

From the Mountains to the Stars ... Doi Chaang Coffee for Sustainability

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Abstract

The agricultural sector is still an essential economic sector in Thailand due to the high proportion of agricultural laborers. However, most agricultural products are products that farmers cannot determine their prices. From the predetermined market price, farmers have a higher chance of selling them at a loss. Differentiation and diversification of agricultural products allow farmers to have market power and be able to set their prices. Thus, farmers' market structure has changed from the perfectly competitive market to the monopolistic competition market. Doi Chaang Coffee is an intriguing case study of Doi Chaang villagers who used to face the same problem since their middlemen had high bargaining power. The situation encouraged the leaders of the Doi Chang people (Khun Panachai Phisailert or Adel) to consult and ask for help with Khun Wicha Phromyong, the primary decision-maker of this case study. Khun Wicha had to decide whether Doi Chaang villagers should take a high level of effort and spend many years developing their coffee quality or not. If successful, the villagers would no longer be a price taker; if not, they could choose other alternatives such as changing to grow other crops. Furthermore, if the villagers decide to produce high-quality coffee, they should apply for international standards which generate high costs, or not.

Keywords: Doi Chaang, Product Differentiation, Market Structure, International Standard

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จากดอยสู่ดาว....กาแฟดอยช้าง กาแฟที่แตกต่างเพื่อความยั่งยืน

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บทคัดย่อ

ภาคการเกษตรยังคงเป็นภาคเศรษฐกิจที่สำคัญของประเทศไทยเนื่องจากแรงงานในสัดส่วนสูงเป็นแรงงานภาคเกษตร อย่างไรก็ตาม สินค้าเกษตรส่วนใหญ่เป็นสินค้าที่ผู้ขายไม่สามารถกำหนดราคาได้ แต่ต้องเป็นผู้รับราคาตลาดทำให้มีโอกาสในการรับผลขาดทุนสูง การสร้างผลิตภัณฑ์ทางการเกษตรให้มีความแตกต่าง ทำให้เกษตรกรสามารถมีอำนาจในการกำหนดราคาได้ เป็นการขายสินค้าภายใต้โครงสร้างตลาดที่เปลี่ยนแปลงไปจากการขายในตลาดแข่งขันสมบูรณ์ เป็นการขายในตลาดกึ่งแข่งขันกึ่งผูกขาด กาแฟดอยช้างเป็นกรณีศึกษาที่น่าสนใจที่ชาวดอยช้างซึ่งเคยประสบปัญหาการขายกาแฟได้ในราคาต่ำเนื่องจากผู้ซื้อซึ่งได้แก่ พ่อค้าคนกลาง มีอำนาจต่อรองสูง จึงเป็นแรงผลักดันให้ผู้นำของชาวดอยช้าง (คุณปณชัย พิสัยเลิศ หรืออาเดล) นำปัญหานี้ไปปรึกษาและขอความช่วยเหลือกับคุณวิชา พรหมยงค์ ซึ่งเป็นผู้ตัดสินใจหลักของกรณีศึกษานี้ คุณวิชาจึงต้องตัดสินใจว่า ชาวดอยช้างควรพัฒนาปรับปรุงกาแฟให้มีคุณภาพที่ดี ซึ่งอาจต้องใช้เวลาหลายปี แต่หากทำสำเร็จชาวดอยช้างจะสามารถเป็นผู้กำหนดราคาได้ หรือควรเปลี่ยนไปปลูกพืชประเภทอื่น และหากตัดสินใจปลูกกาแฟที่มีคุณภาพดีควรยื่นขอรับรองมาตรฐานสากลซึ่งมีค่าใช้จ่ายในการขอรับรองมาตรฐานที่สูงมากหรือไม่

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“The price for your coffee is 5 baht per kilogram: you can sell to me or not.”

This ultimatum was often delivered by the middlemen who bought coffee from the Doi Chang community in 2001¹, according to Mr. Adel, Panachai Phisailert, who at that time was the Por Luang² of the Doi Chang Village in Mae Suai District, Chiang Rai. The unfair pricing made Adel leave the village to seek advice from Khun Wicha Phromyong³, a respected trader and trekker, who was well-known to Adel and Agoh, Pikor Phisailert, Adel's father. The problem of low farm-gate coffee prices had persisted for many years and caused many Doi Chang villagers to stop growing coffee. The villagers had to get rid of the coffee bushes by cutting, burning, and even digging them up, since the purchase price of coffee was so low that it was not worthwhile planting the crop. Yet although the price of coffee in the city was as high as 60-65 baht per kilogram, the Doi Chang villagers were not able to leave their locality to sell their coffee because they were a minority people without Thai ID cards. If they went into the city market, they would risk arrest. Therefore, the people of Doi Chang conceived the idea of switching to other crops, even including a return to opium plantation, as in the years before 1974.

