ARABICA COFFEE QUALITY IMPROVEMENT PROJECT

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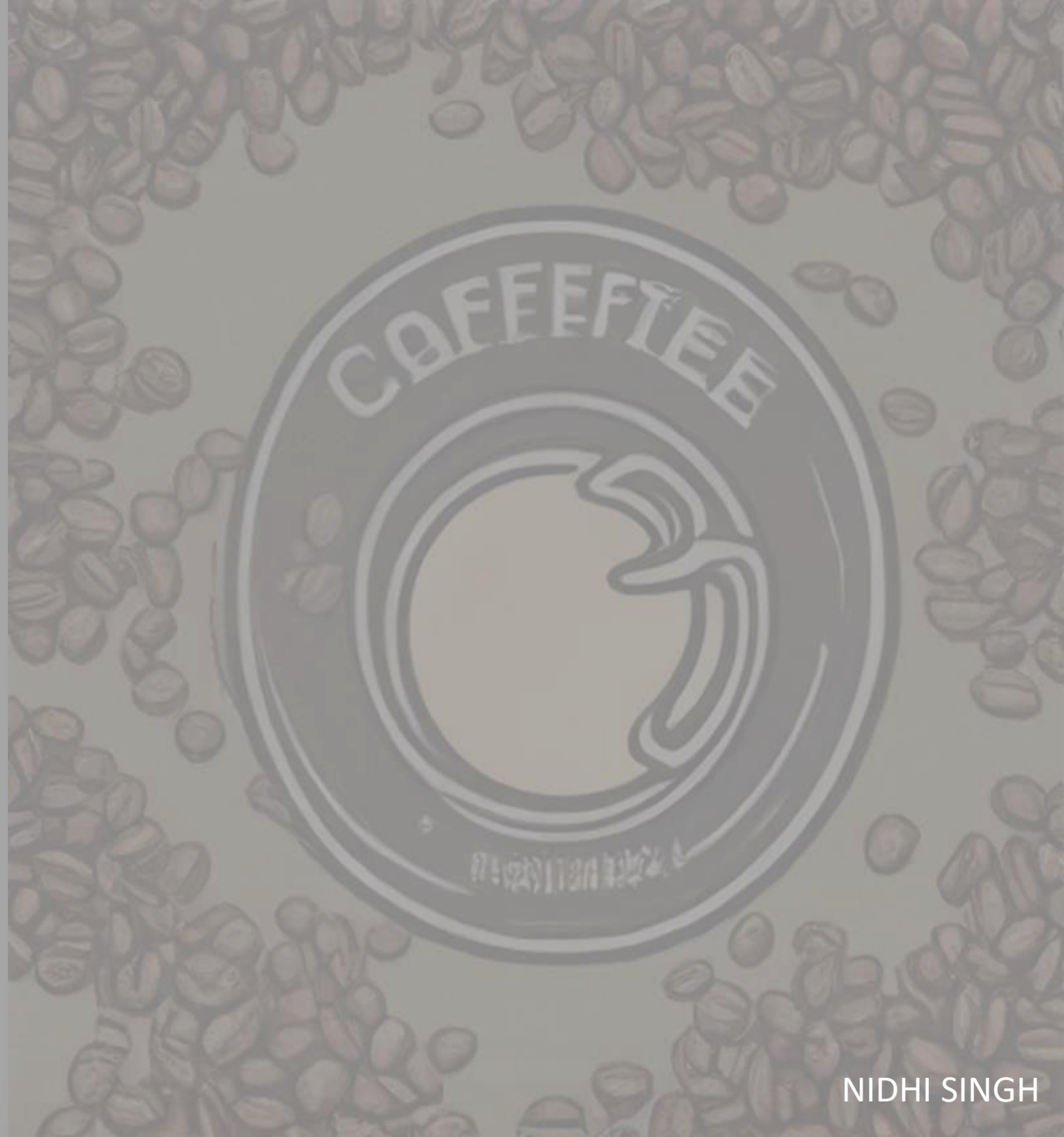

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BUSINESS PROBLEM

The primary goal of this project is to leverage the rich dataset provided by Coffee Quality Institute (CQI) to understand the factors that contribute to coffee quality.

