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Introduction

Avocado which is also known as "butter fruit" in India is a native of Tropical America. In India, avocado is not a commercial fruit crop on a large scale. It was introduced from Sri Lanka in the early years of the 20th century. It is cultivated in Tamil Nadu, Kerala, Maharashtra, Karnataka and in the eastern Himalayan state of Sikkim. It cannot tolerate the hot dry winds and frosts of northern India. Climatically, it is grown in tropical and semitropical areas.

It is now been quoted that, avocados are the 'pandemic-proof' crop in lockdown health craze. Demand for the fruit has accelerated as more consumers eat at home because of the nation-wide lockdown owing to Covid-19. Avocado is now no longer just a component of guacamole for parties, but it's use has also broadened to salads, burritos and of course, the hipster cliché of avocado toast.

This study is aimed to analyse the current demand and supply of Indian Avocado along with its features, specialties and other numerous characteristics. It is also intended to study the factors that affect the demand and supply of Indian Avocado.

Note that this entire study is concerned with Indian Avocados.

Objectives

- ❖ To analyse the pricing, features, utility and other characteristics of avocado.
- ❖ To analyse the demand for avocado.
- ❖ To perform an industry analysis of avocado.
- ❖ To analyse the supply of avocado.
- ❖ To compute and infer the price elasticity of demand and supply of avocado.
- ❖ To analyse how people's income affect the demand of avocado.

Methodology

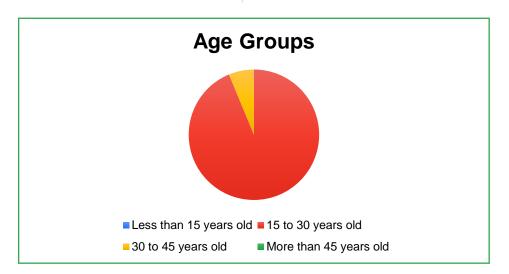
Survey method was executed to collect primary data from consumers. (Refer: <u>Survey Link - Demand</u> for the demand survey questionnaire and Refer: <u>Survey Link - Supply</u> for the supply survey questionnaire). Conducting primary research is necessary for this study as there is little secondary information available for analysing demand, supply and other characteristics

of avocado. Surveys offer a way to measure the opinions and interests of a specific group. As a result of the lack of secondary data, surveys were designed and aligned with the research objectives. Two online surveys were designed with the help of Google Forms. One survey was designed to analyse the product features, availability, demand, etc of avocados and was intended to target consumers who purchase avocados. Another survey was designed to analyse the sales, supply, customer base, etc. and was intended to target the suppliers of avocado. The main modes used to distribute the survey URL were WhatsApp and Instagram. The mediums used to approach the suppliers were emails, Instagram and physical approach. The survey designed to analyse the demand of avocado was targeted only to individual consumers and not to restaurant or other eateries.

Data analysis along with graphical analysis is performed in the excel file which is submitted along with this research report.

Upon splitting on the basis of age groups, 93.75% of the sample population falls in the age band of 15 to 30 years old.

AGE GROUPS		
Age	Number of people	
Less than 15 years old	0	
15 to 30 years old	30	
30 to 45 years old	2	
More than 45 years old	0	



Assumptions

❖ It is assumed that the respondents have understood and completely interpreted any and all of the questions and information provided.

- ❖ It is assumed that each response is truthful and honest.
- ❖ The study is based on the primary data collected and the sample is assumed to be the sample population.
- ❖ It is assumed that the economy is a closed economy which means that there are no imports and exports.
- After a primary research and physical enquiry, it is assumed that the current market price of one avocado is ₹125.

Limitations

The survey that was targeted to consumers received a total of 39 responses. Out of which, total useable responses were 32. The study is restricted to consumers and suppliers in Mumbai. Thus, out of the total 39 responses 2 individuals do not reside in Mumbai and 5 individuals stated that they do not purchase Indian Avocado. Thus, having 32 useable responses indicates a limited set of sample population. This makes the study specific to the smaller sample populations instead of being more general conclusions. Also, the survey that was targeted to suppliers was been distributed to major retailers, Avocado shop-owners and local vendors using Instagram, E-mails and physical approach. But it received 1 useable response. Thus, the supply-side analysis of avocado is limited to that 1 supplier.