In 1974, His Majesty King Bhumibol Adulyadej the Great embarked on a royal initiative to improve the quality of life of the hill tribe people. As a result, a Royal Project, which would research and develop coffee varieties, was set up. The Project led to the cultivation of Arabica coffee on the plateau to replace opium plantation and brought suitable coffee varieties from various countries around the world for experimental cultivation in Thailand. Thailand therefore became a country with many varieties of coffee, ranking in the top 3 world-wide. Once the right varieties for

¹ In 2001, there was a coffee price slump. (Exhibits 1 and 2) and Ritpreecha (2008).

² Por Luang means village head.

³ Khun Wicha Phromyong, the pioneer and driving force who made Doi Chaang coffee world-famous, died on January 23, 2014. Here, in remembrance of him, the author wishes to pay tribute to his merit and good deeds in respect of Doi Chang Coffee.

the Thai environment and landscape had been obtained, then the coffee research findings were made available to the public and led to adoption by the Thai hill tribe people. The seedlings were distributed to the Doi Chang villagers in 1983, a total of 40 families, with 400 trees⁴ per family. However, later on, the number of coffee-growing families decreased due to their inability to market the coffee beans. In 2001, there were only 500-600 rais⁵ of coffee plantation left, reduced from a starting point of 2,000 rais.

At first, Khun Wicha's solution to the problem of the Doi Chang villagers was to help bring coffee from Doi Chang to sell in town. The merchants agreed to buy the coffee for 60 baht per kilogram. So the villagers collected the coffee to be sold by loading it into two or three pickup trucks; however, when they delivered their produce in town, the merchants only paid half of the agreed price: they reasoned that once the hill tribe people had arrived in town with the coffee, they would have to sell it, as the Thai saying went: "When the corpse reaches the morgue, it has to be incinerated."

"At that time, I was enraged. But to this day, I must thank those shameless merchants because in fact they have made Doi Chaang happen." Khun Wicha was speaking about the inspiration to develop Doi Chaang coffee into a quality product so that the people of Doi Chang could have the power to bargain and no longer be exploited.

⁴ Ritpreecha (2008).

⁵ 1 rai is equal to 1,600 square meters.

Doi Chang's Turning Point

Doi Chang in the year 2001 was an unforested mountain, since most villages in the area grew plants that required a lot of sunlight, such as tomatoes, cabbage, and corn. The people of Doi Chang had to cut down the forest trees so their crops were fully exposed to the sunlight. In addition to relying on plentiful sunlight, these vegetables depended on the use of chemical fertilizers, pesticides, and insecticides. At a time when most Doi Chang people could only sell coffee at a low price, households were discouraged from growing more of the crop. In return for a higher income, villagers increased the cultivation of these vegetables as a substitute for coffee. Thus, the Doi Chang people had to cut down more trees and use more chemicals that were harmful to the environment and their health.

After being deceitfully forced to sell the coffee at a lower price, Khun Wicha contacted a friend to take a sample from Doi Chang to check its quality. His friend said that someone used to have to set their coffee for inspection. He agreed to buy the coffee because the sample was of good quality, but the coffee he got was of inferior quality. The seller not only brought mediocre quality coffee to sell but also adulterated it with beans of an unacceptable grade. With this story in mind, Khun Wichai declared his intention that he and the Doi Chang people would only sell good quality coffee to ensure the livelihood of the villagers. Khun Wicha then came back to the village and started on his scientific investigation into how to produce good quality coffee.