TOOLS USED

- Microsoft Power BI Desktop

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ABOUT DATASET

Coffee Quality Institute:

- The Coffee Quality Institute (CQI) is a non-profit organization that works to improve the quality and value of coffee worldwide. It was founded in 1996 and has its headquarters in California, USA.
- CQI's mission is to promote coffee quality through a range of activities that include research, training, and certification programs. The organization works with coffee growers, processors, roasters, and other stakeholders to improve coffee quality standards, promote sustainability, and support the development of the specialty coffee industry.

Data:

- The data includes a range of information on coffee production, processing, and sensory evaluation. It also contains data on coffee genetics, soil types, and other factors that can affect coffee quality.

ABOUT COFFEE

- A process known as **Coffee Cupping** is used to find the quality score of a coffee.
- Every coffee in the world is given a quality score out of 100, which is broken down into sections.
- The final coffee quality score is the sum of the total score of each cup, minus the defects.
- The scores in every category (Fragrance/aroma, Flavour, Aftertaste, Acidity, Body, Uniformity, Balance, Cleanliness, Sweetness, Overall score) are then added together (subtracting any defects) to achieve the final cup score.
- Cuppings are typically carried out by **Q graders**, who are trained by the Coffee Quality Institute to analyse and grade coffee.
- A specialty coffee must score at least 80 points.
- Coffee that scores closer to 80 points is really good but can contain many more faults than the sample that enters the 90+ hall of fame.

TOTAL COFFEE CUPPING QUALITY SCORE		
90 - 100	OUTSTANDING	
85 - 89.99	EXCELLENT	SPECIALTY COFFEE
80 - 84.99	VERY GOOD	
< 80.0	BELOW SPECIALTY COFFEE QUALITY	NOT SPECIALTY COFFEE

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SENSORY EVALUATIONS (COFFEE QUALITY SCORES)

- **Aroma:** Refers to the scent or fragrance of the coffee.
- **Flavor:** The flavor of coffee is evaluated based on the taste, including any sweetness, bitterness, acidity, and other flavor notes.
- **Aftertaste:** Refers to the lingering taste that remains in the mouth after swallowing the coffee.
- **Acidity:** Acidity in coffee refers to the brightness or liveliness of the taste.
- **Body:** The body of coffee refers to the thickness or viscosity of the coffee in the mouth.
- **Balance:** Balance refers to how well the different flavor components of the coffee work together.
- **Uniformity:** Uniformity refers to the consistency of the coffee from cup to cup.
- **Clean Cup:** A clean cup refers to a coffee that is free of any off-flavors or defects, such as sourness, mustiness, or staleness.
- **Sweetness:** It can be described as caramel-like, fruity, or floral, and is a desirable quality in coffee.

'**Total Cup Points**' is the total of 9 features given above and 1 **Overall** parameter where the graders can show their personal consideration. The more the sample reflects the typical features based on its origin, the higher the coffee score.

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DATA UNDERSTANDING

- **Dataset file type:** Comma Separated File.
- **Columns provided:** ID, Country of Origin, Lot Number, Altitude, Region, Number of Bags, Bag Weight, In-Country Partner, Harvest Year, Grading Date, Variety, Status, Processing Method, Aroma, Flavor, Aftertaste, Acidity, Body, Balance, Uniformity, Clean Cup, Sweetness, Overall, Defects, Total Cup Points, Moisture Percentage, Category One Defects, Quakers, Color, Category Two Defects, Expiration
- **Added columns:** Life Span, Species, Quality, Speciality Coffee, Moisture Range, Harvest Year, Expiration Year
- **Data Dimensions:** 207 rows and 31 columns.

