the use of various crowd funding platforms such as that of Kickstarter which has shown to be successful in the funding of the campaign for Cultured Coffee, a fermented product (Cosgrove, 2015). Potential partnerships and investment could be sourced through Viclink, a sector of Victoria University in Wellington for the development of 'Rhizo Coffee'. After further laboratory trials have commenced, future research will be conducted around market and product development, followed by their validation. The business model, goals and vision for 'Rhizo Coffee' will be reviewed and updated every six months if necessary.

The case for 'Rhizo Coffee's' commercialisation will be stronger when an MVP is created on a small and large scale. If this product is commercialised, it will disrupt the specialty coffee marketplace, as the fermented coffee market is not currently large in NZ. It would add value to the specialty coffee market in NZ and it would enable specialty coffee consumers the opportunity to experience a unique cup of coffee that potentially has an enticing flavour profile, health benefits, a product that is of high quality and one that uses sustainable and ethical practices for the sourcing of its beans.

## Appendix A: Interview Information Sheet: Specialty Coffee Organisations



### *Novel Fermented Coffee Product*

#### INFORMATION SHEET FOR PARTICIPANTS

Thank you for your interest in this project. Please read this information before deciding whether or not to take part. If you decide to participate, thank you. If you decide not to take part, thank you for considering my request.

#### **Who am I?**

My name is Ani Morison and I am a Masters student in Innovation and Commercialisation at Victoria University of Wellington. This research project is work towards my thesis.

#### **What is the aim of the project?**

This project aims to identify a novel method of fermenting Fairtrade Arabica coffee beans with a food grade organism, with the result being a fermented coffee product desirable to the specialty coffee consumer. I also aim to understand the products feasibility in the specialty market.

This research has been approved by the Victoria University of Wellington Human Ethics Committee 25041.

#### **How can you help?**

If you agree to take part, I will interview you in an agreed upon location in Wellington. I will ask you questions about specialty coffee and your thoughts and opinions about fermented products. The interview will take up to one hour. I will audio record the interview with your permission and write it up later. You can choose to not answer any question or stop the interview at any time, without giving a reason. You can withdraw from the study by contacting me at any time before 01/03/2018. If you withdraw, the information you provided will be destroyed or returned to you.

### **What will happen to the information you give?**

You will not be named in the final report, but your organisation will be named (provided you have the authority to agree to this on behalf of the organisation).

Only my supervisor and I will read the notes or transcript of the interview. The interview transcripts, summaries and any recordings will be kept securely and destroyed 1 year after the research ends.

### **What will the project produce?**

The information from my research will be used in my Masters report and a report for publication in academic or professional journals.

### **If you accept this invitation, what are your rights as a research participant?**

You do not have to accept this invitation if you don't want to. If you do decide to participate, you have the right to:

- Choose not to answer any question;
- Ask for the recorder to be turned off at any time during the interview;
- Withdraw from the study before 01/03/2018;
- Ask any questions about the study at any time;
- Receive a copy of your interview recording;
- Read over and comment on a written summary of your interview;
- Be able to read any reports of this research by emailing the researcher to request a copy.

### **If you have any questions or problems, who can you contact?**

If you have any questions, either now or in the future, please feel free to contact either:

#### **Student:**

Name: Ani Morison

University email address: morisoani@myvuw.ac.nz

#### **Supervisor:**

Name: Robert Keyzers

Role: Masters Supervisor

School: Chemical and Physical Sciences

Phone: +64 4 463 5117

rob.keyzers@vuw.ac.nz

### **Human Ethics Committee information**

If you have any concerns about the ethical conduct of the research, you may contact the Victoria University HEC Convenor: Associate Professor Susan Corbett. Email [susan.corbett@vuw.ac.nz](mailto:susan.corbett@vuw.ac.nz) or telephone +64-4-463 5480.

## Appendix B: Interview Sheet Specialty Coffee Organisations



### *Novel Fermented Coffee Product*

#### CONSENT TO INTERVIEW

This consent form will be held for 1 year.

Researcher: Ani Morison, School of Chemical and Physical Sciences, Victoria University of Wellington.