By using WhatsApp, E-mail, Instagram, etc to distribute the survey, it subjects the survey to what is known as the snowball effect. Instead of attaining a random sample, the survey uses a convenience sample method and is subject to exclusion of those people without access to a phone or internet that actually are consumers of Indian Avocado.

Analysis of Indian Avocado

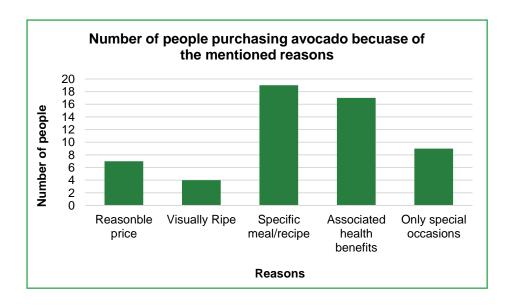
Avocado fruits have greenish or yellowish flesh with a buttery consistency and a rich, nutty flavour. Because, of the buttery flavour, avocado is also known as 'butter fruit' in India. Apart from being known as avocado or butter fruit it is also known as Vennai Pazham in Tamil, Venna Pandu in Telugu, Benne Hannu in Kannada, Makhan phal in Hindi and Alpukat in Marathi.

Reasons for purchasing Indian Avocado

Avocados have great health benefits associated with them, since they are highly nutritious. They are great sources of folate, potassium and healthy fats as well as vitamins K, C and E. They also consist of small amounts of vitamin B and minerals such as copper, phosphorous, magnesium, manganese, iron and zinc. Consuming avocados are good for the heart, eyes and brain since they have antioxidants that may lower the risk of age-related macular degeneration (AMD), cataracts and neurodegenerative diseases like Alzheimer's. Thus, one of the major reasons as to why people purchase and consume avocados is because of these associated health benefits.

This gives rise to the question as to what are the other reasons because of which people purchase avocados. This study analysed the different reasons for the purchase of avocados and the following output was concluded:

REASONS FOR PURCHASING AVOCADO		
Reasons	Number of people	
Reasonble price	7	
Visually Ripe	4	
Specific meal/recipe	19	
Associated health benefits	17	
Only special occasions	9	



Out of the 32 individuals, 7 individuals purchase avocados when the prices are reasonable, thus making them affordable. Avocado prices have boomed in the recent years with a current average market price of ₹125. Major retailers in India like D-Mart and Nature's Basket sell

avocados at a price of approximately ₹120 and ₹150 respectively. E-commerce platforms like Amazon, Jio Mart and Big Basket sell avocados weighing approximately 350 grams at a price of ₹200, ₹200 and ₹150 respectively. Local retailers like Oh!Avocado sell avocados weighing approximately 300 grams at price of ₹225. Whereas, local fruit vendors are selling avocados at a price range of ₹75 to ₹100. Thus, avocados are way more expensive relative to other fruits available in the market. These high prices are because of the multiple inputs that avocados require, whether it's water, fertilizer, pruning or the transportation expenses. Another major contributing factor towards these high prices are the nutritional components in avocados.

One of the other reasons considered is whether the avocados are visually ripe or not. Out of the 32 individuals, 4 individuals stated that they purchase avocados when they are visually ripe. Logically and empirically, it can thus be concluded that avocados being visually ripe is not a major contributing factor towards the purchasing decision of the individuals.

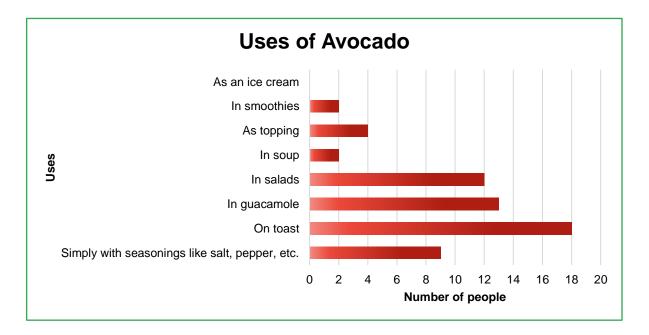
Because of high prices and uneven distribution of consumption among individuals, avocados are not generally purchased on a frequent basis. Empirically it is observed that out of the 32 individuals, 19 individuals purchase avocados only when they need it for a specific meal/recipe.