Initially, Khun Wicha was not a coffee drinker and did not have any experience in coffee trading. So he had to search for information from all available sources. He read hundreds of books and travelled to all the coffee research centers. He discussed the knowledge he gained with academics who had experience in growing coffee and people who were interested in studying the coffee process from cultivation to production. Khun Wicha then brought back the knowledge he had acquired and transferred it to those Doi Chang villagers who were still growing coffee. They participated in experimenting with, adapting, and combining the processes of cultivation and production from each coffee estate. This included the creation of good quality coffee from overseas countries such as Colombia, Kenya, and Costa Rica. Setting up new,

experimental and effective practices for Doi Chaang coffee needed from the beginning a lump sum of 320,000 baht from Adel, who had to sell his car to finance this operation, which began on a newly acquired plot of 1 “Ngarn”⁶ with the building of a warehouse to store coffee.

Meanwhile, Khun Wicha, Adel, and seven fellow Doi Chang villagers had started experimenting with a new type of coffee plantation using the method studied by Khun Wicha. They began with an area of nearly 20 rais. Coffee on this plot was grown under the shade of large trees such as macadamia, avocado, and plum, which provided supplementary revenue. The annual increase in revenue from a low of 60,000-70,000 baht per year to a high of 300,000 baht made this new coffee plantation very popular. Consequently, more people in Doi Chang wanted to grow coffee using this method.

Coffee Quality ... Beginning with Varieties

There are two primary varieties of coffee bean: Arabica coffee and Robusta coffee. In general, Arabica is more expensive than Robusta. The cultivation of Arabica coffee is feasible at a height of about 800 meters above sea level, and the coffee will be of good quality when grown under large trees. This type of shaded coffee requires growers to plant large trees to help protect the coffee from direct sunlight. Robusta coffee trees can be planted at lower altitudes and can also benefit from tree shade. Robusta coffee contains more caffeine, which acts as an insecticide, than the Arabica variety. Robusta is therefore resistant to insects and yields a greater output; it has a lower production cost and a lower average price (Exhibit 2). Caffeine is a bitter substance, giving Robusta coffee a strong flavor, and is more often used in the manufacture of instant coffee, while Arabica coffee, with its subtler taste and nose, is often brewed fresh because it smells better. Arabica coffee has a greater variety of note and tone, with chocolate, orange, and floral scents, as well as having a smooth, mellow flavor and complexity, with the added possibility of having a sweet, sour, salty, or bitter flavor.

⁶ 1 Ngarn is equal to 400 square meters.

Doi Chang has a cultivation area located about 1,000-1,700 meters above sea level, making it ideal for growing Arabica coffee. Cultivation in highland areas at low temperatures (around 18-22 degrees Celsius) means that the coffee beans ripen slowly. On average, the coffee from Doi Chang will take about ten months to ripen, while in general coffee will take 6-7 months to mature. The extended ripening period allows the coffee to absorb more nutrients from the fertile soil of Doi Chang and fully reflect its fruitfulness. These coffee beans have a high level of hardness and a low caffeine level, essential features that make the coffee taste good. Also, the coffee species grown in Doi Chang are coffee varieties that have been selected and researched by the Research Center operating under the Royal Project. They are ideal for the mountainous areas of Thailand. Therefore, the coffee from Doi Chang has distinctive characteristics and can become a single-origin coffee, i.e. coffee using beans from a single plantation. Moreover, Doi Chang coffees have a unique flavor stemming from the specific area of cultivation and the villagers' unique production process.

Coffee quality depends not only on the species but also on equally important post-harvest procedures that can also determine quality. These range from picking coffee beans, preparation of coffee beans before aging, aging, roasting, grinding, and brewing. Coffee pickers will choose, by hand, only the ripe fruit. This hand-picking process requires intensive labor to select and later store the coffee beans. The labor cost of picking and storing coffee thus becomes high, averaging about 5 baht per kilogram. This cost represents about 28 percent of the growers' income. Thus, growing Doi Chaang coffee has a much higher labor cost than that of other coffee plantations, especially when compared to the coffee growers in large areas and strip-pick growers. The large-farm growers use machines to pick and store all of the coffee beans without selecting the highest quality ones. Strip-pick growers collect all the coffee beans by hand indiscriminately, without selecting the best i.e. ripe beans.

Within 24 hours of harvesting, the coffee farmer will prepare the coffee cherries for aging to prevent spoilage of the fruit. There are three methods for preparing the cherries before aging: 1) dry or natural process, 2) semi-wet process, and 3) wet process. After multiple experiments, Doi Chang coffee makers⁷ have chosen the thoroughly washed or wet process, which gives Doi Chaang coffee a distinct flavor. After the coffee cherries have gone through the wet aging process, the remaining varieties of coffee beans will be of better quality. Aging will reduce the sour taste of the coffee and give it a smoother taste, better mouth-feel, and higher quality. Doi Chaang coffee ages over 6-8 months, thus increasing the quality of the green coffee bean.