- I have read the Information Sheet and the project has been explained to me. My questions have been answered to my satisfaction. I understand that I can ask further questions at any time.
- I agree to take part in an audio recorded interview.

I understand that:

- I may withdraw from this study at any point before 01/03/18, and any information that I have provided will be returned to me or destroyed.
- The information I have provided will be destroyed 1 year after the research is finished.
- Any information I provide will be kept confidential to the researcher (Victoria University Student) and the supervisor
- I understand that the results will be used for a Masters report to use in the researcher's thesis.

- I consent to information or opinions which I have given being attributed to my organisation in any reports on this research and have the authority to agree to this on behalf of the organisation Yes  No
- I would like a copy of the recording of my interview: Yes  No
- I would like a summary of my interview: Yes  No
- I would like to receive a copy of the final report and have added my email address below. Yes  No

Signature of participant: \_\_\_\_\_

Name of participant: \_\_\_\_\_

Date: \_\_\_\_\_

Contact details: \_\_\_\_\_



## Appendix C: Interview Questions for Specialty Coffee Organisations

1. What types of qualitative and quantitative research and analysis did you do prior to your coffee being on the market?
2. Looking back, what research methods worked well and what didn't work so well?
3. What would you consider some of the most important aspects/critical success factors when running a business in the specialty coffee industry?
4. How often does your business introduce a new product to market? Is innovation within your organisation relatively fast or slow regarding new product development? Why is this?
5. How willing is your organisation to consider licencing an idea or partnering with another entity in the specialty coffee industry?
6. What do you think about fermented products and the trend we are seeing currently?
7. If I was to say that I have a method to create a novel fermented coffee bean product, how likely would you be to try this product? Would you like to know more?
8. What do your customers like about your coffee and why do they buy it? E.g. Taste, Fairtrade, high quality
9. How did you effectively build a loyal customer base for your brand? E.g. Through various marketing methods etc.
10. What sets you apart from the many specialty coffee companies in Wellington and across New Zealand?
11. What advice could you give to a new start-up specialty coffee company?
12. How do you recommend approaching various shareholders in the early stages of the start-up and who do you recommend approaching?
13. What is some advice that you wish you had received during the early stages in your company's journey to success?

## Appendix D: Qualtrics Survey Questions for Specialty Coffee Consumers

1. What is your age?
2. What is your gender?
3. What is your income per annum (NZD)
4. What is your occupation?
5. How often do you buy coffee at cafes/coffee carts per week?
6. Where do you drink coffee?
7. What is your favourite specialty coffee brand?
8. Why is this your favourite coffee brand?
9. What is your favourite cafe/outlet that sells coffee? Why is it your favourite?
10. What qualities do you look for in the brand of coffee you regularly buy?
11. Would you say that you like to experiment with your coffee?
12. What is the longest period of time you have bought the same brand of coffee for?
13. What do you know and think about the fermented food and beverage trend? E.g. Kombucha, Kimchi, Tempeh
14. Have you tried Kopi Luwak 'civet cat poop' coffee or Black Ivory Thai elephant coffee before?
15. What did you think of it?
16. Would you be willing to try it? Why or why not?
17. Would you be willing to try a new brand of coffee that uses a fermentation process to ferment high-quality coffee beans prior to roasting?
18. Why or why not?
19. How much are you willing to pay for a cup of premium high-quality coffee? (250ml) (NZD)
20. How likely are you purchase coffee online versus other outlets?
21. What do you want to see in a new specialty coffee brand? Why?
22. Enter your email below to go into the draw to win a \$50 Flight Coffee voucher and 200g of Flight Coffee for a month!