Approximately 53.13% people purchase avocados because of the associated health benefits mentioned before. Eating in restaurants and other eateries has reduced in recent times owing to the nation-wide lockdowns because of covid-19. Because of which people are exploring new and healthier recipes and dishes. Thus, the demand for avocados have increased in recent times.

Uses of Indian Avocado

The survey was also designed to analyse as to how does the sample population use avocados. Though avocados are mild, their taste is very unique. The flavour itself is very subtle and is earthy, grassy but nutty and fresh. Because the fruit has a creamy texture, it pairs with a variety of different foods. The following table and chart describe as to what and how do people consume avocado.

USE OF AVOCADO		
Uses	Number of people	
Simply with seasonings like salt, pepper, etc.	9	
On toast	18	
In guacamole	13	
In salads	12	
In soup	2	
As topping	4	
In smoothies	2	
As an ice cream	0	



Unlike many other fruits, only few people i.e., 9 out of the total sample population consume avocado simply with seasonings like salt and pepper. One of the main reasons that people do not prefer consuming avocado as a direct fruit is because of a mild flavour.

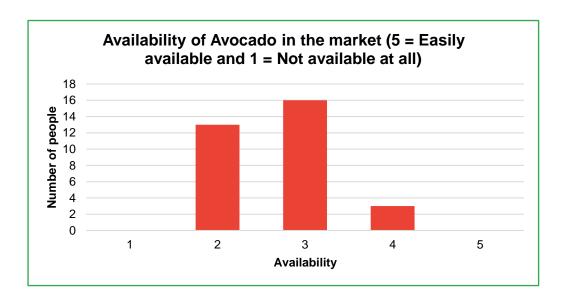
On the other hand, 56.25% people stated that they consume avocado on toast. This is possibly the simplest and easiest way to consume avocado. Guacamole is a popular Mexican dip made from coriander, tomato, onions, and lime along with mashed avocado binding these ingredients together.

Apart from these uses, avocados are also used in salads, soup, as toppings and in smoothies. Though avocados are also used in ice creams, it is observed that it is not a general use/trend and is consumed only by a few number of people.

Availability and Place of Purchase

The sample population through this study was asked about the availability of avocado in the market.

Availability of Avocado in the market (5 = Easily available and 1 = Not available at all)	
Avalability	Number of people
1	0
2	13
3	16
4	3
5	0



On a scale of 1 to 5, where 1 being not available at all and 5 being easily available, majority of the rating for the availability of avocados were between 2 and 3. The average availability of avocados can be said to be just 2.5. This indicates the relative unavailability of avocados with respect to other fruits. This can be one of the factors that contributes to the high prices of avocados.

Talking about where can one purchase avocados from, there are many purchase locations that were considered in the study.

PLACE OF PURCHASE		
Locations	Number of people	
Local Vendors	22	
Supermarkets	16	
Online Markets	7	
Directly from farms	0	



The different locations of purchase considered were local vendors, supermarkets like Big Bazaar, D-mart and Nature's Basket, online markets like Jio Mart, Amazon and Flipkart, directly from farms, etc.

Logically as per the high prices and empirically it was observed that majority of the people purchased avocados from local vendors. A reason for this behaviour can be the negotiating and bargaining power of buyers with the local vendors. The location that ranks second in terms of the number of people purchasing avocados from are supermarkets like Big Bazaar. People also purchased avocados from online markets like Amazon. However, the study analysed that only few people purchased from e-commerce platforms. It can be because of the fact that people when paying such high amounts for avocados want fresh and the best quality fruit.

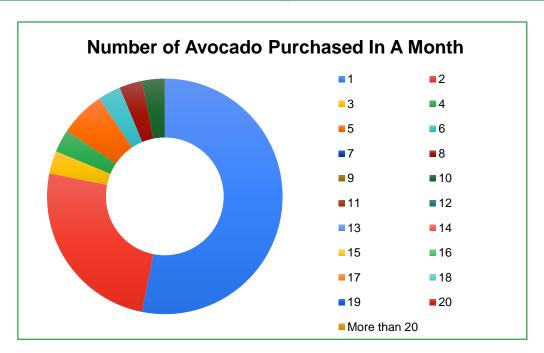
And there stands nobody who purchases avocados directly from farms because of the fact that it requires bulk orders and avocado as a fruit is rarely purchased in bulk orders by individual consumers.