Roasting is another crucial process of coffee production. Before roasting, the coffee roasters have to select the same-size beans so that every bean will change to the same color at the same roasting time. The standard roasting levels are mild (light), medium, and dark. There are specific names given to the coffee, according to the heat level used in the process of roasting, from mild to dark roasts: examples are the light roasting known as Cinnamon Roast, medium roasting known as City and Full City Roast, and the dark roast Vienna Roast, Italian Roast, and French Roast. Different roasting levels yield different tastes. The mild-roasted coffee will preserve the property of the original coffee that can be sour, tart, or refreshing, and with low acidity. It is suitable for making hot coffee, while medium roasting gives a bitter=sweet flavor with a slightly tart taste, which is ideal for both hot and cold coffee. The dark roasting will make the coffee bitter with a touch of sweetness. Hence, it is suitable for making iced coffee. Doi Chang coffee makers attach a lot of importance to the roasting process and therefore use high-quality, expensive automatic coffee roasters from Italy. However, the machine is a worthwhile investment because it can create more value-added through the sale of roasted coffee instead of green coffee. Also, a high-quality roaster will easily control the quality of the coffee that the villagers want and help maintain the standard and uniqueness of Doi Chaang Coffee.

⁷ Doi Chaang Coffee maker in this case study means Doi Chaang Coffee Original Co., Ltd.

The use of appropriate packaging technology will allow the coffee to preserve its quality before reaching the consumer. Coffee packaging includes pressurised cans or bags that use valves to allow gases to come out but prevent air from outside entering. The roasted coffee beans will release carbon dioxide; thus, without a valve, the bag will eventually swell and burst. If air from outside can enter the container, oxygen will react with the coffee oil and make the coffee rancid. The Doi Chaang coffee maker has chosen to pack the coffee in a four-layer foil bag with a valve to maintain the quality of the coffee. Most sales of Doi Chaang coffee are made from the sale of roasted beans. Sometimes, Doi Chaang coffee is exported and sold as green coffee beans because consumers abroad have different tastes in terms of the levels of roasting. Doi Chaang Coffee has extended its business line by opening more Doi Chaang coffee shops in Thailand, where the quality of grinding and brewing can be controlled. Customers will be able to experience the taste of coffee made by the expert and well-trained staff of the Doi Chaang coffee company. Therefore, every cup of coffee served will be of high quality and the standard for Doi Chang coffee drinkers everywhere will be maintained. Consumers will consistently receive the same unique flavor from every cup. Consistency is the most critical factor in maintaining the standards, reputation and customer base of Doi Chaang coffee.

Results of Perseverance: Doi Chaang People Have a Role in Determining Coffee Prices.

Doi Chaang coffee development is a complete upgrading from the upstream to the downstream of coffee production (From Earth to Cup). This upgrading rewards the Doi Chang people for the difficulty of the task undertaken and compensates them for their exhausting labor with a higher coffee price. More importantly, the Doi Chaang coffee makers and villagers have a say in the price of their coffee: the Doi Chaang coffee price will no longer be determined by the middleman.

In its initial stages, the company had many patrons who came to drink Doi Chaang coffee at the small shop in front of the store in Chiang Rai. At present, both Thai and foreign customers are enthusiastic about the taste of the coffee. They take some back home either for themselves or as a gift for their relatives: the superb quality of the coffee results in “word of mouth” marketing. Moreover, Doi Chaang Coffee has won recognition from many world-class coffee organizations. Every time a Coffee Review website reviews Doi Chaang coffee, it always reaches the Specialty Coffee grade (meaning a coffee type receiving more than 80 out of 100 points). Specialty is the highest possible grade for single-origin coffee. Grades awarded by such Coffee Review websites range from the highest quality to the lowest quality as follows: Specialty Grade, Premium Grade, Exchange Grade, Below Standard Grade, and Off Grade.