DATA DICTIONARY

- **ID:** A unique identifier for each entry in the dataset.
- **Country of Origin:** The country where the coffee beans were grown.
- **Lot Number:** The specific lot number associated with the batch of coffee beans.
- **Altitude:** The altitude at which the coffee beans were grown.
- **Region:** The specific region within the country where the coffee beans were cultivated.
- **Number of Bags:** The quantity of bags containing coffee beans in the batch.
- **Bag Weight:** The weight of each bag of coffee beans.
- **In-Country Partner:** The local partner or organization involved in the coffee production process within the country of origin.
- **Harvest Year:** The year in which the coffee beans were harvested.
- **Grading Date:** The date when the coffee beans were graded or evaluated.
- **Variety:** The variety or species of coffee beans, such as Arabica or Robusta.

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DATA DICTIONARY

- **Status:** The status of the batch, indicating whether it's completed or ongoing.
- **Processing Method:** The method used to process the coffee beans, such as washed/wet, natural/dry, or semi-lavado.
- **Defects:** Defects are the detected unpleasant flavors warranting a negative score.
- **Total Cup Points:** The total points awarded to the batch based on its sensory evaluation.
- **Moisture Percentage:** The percentage of moisture present in the coffee beans.
- **Category One Defects:** The number of category one defects found in the batch.
- **Quakers:** The presence of quaker beans, which are underdeveloped or defective beans.
- **Color:** The color of the coffee beans.
- **Category Two Defects:** The number of category two defects found in the batch.
- **Expiration:** The expiration date associated with the evaluation or certification of the coffee beans.