## Appendix E: Qualtrics Survey Data Margin of Error and Confidence Intervals

Number	Sample	Fraction out of sample size	Margin of Error Percent*	Confidence Interval Range for the True Population Proportion
1	<\$30,000 p.a. Student 18-24 Subgroup	54/273	± 4.73	(15.05% to 24.51%)
2	Student Subgroup	62/272	± 4.99	(17.80% to 27.78%)
3	<30,000 subgroup	93/270	± 5.67	(27.77% to 40.11%)
4	\$50,000-\$99,000 subgroup	97/270	± 5.72	(30.21% to 41.65%)
<b>Q1 What is your age?</b>				
5	18-24 subgroup	120/273	± 5.89	(38.07% to 49.85%)
6	25-34 subgroup	72/273	± 5.23	(21.14% to 31.6%)
7	35-44 subgroup	33/273	± 3.87	(8.22% to 15.96%)
8	25-34 \$50,000-\$99,000 subgroup	41/72	± 11.44	(45.5% to 68.38%)
9	25-34 \$30,000-\$49,999 subgroup	14/72	± 9.14	(10.30% -28.58%)
10	25-34 <\$30,000	12/72	± 8.61	(8.06% to 25.28%)
<b>Q2 What is your income per annum?</b>				
11	\$50,000 - \$99,000 subgroup	97/270	± 5.72	(30.21% to 41.65%)
12	<\$30,000 subgroup	93/270	± 5.67	(28.77% to 40.11%)
13	\$30,000- \$49,999 subgroup	58/270	± 4.9	(16.58% to 26.38%)
14	Teacher	20/272	± 3.1	(4.25% to 10.45%)
15	People who Worked in the Coffee Industry	15/272	± 2.71	(2.8% to 8.22%)
<b>Q3 How often do you buy coffee at cafes or coffee carts per week?</b>				
16	Bought coffee once a week	95/273	± 5.65	(29.15% to 40.45%)
17	Once a day	78/273	± 5.36	(23.21% to 33.93%)
18	Several times a day	21/273	± 3.16	(4.53% to 10.85%)
19	Other, 2-3 times a day	14/273	± 2.62	(2.51% to 7.75%)
20	<\$30,000 p.a. Student 18-24 Subgroup: Once a day	20/56	± 12.55	(23.16% to 48.26%)
21	<\$30,000 p.a. Student 18-24 Subgroup: Once a week	11/56	± 10.41	(9.23% to 30.05%)
22	<\$30,000 p.a. Student 18-24 Subgroup: Once a month	9/56	± 9.62	(6.45% to 25.69%)
23	\$50,000 - \$99,999 p.a. Subgroup: Once a Week	38/97	± 9.71	(29.47% to 48.89%)
24	\$50,000 - \$99,999 p.a. Subgroup: Once a day	26/97	± 8.81	(17.99% to 35.61%)

Number	Sample	Fraction out of sample size	Margin of Error Percent*	Confidence Interval Range for the True Population Proportion
1	<\$30,000 p.a. Student 18-24 Subgroup	54/273	± 4.73	(15.05% to 24.51%)
2	Student Subgroup	62/272	± 4.99	(17.80% to 27.78%)
3	<30,000 subgroup	93/270	± 5.67	(27.77% to 40.11%)
4	\$50,000-\$99,000 subgroup	97/270	± 5.72	(30.21% to 41.65%)
<b>Q1 What is your age?</b>				
5	18-24 subgroup	120/273	± 5.89	(38.07% to 49.85%)
6	25-34 subgroup	72/273	± 5.23	(21.14% to 31.6%)
7	35-44 subgroup	33/273	± 3.87	(8.22% to 15.96%)
8	25-34 \$50,000-\$99,000 subgroup	41/72	± 11.44	(45.5% to 68.38%)
9	25-34 \$30,000-\$49,999 subgroup	14/72	± 9.14	(10.30% -28.58%)
10	25-34 <\$30,000	12/72	± 8.61	(8.06% to 25.28%)
<b>Q2 What is your income per annum?</b>				
11	\$50,000 - \$99,000 subgroup	97/270	± 5.72	(30.21% to 41.65%)
12	<\$30,000 subgroup	93/270	± 5.67	(28.77% to 40.11%)
13	\$30,000- \$49,999 subgroup	58/270	± 4.9	(16.58% to 26.38%)
14	Teacher	20/272	± 3.1	(4.25% to 10.45%)
15	People who Worked in the Coffee Industry	15/272	± 2.71	(2.8% to 8.22%)
<b>Q3 How often do you buy coffee at cafes or coffee carts per week?</b>				
16	Bought coffee once a week	95/273	± 5.65	(29.15% to 40.45%)
17	Once a day	78/273	± 5.36	(23.21% to 33.93%)
18	Several times a day	21/273	± 3.16	(4.53% to 10.85%)
19	Other, 2-3 times a day	14/273	± 2.62	(2.51% to 7.75%)
20	<\$30,000 p.a. Student 18-24 Subgroup: Once a day	20/56	± 12.55	(23.16% to 48.26%)
21	<\$30,000 p.a. Student 18-24 Subgroup: Once a week	11/56	± 10.41	(9.23% to 30.05%)
22	<\$30,000 p.a. Student 18-24 Subgroup: Once a month	9/56	± 9.62	(6.45% to 25.69%)
23	\$50,000 - \$99,999 p.a. Subgroup: Once a Week	38/97	± 9.71	(29.47% to 48.89%)