The Coffee Review’s scoring criteria consist of roasting levels, (Agtron, which has values on a scale from 0-100, the increasing number reflecting the intensity of the roasting process), aroma, body, flavor, aftertaste, and taste with milk. The manufacturer of Doi Chaang Coffee started to send coffee samples for testing in 2007 and has continued to send such samples. For the past year, Doi Chaang Coffee received a very high score (90 or more points), as shown in Exhibits 3. and 4. These exhibits provide an example of the coffee rating based on the criteria of the Coffee Review. In addition to sending coffee samples to the Coffee Review for testing, Doi Chaang also sends its coffees to other accredited coffee testing institutions such as CoffeeCuppers. Moreover, from Exhibit 3, it can be seen that the Doi Chaang coffee with its high rating from Coffee Review can sell at a much higher price than ordinary coffee. Thus, the Doi Chaang coffee growers and makers do not have to sell their products at low market prices and have the power to determine the price by themselves.

Growing Globally with International Standards

Khun Wichai planned that the initial sales strategy of Doi Chaang coffee should focus on foreigners since it is not very popular with Thai consumers. The low popularity may be due to the high price of Doi Chaang coffee and lack of familiarity with the brand. In addition, at that time, Thai consumers did not like to drink freshly ground coffee. Thai customers now often choose Robusta coffee, which is cheap and easy to find. Moreover, customers do not want to pay a lot of money to buy coffee in a specialty shop or café that sells freshly ground coffee. Doi Chaang coffee makers, therefore, are collaborating with foreign partners with similar operating principles to market their product internationally.

Although Doi Chaang coffee is of high quality and well accepted among foreign coffee drinkers, selling it to bulk buyers such as supermarkets or a coffee shop with many branches overseas is not an easy task. These buyers will carefully scrutinize the coffee before purchasing for their shops. In order to maintain the retailer's reputation and to ensure consumers come back to buy Doi Chaang coffee, one of the main criteria for buying and selling is the achievement of international standards. Moreover, individual coffee makers are not able to sell their coffee in certain countries at all without gaining the standardized local certification. Thus, Doi Chaang coffee has started the process of requesting quality certification from various organizations such as USDA Organic, EU Organic Farming, EU Geographical Indication, Specialty Coffee Association, and the Swiss Water Process, as shown in Exhibit 5. Quality assurance is essential for Doi Chaang coffee to have a chance of being sold abroad. The compliance process, with the terms and conditions of quality certification, encourages Doi Chaang coffee makers to maintain and improve the quality of their coffee. Improvement means the development of production processes that meet the changing needs of consumers. Enhancement of production allows the consumers to enjoy a superb taste with consistent quality with every cup of Doi Chaang coffee.

In addition to the fact that bulk buyers and retailers buy coffee on the basis of the quality of the product, coffee consumers in developed countries also consider the quality of life of the coffee farmers themselves, as well as the environmental conditions. This means bulk buyers include Fair Trade standards as an additional criterion for selecting coffee to be sold at their stores. Thus, Doi Chaang Coffee has to acquire certification not only in terms of product quality but also in respect of Fair Trade standards.

“In Canada, Doi Chaang coffee is now available only in small retail stores and sales cannot expand, because although our aim is to sell to chain stores, we do not have Fair Trade certification, so our product cannot be sold there. But I have recently submitted all the necessary requests for Fair Trade certification both in America and Europe. The certifying bodies will send people to check whether or not we have achieved the required standard. Checking also ensures that the farmer will have a fair share since some coffee makers pay the farmers very little: 1 kilogram of coffee turns out to be less expensive than 1 cup of coffee in their shop.” This statement is from Khun Wicha, who is describing the rationale behind adopting Fair Trade certification.

More Important than Profit are Sustainability and Fair Trade.

The idea of fair trade has been around for half a century, but the first enterprise that achieved Fair Trade certification was the Solidaridad agency in the Netherlands in 1988. Since then, this concept has become widespread in countries all over the world, including Europe, the United States, and Japan.

The three main conditions as required by the Fair Trade Standards Establishment Agency are: 1) fair purchase price of farmers' products; 2) the maintenance of a long-term relationship with farmers that allows them to cultivate crops sustainably; and 3) advance payment to the farmers to reduce the shortage of funds and help them to be free from financial burdens. The main objectives of Fair Trade are individual and community well-being, empowerment, fair price, and prohibition of child labor. Moreover, these conditions imply increasing competitive capacity in both production

and trading for underprivileged farmers, especially women and minorities, protecting human rights, and solving environmental problems through environmental stewardship.