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DATA DICTIONARY

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	ID	Country o	Lot Numb	Altitude	Region	Number o	Bag Weigh	In-Countr	Harvest Ye	Grading D	Variety	Status	Processin	Aroma	Flavor	Aftertaste	Acidity	Body	Balance	Uniformit	Clean
2	0	Colombia	CQU20220	1700-1930	Piendamo	1	35 kg	Japan Cof	2021 / 202	Septembe	Castillo	Complete	Double Ar	8.58	8.5	8.42	8.58	8.25	8.42	10	
3	1	Taiwan	The 2022 F	1200	Chiayi	1	80 kg	Taiwan Co	2021 / 202	Novembe	Gesha	Complete	Washed /	8.5	8.5	7.92	8	7.92	8.25	10	
4	2	Laos	The 2022 F	1300	Laos Boro	19	25 kg	Taiwan Co	2021 / 202	Novembe	Java	Complete	Semi Was	8.33	8.42	8.08	8.17	7.92	8.17	10	
5	3	Costa Rica	CQU20220	1900	Los Santos	1	22 kg	Japan Cof	2022	Septembe	Gesha	Complete	Washed /	8.08	8.17	8.17	8.25	8.17	8.08	10	
6	4	Colombia	CQU20230	1850-2100	Popayan,(	2	24 kg	Japan Cof	2022	March 6th	Red Bourb	Complete	Honey,Mo	8.33	8.33	8.08	8.25	7.92	7.92	10	
7	5	Guatemal	The 2022 F	1668	Chimalter	5	30 kg	Taiwan Co	2022	Novembe	Gesha	Complete	Washed /	8.33	8.33	8.25	7.83	7.83	8.17	10	
8	6	Taiwan	The 2022 F	1250	Chiayi	1	27 kg	Taiwan Co	2021 / 202	Novembe	Gesha	Complete	Washed /	8.33	8.17	8.08	8	7.83	8.25	10	
9	7	Taiwan	The 2022 F	1200	Chiayi	1	90 kg	Taiwan Co	2021 / 202	Novembe	Sl34+Gesh	Complete	Natural / I	8.25	8.25	8.17	8	7.92	8.08	10	
10	8	Taiwan	The 2022 F	1250	Chiayi	1	30 kg	Taiwan Co	2021 / 202	Novembe	SL34	Complete	Washed /	8.08	8.08	8.25	8.08	7.92	8	10	
11	9	Tanzania,	CN 412723	1400-1700	KILIMANJ	320	60 kg	Kenya Cof	2022 / 202	February :	Bourbon	Complete	Washed /	8.08	8.17	8.08	8.17	8	8	10	
12	10	Ethiopia	010/0296/	1800-2200	Guji	10	30 kg	Japan Cof	2021 / 202	May 31st,	Ethiopian	Complete	Natural / I	8.08	8.25	8	8.08	7.92	7.92	10	
13	11	Guatemal	The 2022 F	2000	Acatenang	5	15 kg	Taiwan Co	2021	Novembe	Gesha	Complete	Natural / I	8.08	8	8	7.75	8.25	8.17	10	
14	12	Taiwan	The 2022 F	1250	Yunlin	1	60 kg	Taiwan Co	2021 / 202	Novembe	Gesha	Complete	Washed /	8.08	8	8.08	8.08	8	8	10	
15	13	Ethiopia	Grade 1, G	1900-2000	Guji	40	60 kg	METAD Ag	2021 / 202	August 26	Gesha	Complete	Natural / I	7.67	8.17	8	8.33	8	8	10	
16	14	Colombia	The 2022 F	1850	tolima	70	35 kg	Taiwan Co	2021 / 202	Novembe	Caturra	Complete	Washed /	8.08	8	8.08	7.92	8.08	8	10	
17	15	Taiwan	The 2022 F	1100	Chiayi	1	60 kg	Taiwan Co	2021 / 202	Novembe	SL34	Complete	Pulped na	8.17	8.08	8	7.92	8	7.92	10	
18	16	Ethiopia	CQU20230	1900-2100	Gedeb,Yir	8	5 kg	Japan Cof	2022	April 7th,	Wolishalo	Complete	Washed /	8.17	8.08	7.92	8.17	7.75	7.92	10	
19	17	Taiwan	202203	1300	Shibi, Guk	5	2 kg	Blossom V	2022	October 2	Gesha	Complete	Natural / I	8	8.17	8	7.92	7.92	7.92	10	
20	18	Taiwan	202112	1200	Gukeng To	8	1 kg	Blossom V	2021 / 202	October 2	Gesha	Complete	Natural / I	8.08	8.17	7.75	7.92	7.83	8	10	
21	19	Tanzania,	CN 412723	1570-1600	Arusha	200	30 kg	Kenya Cof	2022 / 202	February :	Bourbon	Complete	Washed /	8.17	8	7.92	7.92	8.17	7.75	10	
22	20	Guatemal	The 2022 F	1900	Guatemal	8	30 kg	Taiwan Co	2021 / 202	Novembe	Gesha	Complete	Natural / I	8	7.92	8.08	7.92	7.75	8	10	
23	21	Taiwan	2022/03	850	å"ºøáé,%	1	20 kg	Taiwan Co	2022	Decembe	Typica	Complete	Natural / I	8.08	8	7.92	7.92	8	7.83	10	

Source_File(df_arabica_clean)