Demand for Indian Avocado

One of the important objectives of the study was to analyse the current demand of avocados. Thus, for the purpose of understanding the demand for avocados, the data for the average number of avocados purchased in a month was collected from the sample population.

It yield the following results:

NUMBER OF AVOCADO PURCHASED IN A MONTH		
Number of avocado	Number of people	
1	17	
2	8	
3	1	
4	1	
5	2	
6	1	
7	0	
8	1	
9	0	
10	1	
11	0	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	
More than 20	0	

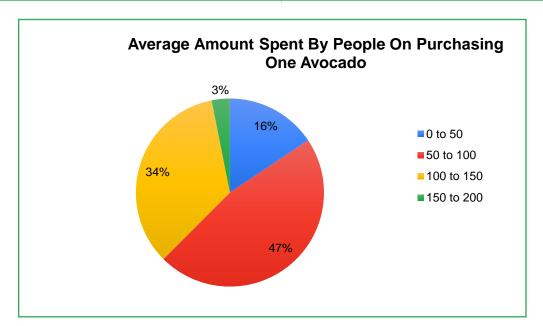


Empirically, it was inferred that the demand for avocados was relatively low in the Indian market. It is because since 50% of the sample population purchased just 1 avocado on average per month. However, there can be seen that 8 people purchase 2 avocados on average per month and so on. (Refer the above table and the graph).

Considering the current sample population, the demand for avocados can be statistically and empirically concluded to be low. However, it can a limitation of sampling and may be otherwise for another group of samples.

Since, majority of the people purchased avocados from local vendors, the price that they pay is relatively lower than that in supermarkets and e-commerce platforms owing to bargaining power of the buyers.

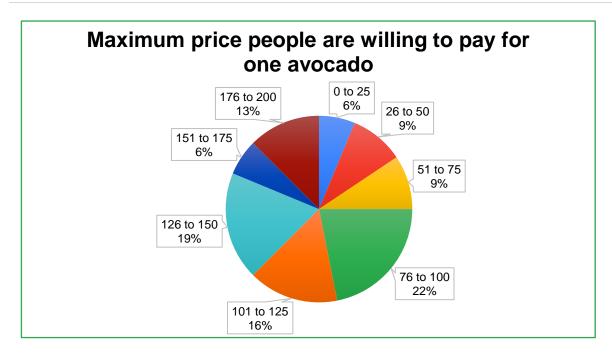
AVERAGE AMOUNT SPENT ON PURCHASING ONE AVOCADO		
Amount (in ₹)	Number of people	
0 to 50	5	
50 to 100	15	
100 to 150	11	
150 to 200	1	



As can be inferred from the above chart, 47% of the people purchased avocados at a price range of ₹50 to ₹100, and majority of the people from this group purchase avocados from local vendors.

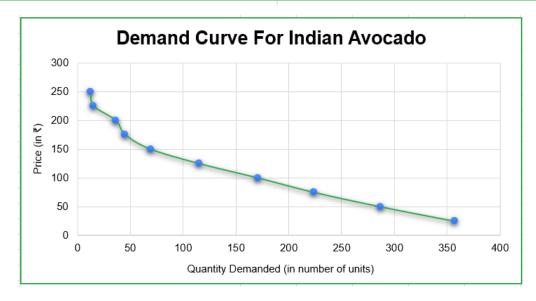
The maximum amount that people are willing to pay for one avocado was analysed during this research study. The following outputs were observed.

MAXIMUM PRICE WILLING TO PAY FOR ONE AVOCADO		
Price (in ₹)	Number of people	
0 to 25	2	
26 to 50	3	
51 to 75	3	
76 to 100	7	
101 to 125	5	
126 to 150	6	
151 to 175	2	
176 to 200	4	



One of the demand survey questions was aligned to determine the quantity of avocados demanded if the price of avocados increased or decreased from the current average market price of ₹125. The observations were used to calculate the aggregate market demand at a particular price and the demand schedule as well as demand curve was constructed.