The above Fair Trade rules are useful for farmers in countries where they are often exploited. Some coffee growers are disadvantaged, and they do not have many choices. However, the coffee growers of Doi Chang are independent farmers who have options and can make their own decisions. Khun Wicha is of the opinion that the standard of Doi Chang coffee exceeds the Fair Trade standard; for example, the purchase price of cherry coffee is no less than 18 baht per kilogram. Therefore, Doi Chaang Coffee can get Fair Trade certification quickly. However, the main obstacles to applying for certification are the relatively high cost, the language barrier (in terms of documentation), and the interpretation of various rules and specifications. However, once Doi Chaang Coffee has received Fair Trade certification, it can help increase sales and gain acceptance in foreign markets.

In addition to complying with Fair Trade standards, Doi Chang coffee makers have also established the Doi Chaang Coffee Foundation. The foundation's main objectives are to support and promote education and medical care for people in the community. It will organize activities and projects to improve the quality of life of people and promote community culture; these have been further developed in nearby hill tribe communities. The thirty percent operating fund comes from the Doi Chaang coffee makers' income before deducting their expenses. The revenue sharing with the Doi Chaang Coffee Foundation is one of the essential features of Doi Chaang Coffee Original Co., Ltd. since its inception. This sharing demonstrates the commitment to community development and helping local people.

Moreover, the coffee makers have established the Doi Chaang Coffee Academy as a learning center to develop the potential of coffee growers and coffee makers both domestically and internationally. Knowledge sharing stems from the development of Doi Chaang's coffee production process. Hence, farmers and those who are interested in coffee can apply their knowledge to help to improve operations, and the Doi Chang people in general can use this knowledge to improve their coffee quality further.

From an Idea to a Decision for Sustainable Development

Doi Chaang coffee may have originated because the village coffee growers lacked opportunities to access the market. The growers were unable to sell their products at a fair price, lacking market power and being exploited by middlemen. Hence, relying on others to sell coffee at market prices was a temporary solution. Khun Wicha then had to decide whether he should advise the Doi Chang villagers to improve the coffee production process from upstream to downstream or not. This development required both intense effort and cooperation to produce high-quality coffee and make the growers into price-setters. Thus, the farmers would no longer have to accept the price proposed by the middlemen. However, Khun Wicha had to acknowledge that the farmers faced the dilemma of whether to follow his advice if improvement required heavy financial investment and intensive labor, along with the need for building long-term cooperation with the Doi Chang villagers. It would be difficult to follow his successfully.

Should Khun Wicha then suggest other solutions that might have more chance of success in improving the quality of life of Doi Chang people? Such advice might be the introduction of different types of monoculture crops that the villagers used to plant, or even growing coffee in a way that focuses only on increasing volume and reducing costs. Another recommendation might be that Doi Chang people migrate to study and work in the city, as others did in the past. There are many options and ways for Khun Wicha to advise Adel and the Doi Chang people so that they can have a better life. The choice made by Khun Wicha came from a consideration of cause and effect, and the possibility. Decisions and advice to farmers in different areas with different contexts from Doi Chang might be different as well.

Once Khun Wicha had decided to recommend to the Doi Chang people to improve the quality of their coffee, communication with buyers and consumers about coffee quality became extremely important. Making consumers accept the quality of Doi Chaang coffee is no less challenging than improving the quality of coffee itself. Therefore, if Khun Wicha decides to develop the process to produce good quality coffee, he also has to face another critical question namely how to let the consumers

appreciate the excellence of the coffee quality and whether the coffee deserves the higher price. Moreover, getting international quality certification is not an easy task: it takes at least 2-5 years to get quality certification. The certification process entails many expenses and complicated procedures and conditions. These stipulations involve many stakeholders from farmers to production supervisors as well as personnel from the foreign certifying body that has to inspect the Doi Chaang area.

Khun Wicha's decision to advise Doi Chaang villagers in 2001 had to take into account consideration of the surrounding environment and anticipate future obstacles. Moreover, creating a suitable system of operations and preserving the aspiration to make Doi Chang farmers have a better life are crucially important. This will lead to sustainable development and a guaranteed livelihood for the farmers of Doi Chang.