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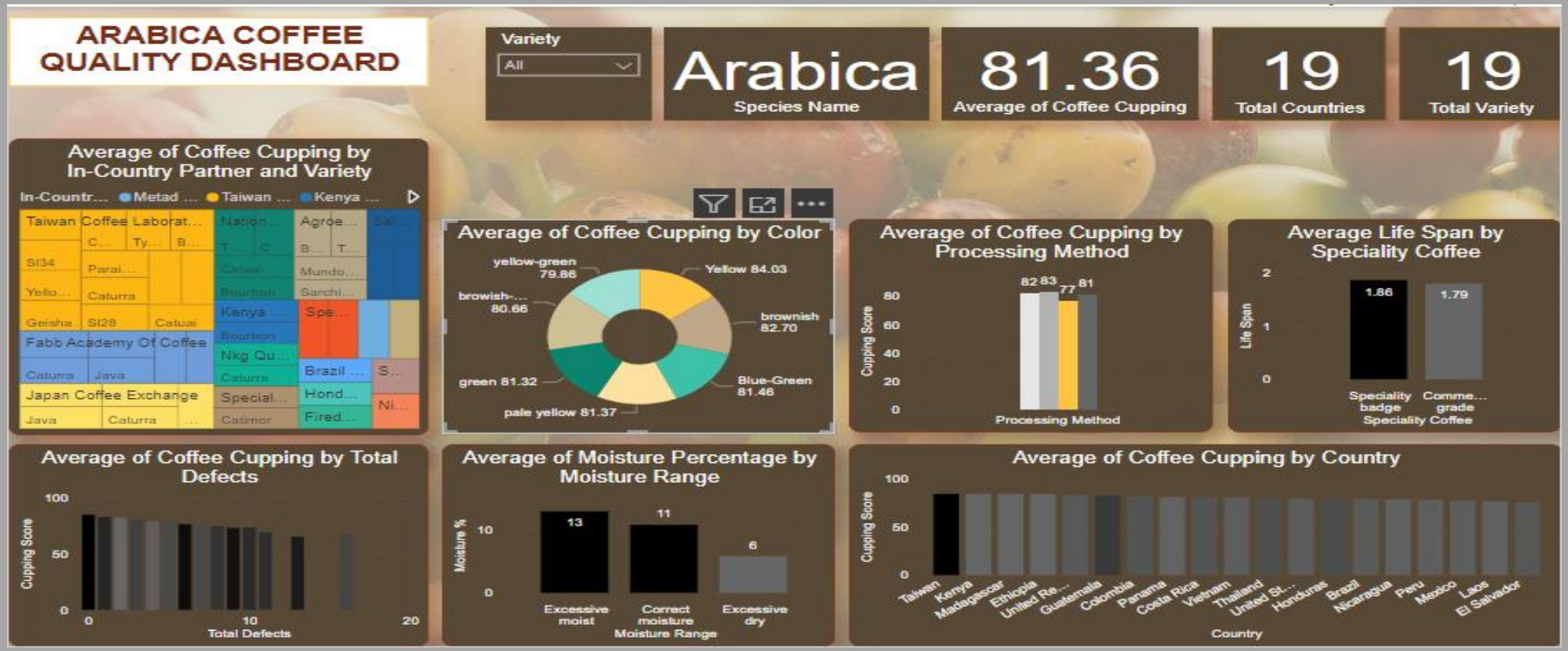
VISUALIZATION



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INSIGHTS

- The species taken into consideration is **Arabica**.
- The total number of countries taken into consideration is **19**.
- The total number of varieties taken into consideration is **19**.
- **Taiwan** is the best-working country when it comes to upgrading Arabica coffee quality.
- Highest number of variety are grown by **Taiwan Coffee Laboratory.**
- **Defects** are inversely proportional to coffee quality.
- **Yellow** beans should be plucked to obtain good quality beans.
- Coffee beans should contain **9-12 % moisture.** The moisture present in the coffee beans of the dataset is correct.
- The **Pulped Natural/Honey** processing method should be adopted.
- **Taiwan Coffee Laboratory** is the best in-country partner.
- The better the coffee quality, the **longer** the lifespan of the coffee.

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RECOMMENDATIONS

- **Focus on Quality Control:** Implement stringent quality control measures throughout the production process to minimize defects and maintain high coffee quality standards.
- **Collaborate with Taiwan's Laboratory**: Strengthen partnerships with Taiwan's laboratory to leverage their expertise and resources in coffee research, analysis, and quality assurance.
- **Prioritize Pulped Natural/Honey Processing:** Emphasize the use of the Pulped Natural/Honey processing method for coffee beans to ensure cleaner, brighter flavors and higher cup scores.
- **Control Moisture Content:** Monitor and regulate the moisture content of coffee beans to fall within the optimal range of 9-12%, as this contributes to superior cup scores and overall coffee quality.
- **Quality Yellow Coffee Beans:** Source and select yellow coffee beans, indicating fully developed beans as they give the coffee its best flavors and ensures a better starting point for coffee production.
- **Invest in Training and Equipment:** Provide training for coffee producers on best practices for cultivation, processing, and quality control. Additionally, invest in equipment and infrastructure to support these efforts and enhance overall coffee quality.

THANK YOU

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