DEMAND SCHEDULE		
Aggregate monthly market demand for Indian Avocado		
Amount (in ₹)	Aggregate market demand (in units)	
25	357	
50	287	
75	224	
100	171	
125	115	
150	69	
175	45	
200	36	
225	15	
250	12	



Empirically, it can be seen that the demand curve is downward sloping with consumers demanding more quantity of avocados at a lower price and less quantity of avocados at a higher price.

Thus, it proves the law of demand that demand is inversely proportional to the price of the product under the assumption of ceteris paribus.

Market/Industry Analysis

India is suitable to cultivate almost all the fruits because of its wide range of climatic conditions. India is not only abundant in various agricultural resources but its most important economic activity is agriculture. Agricultural activity accounts for about 43% of the land in India.

But still, currently avocados are not a commercial crop. It is difficult for avocados to compete against other fruits such as banana, mango and grapes. There is a lack of awareness of the nutritional quality of avocados.

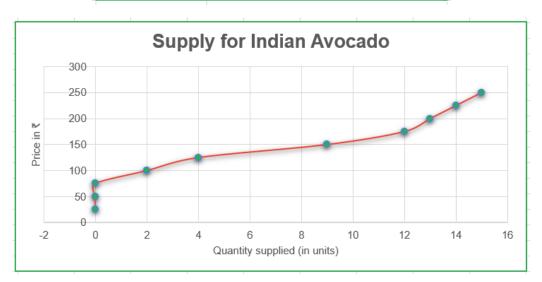
Avocados can be gateway fruit to India in the future. Even if it is not currently a commercial crop, there are benefits that can be obtained by the people of India. There are many nutritional benefits for the people who are malnourished. However, there lie many problems in the way to have a constant supply of avocados in India. Researchers have proven that avocados must grow in a pH range of 5-7. Because of this pH and the characteristic of a hot and yet wet climate, avocados can only grow in few parts of India. Grown in Southern states of India and in the hilly North eastern state of Sikkim, the cultivation of avocado is limited. Many different varieties of avocado affect the market potential because the varieties result in an inconsistent quality in the fruit. Adequate research is required to identify one variety that has the best yield and is a high-quality fruit. If India focuses o one variety of avocado, then all of the avocado producers can focus their attention to producing the best quality fruit of that particular variety. With the focus tuned to only one variety of avocados, a market can be established. Not only India could benefit from the higher nutritional value of avocado but it will also generate a new source of income to the country.

Supply of Indian Avocado

The availability of avocados in Mumbai had an average rating of 2.5 on a scale of 1 to 5 which can be considered to be low. And majority of the consumers purchase the fruit from local vendors and supermarkets.

The study also analysed as to what is the current supply of avocados and the supply survey had a question which was aligned to ask the suppliers as to how would their supply change if the prices of avocado increased or decreased from the current market price of ₹ 125. Supply schedule and supply curve was constructed therein.

SUPPLY SCHEDULE			
Individual mo	Individual monthly market supply for Indian Avocado		
Amount (in ₹)	Individual market supply (in units)		
25	0		
50	0		
75	0		
100	2		
125	4		
150	9		
175	12		
200	13		
225	14		
250	15		



Empirically and logically, it can be inferred that the supply curve is upward sloping. Which means that suppliers sell more quantity of avocados at higher prices and less quantity of avocados at lower prices.

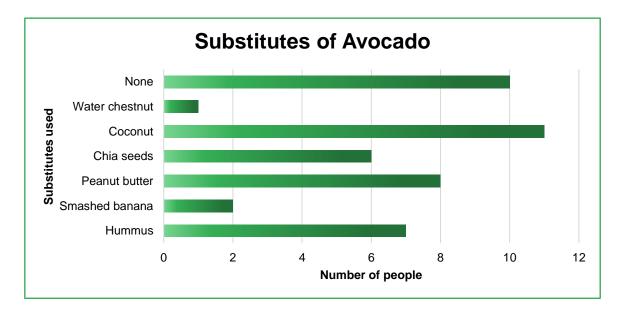
Thus, it proves the law of supply that supply is directly proportional to the price of the product under the assumption of ceteris paribus. However, there exists a limitation for the

supply of avocados in context with this study. It is that for supply survey, only one response was received from a local vendor.