24	\$50,000 - \$99,999 p.a. Subgroup: Once a day	26/97	± 8.81	(17.99% to 35.61%)
25	\$50,000 - \$99,999 p.a. Subgroup: Other: 2-3 times a week	6/97	± 4.8	(1.39% to 10.99%)
26	\$50,000 - \$99,999 p.a. Subgroup: Several times a day	8/97	± 5.48	(2.77% to 13.73%)
27	25-34 Subgroup: Once a week	26/72	± 11.09	(25.02% to 47.2%)
28	25-34 Subgroup: Once a day:	21/72	± 10.5	(18.67% to 39.67%)
29	25-34 Subgroup: Other: 2-3 times per week:	4/72	± 5.29	(0.27% to 10.85%)
30	25-34 Subgroup: Several times a day	5/72	± 5.87	(1.07% to 12.81%)
<b>Q4 Where do you drink coffee?</b>				
31	In cafes	240/759	± 3.31	(28.31% to 34.93%)
32	Home	211/759	± 3.19	(24.61% to 30.99%)
33	Workplace	204/759	± 3.15	(23.74% to 30.04%)
34	<\$30,000 p.a. Student 18-24 Subgroup: Workplace	50/150	± 7.54	(25.79% to 40.87%)
35	<\$30,000 p.a. Student 18-24 Subgroup: Cafes	47/150	± 7.42	(23.91% to 38.75%)
36	<\$30,000 p.a. Student 18-24 Subgroup: Home	43/150	± 7.24	(21.43% to 35.91%)
37	\$50,000 - \$99,999 p.a. Subgroup: Cafes	85/278	± 5.42	(25.16% to 36%)
38	\$50,000 - \$99,999 p.a. Subgroup: Home	79/278	± 5.3	(23.12% to 33.72%)
39	\$50,000 - \$99,999 p.a. Subgroup: Workplace	76/278	± 5.24	(22.1% to 32.58%)
40	25-34 Subgroup: Workplace	56/198	± 6.27	(22.01% to 34.55%)
41	25-34 Subgroup: At Home	55/198	± 6.24	(21.54% to 34.02%)
42	25-34 Subgroup: In Cafes	62/198	± 6.36	(24.85% to 37.77%)
<b>Q5 What is your favourite coffee brand?</b>				
43	Flight Coffee	99/273	± 5.7	(30.56% to 41.96%)
44	Other	85/273	± 5.49	(25.65% to 36.63%)
	Havana	21/273	± 3.16	(4.53% to 10.85%)
45	Supreme	38/273	± 4.11	(9.81% to 18.03%)
46	L'affare	27/273	± 3.54	(6.35% to 13.43%)
47	<\$30,000 p.a. Student 18-24 Subgroup: Flight Coffee	25/56	± 13.02	(31.62% to 57.66%)
48	<\$30,000 p.a. Student 18-24 Subgroup: Supreme:	9/56	± 9.62	(6.45% to 25.69%)