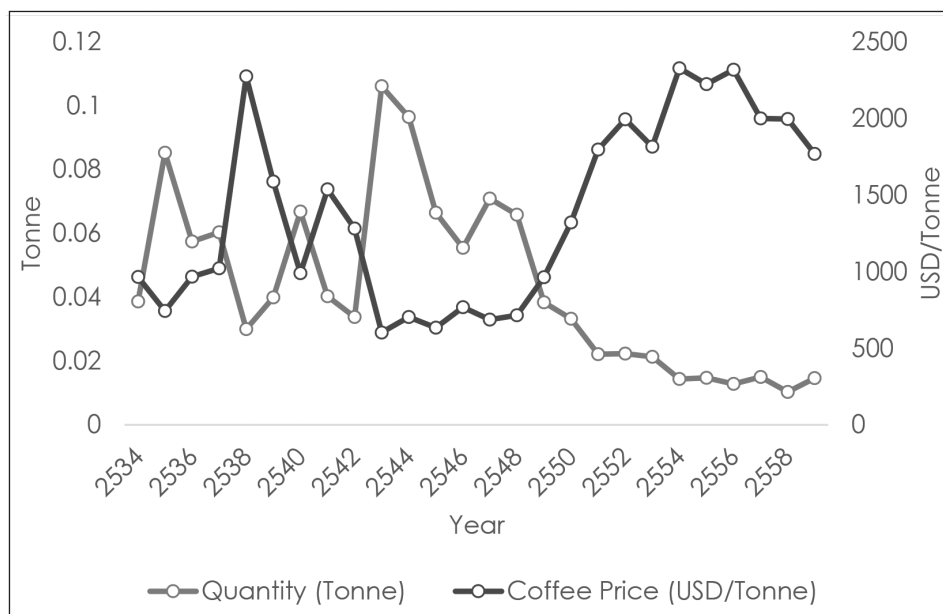


Exhibit 1: Price and Quantity of Thai Coffee Industry

Source: FAO. (2019). FAOSTAT. Retrieved September 10, 2019

from <http://www.fao.org/faostat/en/#home>

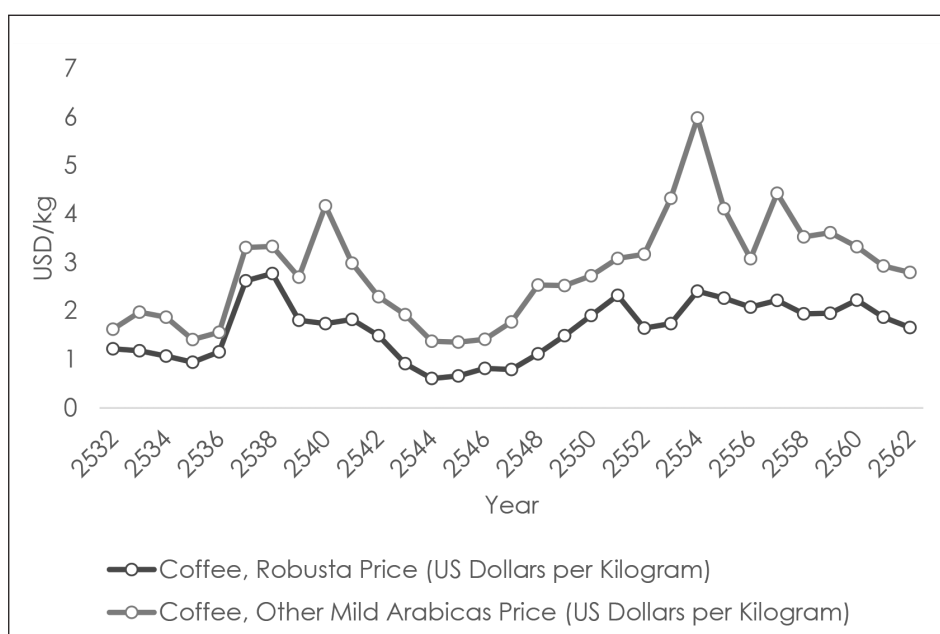


Exhibit 2: Robusta and Arabica Price

Source: IndexMundi. *Coffee, Robusta vs. Coffee, Other Mild Arabicas-Price Rate of Change Comparison*. (2015). Retrieved September 10, 2019, from <https://www.indexmundi.com/commodities/?commodity=robusta-coffee&months=360&commodity=other-mild-arabicas-coffee>