Avocado being an expensive fruit, there was initially a thought that there might be significant number of substitutes that people include in their diet. But this was not the case post study conclusions. Since, not many people consume avocados in the sample population, consumers do not include a substitute for avocados in their diet.

The substitutes that were considered in the study were hummus, smashed banana, peanut butter, chia seeds, coconut and water chestnut. These substitutes were based on characteristics like taste, uses, texture, price and nutritional values.

EAVOCADO		
SUBSTITUES OF AVOCADO		
Number of people		
7		
2		
8		
6		
11		
1		
10		



Coconut was something that many consumers used as a substitute for avocado. Thus, if the prices of avocado increased then many people would decrease their consumption of avocados and would increase the consumption of coconut.

Whereas, 10 consumers stated that they do not use any substitutes for avocado. A substitute that was used by consumers instead of avocados for its use as a spread and a dip is peanut butter. In terms of nutritional value people use hummus as substitute for avocados.

Since, majority of the consumers used avocado in the form of avocado toast, bread can be considered as a significant complementary good to avocado.

Price Elasticity of Demand

Since, not many people consume avocados in their daily diet and owing to high prices, the demand for avocados is very elastic. A small change in price causes significant change in the quantity demanded, as it is not viewed as necessity by majority of the consumers and one can turn to substitutes if the prices of avocado increases.

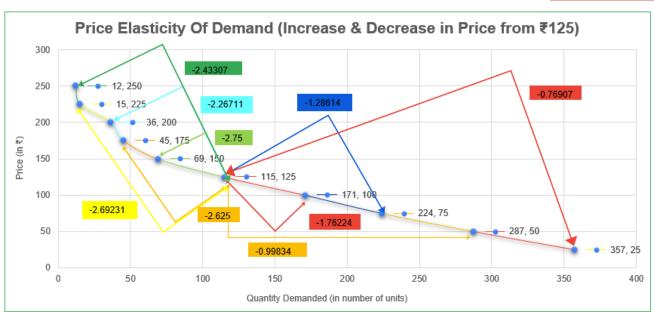
One of the important objectives of the study was to determine the price elasticity of demand for avocados. Since, the demand schedule and demand curve were already constructed the price elasticity of demand was easily calculated.

The method used to calculate the price elasticity of demand was the average (midpoint) formula of arc elasticity.

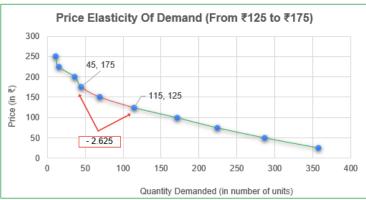
Price Elasticity Of Demand								
Price		Quantity Demanded		(Delta)Q	Average Q	Average P	(Delta)P	PED
From	То	From	To					
125	150	115	69	-46	92	137.5	25	-2.7500
125	175	115	45	-70	80	150	50	-2.6250
125	200	115	36	-79	75.5	162.5	75	-2.2671
125	225	115	15	-100	65	175	100	-2.6923
125	250	115	12	-103	63.5	187.5	125	-2.4331
125	100	115	171	56	143	112.5	-25	-1.7622
125	75	115	224	109	169.5	100	-50	-1.2861
125	50	115	287	172	201	87.5	-75	-0.9983
125	25	115	357	242	236	75	-100	-0.7691

Average Price Elasticity -1.9537









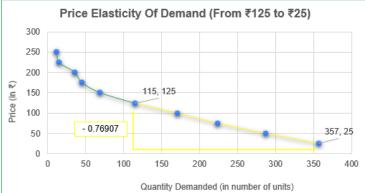














The above table of price elasticity of demand and the graphs are constructed on the consideration that the prices of avocados are increasing (left hand side graphs) or decreasing (right hand side graphs) from the current market price of ₹125. It can be inferred from the table that for majority of the price movements, it indicates that the price elasticity of demand is very high.