49	<\$30,000 p.a. Student 18-24 Subgroup: Mojo	5/56	± 7.47	(1.46% to 16.4%)
50	25-34 Subgroup: Flight	32/72	± 11.48	(32.96% to 55.92%)
51	25-34 Subgroup: Other	17/72	± 8.68	(8.32% to 25.68%)
	Peoples	4/72	± 5.29	(0.27% to 10.85%)
52	25-34 Subgroup: Supreme	14/72	± 9.14	(10.3% to 28.58%)
53	25-34 Subgroup: L'affare	6/72	± 6.38	(1.95% to 14.71%)
54	\$50,000 - \$99,999 p.a. Subgroup: Flight	29/97	± 9.11	(20.79% to 39.01%)
55	\$50,000 - \$99,999 p.a. Subgroup: Supreme	11/97	± 6.31	(5.03% to 17.65%)
56	\$50,000 - \$99,999 p.a. Subgroup: Havana:	10/97	± 6.05	(4.26% to 16.36%)
57	\$50,000 - \$99,999 p.a. Subgroup: L'affare	9/97	± 5.77	(3.51% to 15.05%)
58	Good taste and flavour	111/273	± 5.83	(34.83% to 46.49%)
59	Variety	18/273	± 2.95	(3.65% to 9.55%)
60	Consistency of Product	14/273	± 2.62	(2.51% to 7.75%)
61	Locality and Convenience	13/273	± 2.53	(2.23% to 7.29%)
<b>Q6 What qualities do you look for in the brand of coffee you regularly buy?</b>				
62	Good Taste	268/1009	± 2.73	(23.83% to 29.29%)
63	Ethically sourced	162/1009	± 2.27	(13.79% to 18.33%)
64	High Quality	147/1009	± 2.18	(12.39% to 16.75%)
65	Value or for Money	126/1009	± 2.04	(10.45% to 14.53%)
66	Fairtrade	121/1009	± 2	(9.99% to 13.99%)
67	<\$30,000 p.a. Student 18-24 Subgroup: Tastes good	54/214	± 5.81	(19.31% to 30.93%)
68	<\$30,000 p.a. Student 18-24 Subgroup: Ethically sourced	35/214	± 4.96	(11.4% to 21.32%)
69	<\$30,000 p.a. Student 18-24 Subgroup	32/214	± 4.78	(10.17% to 19.73%)
70	\$50,000 - \$99,999 p.a. Subgroup: Tastes good	96/341	± 4.77	(23.38% to 32.92%)
71	\$50,000 - \$99,999 p.a. Subgroup: Ethically sourced	58/341	± 3.99	(13.02% to 21%)
72	\$50,000 - \$99,999 p.a. Subgroup: High Quality	54/341	± 3.88	(11.96% to 19.72%)
73	25-34 Subgroup: tastes good	70/266	± 5.29	(21.03% to 31.61%)
74	25-34 Subgroup	45/266	± 4.51	(12.41% to 21.43%)
75	25-34 Subgroup	43/266	± 4.42	(11.75% to 20.59%)