Name	Review Date	Price	Score
Doi Chaang Coffee Espresso	Jan 2019	CAD \$29.99/32 ounces	91
Moriah Coffee Doi Chaang Arabica	Dec 2014	TWD \$500/8 ounces	92
Moriah Coffee Doi Chaang Arabica	Oct 2014	US \$15.00/8 ounces	90
Doi Chaang Coffee Doi Chaang Wild Civet Passed Coffee	Feb 2013	CAD \$55.00/50 g.	91
Doi Chaang Coffee Single-Estate Medium	Dec 2012	CAD \$15.99/16 ounces	90
Doi Chaang Coffee Single-Estate Piko's Peaberry	Dec 2012	CAD \$15.99/16 ounces	90
Doi Chaang Coffee Single-Origin Medium Roast	Jun 2011	CAD \$15.99/16 ounces	89

Name	Review Date	Price	Score
Doi Chaang Coffee Single Origin Medium Roast	Feb 2011	CAD \$15.99/16 ounces	89
Doi Chaang Coffee Single Origin Decaf	Nov 2010	CAD \$15.00/16 oz.	90
P&F Coffee Doi Chaang Lisumi Single Origin	Nov 2010	THB 150/250 g.	92
Doi Chaang Coffee Doi Chaang Wild Civet Spat Coffee	Nov 2010	CAD \$55.00/50 g.	88
Doi Chaang Coffee Single-Origin Signature Roast	Oct 2010	CAD \$15.99/16 oz.	87
Doi Chaang Coffee Single-Origin Dark Roast	Oct 2010	CAD \$15.99/16 oz.	87
Doi Chaang Coffee Single-Estate Decaf Medium	Dec 2009	n.a.	90
Doi Chaang Coffee Single Origin Medium Roast	Oct 2009	n.a.	90
Doi Chaang Coffee Piko's Peaberry Medium Roast	Oct 2009	n.a.	91
Doi Chaang Coffee Doi Chaang Wild Civet Coffee	Jun 2009	n.a.	90
Doi Chaang Coffee Single Estate Peaberry Medium Roast	Apr 2008	n.a.	93
Doi Chaang Coffee Single Origin Medium Roast	Feb 2008	n.a.	90
Doi Chaang Coffee Aged Piko's Peaberry	Mar 2007	n.a.	89
Doi Chaang Coffee Single Origin Dark Roast	Mar 2007	n.a.	85

Exhibit 3: Doi Chaang Score from Coffee Review 2007-2019

Remark: n.a. means not available.

Source: *Coffee Review*. (2019). Retrieved July 26, 2019, from <https://www.coffeereview.com/search/doi+chaang/>

Doi Chaang Coffee

Espresso

Location: **Richmond, British Columbia, Canada**

Origin: **Northern Thailand**

Roast: **Medium**

Est. Price: **CAD \$29.99/32 ounces**

Review Date: **January 2019**

Agtron: **46/68**

Aroma: **8**

Body: **8**

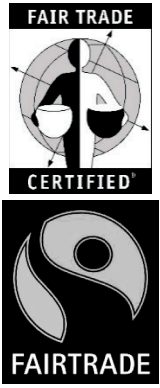
Flavor: **8**

Aftertaste: **8**

With Milk: **9**

Exhibit 4: Example of Coffee Review's Criteria

Source: Coffee Review. (2019). Retrieved July 26, 2019, from <https://www.coffeereview.com/search/doi+chaang/>

Logo	Organization	Website
	Fairtrade International	https://www.fairtradecertified.org/
	U.S. Department of Agriculture	https://www.usda.gov/topics/organic
	European Commission	https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/organics-glance_en
	European Commission	https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/quality-schemes-explained
	The Specialty Coffee Association (SCA)	http://scaa.org/

Logo	Organization	Website
	Swiss Water Decaffeinated Coffee, Inc.	https://www.swisswater.com/
	กรมทรัพย์สินทางปัญญา	http://www.ipthailand.go.th/th/gi-007.html
	Bioagricert S.r.l	https://www.bioagricert.org/en/
	-	http://www.doichaangcoffee.com/
	Canterbury Coffee Corporation	https://www.canterburycoffee.com/

Exhibit 5: Examples of Doi Chaang's International Standard Certification

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