Now, considering movement in prices from ₹250 to ₹25, including every price that falls in the interval. Even the below table indicates that the price elasticity of demand for avocados is high for majority of the price combinations. And that the price elasticity of demand is not constant along the demand curve.

Price Elasticity Of Demand								
	Price		Quantity Demanded		Average Q	Average P	(Delta)P	PED
From	То	From	To					
250	225	12	15	3	13.5	237.5	-25	-2.1111
225	200	15	36	21	25.5	212.5	-25	-7.0000
200	175	36	45	9	40.5	187.5	-25	-1.6667
175	150	45	69	24	57	162.5	-25	-2.7368
150	125	69	115	46	92	137.5	-25	-2.7500
125	100	115	171	56	143	112.5	-25	-1.7622
100	75	171	224	53	197.5	87.5	-25	-0.9392
75	50	224	287	63	255.5	62.5	-25	-0.6164
50	25	287	357	70	322	37.5	-25	-0.3261

Average Price Elasticity

-2.2121

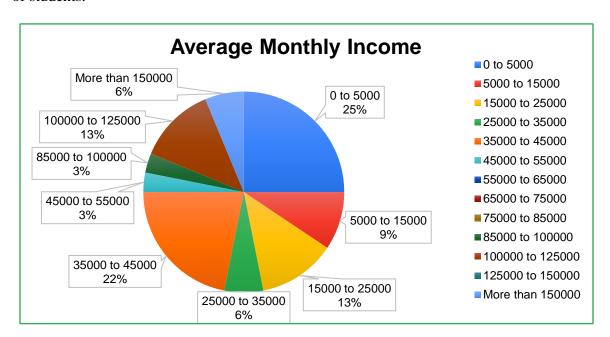
Income Analysis w.r.t. Demand for Avocados

The demand survey questionnaire asked consumers their average monthly income with a view to perform analysis between income and the demand for avocados. This analysis consists of the number of avocados purchased by an individual per month, average amount spent on buying one avocado per month by an individual and average income spent on buying avocados per month by an individual; in all cases the sample population was split on the basis of their average monthly income.

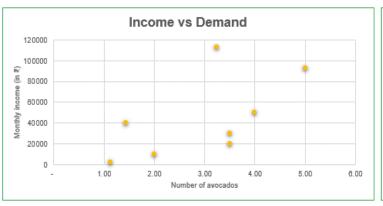
The average monthly income of the sample population can be demonstrated by the following table and graph.

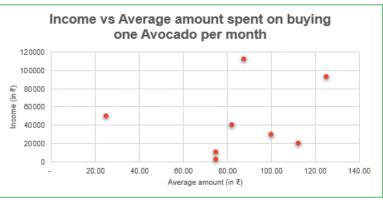
AVERAGE MONTHLY INCOME						
Monthly Income (in ₹)	Number of people					
0 to 5000	8					
5000 to 15000	3					
15000 to 25000	4					
25000 to 35000	2					
35000 to 45000	7					
45000 to 55000	1					
55000 to 65000	0					
65000 to 75000	0					
75000 to 85000	0					
85000 to 100000	1					
100000 to 125000	4					
125000 to 150000	0					
More than 150000	2					

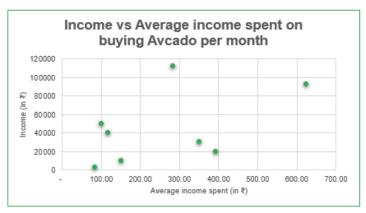
The sample population consists of a greater number of consumers between the income group of $\gtrless 0$ to $\gtrless 5000$. Thus, it can be inferred that sample population consists of a greater number of students.



Income Interval (in ₹)	Income Midpoint (in ₹)	Number of Avocado purchased per month by an individual	Average amount spent on buying one Avocado per month by an individual	Average income spent on buying Avocado per month by an individual
0 to 5000	2500	1.13	75.00	84.38
5000 to 15000	10000	2.00	75.00	150.00
15000 to 25000	20000	3.50	112.50	393.75
25000 to 35000	30000	3.50	100.00	350.00
35000 to 45000	40000	1.43	82.14	117.35
45000 to 55000	50000	4.00	25.00	100.00
85000 to 100000	92500	5.00	125.00	625.00
100000 to 125000	112500	3.25	87.50	284.38







It can be concluded that generally as the income increases, the number of avocados purchased per month increases, the average amount spent on buying one avocado increase and the average income spent on buying avocados per month also increases.