<b>Q7 Would you say that you like to experiment with your coffee?</b>				
76	Agree	143/273	± 5.92	(46.46% to 58.3%)
77	Indecisive	118/273	± 5.85	(35.85% to 47.55%)
78	Disagree	12/273	± 2.39	(1.85% to 6.63%)
79	<\$30,000 p.a. Student 18-24 Subgroup: Indecisive	30/56	± 13.06	(40.51% to 66.63%)
80	<\$30,000 p.a. Student 18-24 Subgroup: Agree	24/56	± 12.96	(29.9% to 55.82%)
81	<\$30,000 p.a. Student 18-24 Subgroup: Disagree	2/56	± 4.49	(-1.46% to 7.52%)
82	\$50,000 - \$99,999 p.a. Subgroup: Agree	49/97	± 9.83	(32.44% to 52.1%)
83	\$50,000 - \$99,999 p.a. Subgroup: Indecisive	39/97	± 9.76	(30.45% to 49.97%)
84	\$50,000 - \$99,999 p.a. Subgroup: Disagree	6/97	± 4.8	(1.39% to 10.99%)
85	25-34 Subgroup: Agree	44/72	± 11.26	(49.85% to 72.37%)
86	25-34 Subgroup: Indecisive	24/72	± 10.89	(22.44% to 44.22%)
87	25-34 Subgroup: Disagree	4/72	± 5.29	(0.27% to 10.85%)
<b>Q8 What is the longest period of time you have bought the same brand of coffee for?</b>				
88	One year	106/273	± 5.78	(33.05% to 44.61%)
89	One month	86/273	± 5.51	(25.99% to 37.01%)
90	Five years	31/273	± 3.76	(7.6% to 15.12%)
91	<\$30,000 p.a. Student 18-24 Subgroup:	26 /56	± 13.06	(33.37% to 59.49%)
92	<\$30,000 p.a. Student 18-24 Subgroup:	14/56	± 11.34	(13.66% to 36.34%)
93	<\$30,000 p.a. Student 18-24 Subgroup	8/56	± 9.17	(5.12% to 23.46%)
94	\$50,000 - \$99,999 p.a. Subgroup: 1 year	33/97	± 9.43	(24.59% to 43.45%)
95	\$50,000 - \$99,999 p.a. Subgroup: 1 month	29/97	± 9.11	(20.79% to 39.01%)
96	\$50,000 - \$99,999 p.a. Subgroup: 5 years:	18/97	± 7.74	(10.82% to 26.3%)
97	25-34 Subgroup: 1 year	31/72	± 11.44	(31.62% to 54.5%)
98	25-34 Subgroup: 1 month	24/72	± 10.89	(22.44% to 44.22%)
99	25-34 Subgroup: 1 week	6/72	± 3.38	(1.95% to 14.71%)
<b>Q9 Would you be willing to try Black Ivory Coffee or Kopi Luwak Coffee?</b>				
100	Yes	166/262	± 5.83	(57.53% to 69.19%)










101	Maybe	53/262	± 4.86	(15.37% to 25.09%)
102	No	43/262	± 4.48	(11.93% to 20.89%)
<b>Q10 Would you be willing to try a new brand of coffee that uses a fermentation process to ferment high-quality coffee beans prior to roasting?</b>				
103	Indecisive	134/262	± 6.05	(45.1% to 57.2%)
104	Definitely yes	127/262	± 6.05	(42.42% to 54.52%)
105	Definitely not	1/262	± 0.75	(-0.37% to 1.13%)
106	<\$30,000 p.a. Student 18-24 Subgroup: Definitely yes	30/56	± 13.06	(40.51% to 66.63%)
107	<\$30,000 p.a. Student 18-24 Subgroup: Indecisive	26/56	± 13.06	(33.37% to 59.49%)
108	\$50,000 - \$99,999 p.a. Subgroup: Definitely yes	76/92	± 7.74	(74.87% to 90.35%)
109	\$50,000 - \$99,999 p.a. Subgroup: Indecisive	50/92	± 10.18	(44.17% to 64.53%)
110	25-34 Subgroup: Definitely yes	38/70	± 11.67	(42.62% to 65.96%)
111	25-34 Subgroup: Indecisive	32/70	± 11.67	(34.04% to 57.38%)
<b>Q11 How much are you willing to pay for a cup of premium high-quality coffee? (250ml) (NZD)</b>				
112	Up to \$5	136/262	± 6.05	(45.86% to 57.96%)
113	Up to \$10	89/262	± 5.73	(28.24% to 39.7%)
114	Other	25/262	± 3.56	(5.98% to 13.1%)
	Up to \$6	5/262	± 1.66	(0.25% to 3.57%)
115	Up to \$15	9/262	± 2.21	(1.23% to 5.65%)
116	<\$30,000 p.a. Student 18-24 Subgroup: Up to \$5	30/56	± 13.06	(40.51% to 66.63%)
117	<\$30,000 p.a. Student 18-24 Subgroup: Up to \$10	25/56	± 10.93	(33.71% to 55.57%)
118	<\$30,000 p.a. Student 18-24 Subgroup: Up to \$15	1/56	± 3.47	(-1.68% to 5.26%)
119	\$50,000 - \$99,999 p.a. Subgroup: Up to \$5	49/92	± 10.2	(43.06% to 63.46%)
120	\$50,000 - \$99,999 p.a. Subgroup: Up to \$10	31/92	± 9.66	(24.04% to 43.36%)
121	\$50,000 - \$99,999 p.a. Subgroup: Up to \$15	3/92	± 3.63	(-0.37% to 6.89%)
122	25-34 Subgroup: Up to \$5:	28/70	± 11.48	(28.52% to 51.48%)
123	25-34 Subgroup: Up to \$10:	32/70	± 11.67	(34.04% to 57.38%)



124	25-34 Subgroup: Other: 7/70: Up to \$7	3/70	± 4.75	(-0.46% to 9.04%)
<b>Q12 How likely are you to purchase coffee online versus at other outlets?</b>				
125	Indecisive	103/262	± 5.91	(33.4% to 45.22%)
126	Unlikely	84/262	± 5.65	(26.41% to 37.71%)
127	Likely	75/262	± 5.47	(23.16% to 34.1%)
128	<\$30,000 p.a. Student 18-24 Subgroup: Unlikely	25/56	± 13.02	(31.62% to 57.66%)
129	<\$30,000 p.a. Student 18-24 Subgroup: Indecisive	21/56	± 12.68	(24.82% to 50.18%)
130	<\$30,000 p.a. Student 18-24 Subgroup: Likely	10/56	± 10.03	(7.83% to 27.89%)
131	\$50,000 - \$99,999 p.a. Subgroup: Likely	34/92	± 9.07	(17.89% to 36.03%)
132	\$50,000 - \$99,999 p.a. Subgroup: Indecisive:	27 /92	± 9.3	(20.05% to 38.65%)
133	\$50,000 - \$99,999 p.a. Subgroup: Unlikely	22/92	± 8.72	(15.19% to 32.63%)
134	25-34 Subgroup: Indecisive	29/70	± 11.54	(29.89% to 52.97%)
135	25-34 Subgroup: Likely	27/70	± 11.4	(27.17% to 49.97%)
136	25-34 Subgroup: Unlikely	14/70	± 9.37	(10.63% to 29.37%)