Factors influencing the Purchase of Indian Avocados

Since, not many people purchase avocados even outside the sample population considered, it is important to analyse as to what are the factors that affect the purchase of avocados. The demand survey questionnaire involved a question which asked the consumers to rate the importance of the mentioned factors while purchasing avocados on a scale of 1 to 5.

The factors considered were the point of origin of the avocados, low price, ripeness, place of purchase, large size, visual appearance and whether the avocados were sustainably grown.

The average importance of point of origin on a scale of 1 to 5 was found out to be 2.57 which indicates that the point of origin is not a significant factor that consumers consider. Whereas, the average importance of low price of avocados has an average importance of 3.82 which indicates that price is a crucial factor and can significantly alter the purchase decisions of the consumers.

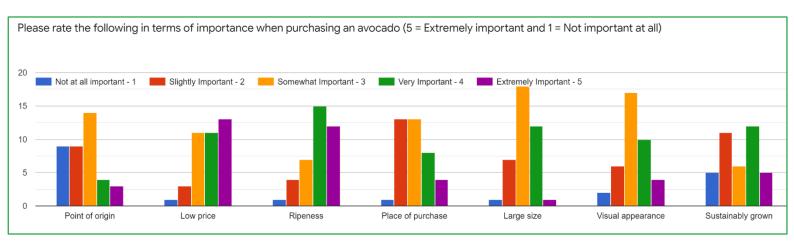
The factor of whether the avocados are ripe has an equivalent average rating of 3.84. However, many consumers find it difficult to differentiate between avocados that are ripe and the one's that are not yet ripe. And is generally consider a purchase issue by many of the consumers.



(Image reference: https://www.bodybuildingmealplan.com/how-to-tell-if-an-avocado-is-ripe)

Another factor that was considered was the place of purchase which was observed to have an importance of 3.03. Whether the size of the avocados is large, has an average rating of 3.13.

Factors like visual appearance and sustainably grown avocados received an average rating of 3.21 and 3.03 respectively.



Conclusion

The data that was analysed offered insights into the features, availability, pricing, demand, supply, elasticity, market conditions and many other factors of Indian Avocados.

The main reason as to why people purchase avocados was found out to be in case of specific meal/recipe and the associated health benefits with avocados. The most trending and observed way of including avocados in the diet are in the form of avocado toast, thus concluding that bread is a complementary good to avocados.

The availability of avocados is not so high in the Indian market and can be rated as 2.5 on a scale of 1 to 5. The place of purchase for most of the consumers was found out to be local vendors followed by supermarkets. It was found out that 47% people purchase avocados in the price range of ₹50 to ₹100 which indeed supports the observation that most avocados are purchased from local vendors, because the prices in supermarkets lie in the average range of ₹100 to ₹150. Coconut is the major substitute for avocados used by many consumers.

The price elasticity of demand for avocados was computed using the constructed demand curve. The elasticity varies along the demand curve. Majority of the price combinations indicated that the demand for avocados is highly price elastic. The income analysis of the sample population concluded that as the income of the consumer increases, the number of avocados purchased per month increases, the average amount spent on buying one avocado increases and also the average income spent on buying avocados per month also increases.

The factors that played a significant role in the purchasing decision of avocados were found out to be (in descending order) ripeness, low price, visual appearance, large size, place of purchase, sustainably grown and the point of origin.

Recommendations for Further Research

Residency is an interesting variable to analyse and valuable information can be gathered based on more diverse and specific geographical locations. The effectiveness of avocado advertising would be interesting to analyse. Effects on the demand and pricing of avocados if there would be a government authority looking after the Indian avocado market would be interesting to study. Brand names to consumers with respect to avocados played little importance in regards to this study, thus, identifying if consumers even recognize or can differentiate avocado brands would be an additional topic for further research.

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Survey Links

Demand survey questionnaire. Link: https://forms.gle/T29BvaG8Do84pUf16

Supply survey questionnaire. Link: https://forms.gle/QBERWmrFhAZ51uzL7