\*Assumes a 95% level of confidence

# Appendix F: The Business Model Canvas

<p><b>Key Partners</b> </p> <p>Specialty Coffee businesses: Licencing and partnerships</p> <p>Viclink: Licencing and partnerships</p> <p>KiwiNet: Government funded Pre-Seed investment</p> <p>Callaghan Innovation: Research and Development Grants</p> <p>Return on Science: Research commercialisation program</p> <p><b>Cost Structure</b></p> <p>'Rhizo Coffee' beans priced between: \$5.50-\$6.50 NZD per cup, (retail price) production and advertising cost dependent</p> <p>Afineur prices their Cultured Coffee for around \$25 per 100g of roasted beans and \$280 per kg of roasted beans (Eat Cultured, 2018). 'Rhizo Coffee' may be priced in a similar range due to their similar process (production and advertising cost dependent)</p> <p>B2B and B2C distribution costs</p> <p>Marketing and Branding cost through various channels. Production costs: supply/distribution, production, centres, staff hire, packaging</p>	<p><b>Key Activities</b> </p> <ul style="list-style-type: none"> <li>Raise capital or find a partnership to fund further small-scale laboratory trials</li> <li>Hire a PC2 laboratory and a scientist or postgraduate science student to carry out trials for the development of the MVP</li> <li>When the MVP is developed, seek further investment to test the products viability on a larger scale</li> <li>Create a plan for the manufacturing process and equipment that may be required for larger scale production when the MVP is developed</li> </ul>	<p><b>Value Propositions</b> </p> <p>POD is the unique fermentation process and story behind the origin of the coffee beans all the way up to the finished cup of coffee, which means that there must be a close relationship with the coffee farmers at origin and the suppliers and distributors of the coffee beans</p> <p>'Rhizo Coffee' will use high quality Arabica coffee beans that are sustainably and ethically sourced.</p> <p>There may be health benefits associated with the final coffee product, such as a lower caffeine content, which Afineur's product has shown makes it easier to digest than regular coffee (Eat Cultured, 2018). As 'Rhizo Coffee' will be secondarily fermented like Afineur's product, the same characteristics may be found in the MVP.</p> <p>Potential for the MVP to have unique flavour characteristics</p> <p>The commercialised product will be of specialty grade (scores 80+ in cupping) (SCAA, 2018)</p> <p>The final product will have premium attached to it but it will still be within most consumers range of affordability in NZ (i.e. \$5.50-\$6.50 NZD depending on a range of factors)</p>	<p><b>Customer Relationships</b> </p> <p>There will be transparency about the coffee process and traceability from the suppliers and farmers to its import and distribution in NZ.</p> <p>Eventually the customers will be educated about the brand on its website which will display the coffee origin story and the brands values</p> <p>The website will contain a contact email for enquires and there will be a commonly asked question and answer section on the website (if the products owner goes into a partnership or creates their own business)</p>	<p><b>Customer Segments</b> </p> <p>Those who earn between \$50,000-\$99,999 NZD p.a. in the age range between 18-34 based on market research in this thesis.</p> <p>Could expand this range to those who earn \$50,000+ NZD p.a. and target millennials (born between 1980 and 2000 or 18-38 years old as of 2018) (Goldman Sachs, 2018).</p> <p>Targeting those coffee consumers who are willing to: be experimental with their coffee, try new fermented products, pay a premium price for coffee (and can afford to).</p>
<p><b>Cost Structure</b> </p> <p>Specialty grade Arabica Coffee Beans: \$14– \$27 NZD per kg from a supplier in NZ (Green Bean House , 2018).</p> <p><i>Y. lipolytica</i> and <i>R. oligosporus</i> species were purchased from Landcare Research: <i>Y. lipolytica</i>: \$120 NZD <i>R. oligosporus</i>: \$150 NZD (Landcare Research, 2018a). These samples can be used to make many more fresh cultures.</p> <p>Laboratory hire: If a partnership with a university enterprise can be made with a company such as with VicLink, laboratory and scientist access could be negotiated</p>	<p><b>Revenue Streams</b> </p> <p>Sale of product (potentially whole coffee beans or pre-packaged cold brews) via proposed channels</p> <p>If the product is licenced to a company, revenue streams via royalties and potentially shares.</p> <p>Advertising revenues via proposed channels</p>			
<p><b>Key Resources</b> </p> <ul style="list-style-type: none"> <li>Scientist or postgraduate science student to carry out 'Rhizo Coffee' trials for the development of the MVP</li> <li>PC2 laboratory with access to an anaerobic chamber, laboratory equipment, chemical ingredients, commercial oven, GC-MS, LC-MS</li> <li>Moisture Meter, Arabica coffee beans (specialty grade), <i>R. oligosporus</i> and <i>Y. lipolytica</i> species</li> <li>Capital to fund the project development of the MVP and further trials</li> </ul>			<p><b>Channels</b> </p> <p>Crowd Funding Platforms: Snowball Effect, PledgeMe NZ, Equitise Australia and NZ, Kickstarter,</p> <p>Advertising though: Television interviews, newspaper outlets, coffee events e.g. NZ Coffee Festival (supply tastings), Social Media: Facebook, Instagram, website</p> <p>Word of Mouth, Partnership Programs</p> <p>B2B channels: Koru Lounges, luxury accommodation, cafes and restaurants</p> <p>B2C channels: e-commerce</p>	<p><b>Key Resources</b></p> <p>'Rhizo Coffee' on a larger scale:</p> <ul style="list-style-type: none"> <li>Roastery that will allow fermented beans to be roasted there.</li> <li>Large warmer or fermentation vat for controlled fermented growth</li> <li>Multiple scientists</li> <li>PC2 laboratory or secure PC2 area to ferment coffee beans</li> <li>Specialty grade Arabica coffee beans sourced from a supplier</li> <li>Packaging for whole beans and possibly ready-made cold brew</li> <li>Advertising Agencies e.g. Koru magazine. 3 news. Social media.</li> </ul>

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