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Demand and Economic Feasibility Analysis of Peanut Oil Plant

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Production, Demand and Economic Feasibility Analysis of Peanut Oil

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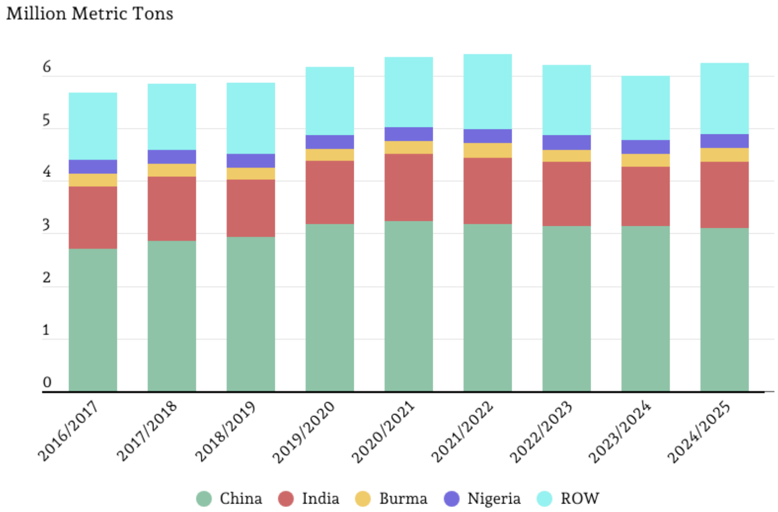
World Market

Production of peanut oil for the five largest markets together accounted for 81 percent of the 6.24 million metric tons (MMT) of global production for the 2024/2025 marketing year. Leading global producers, China has kept production remained relatively stable between 3.1-3.23 MMT since the 2019/2020 marketing year. Indian production has been similar with production totaling between 1.2-1.28 MMT since the 2019 marketing year. The three that follow accounted for only 694 thousand metric tons (TMT). These five leading producers for the 2024 marketing year were China (3.1 MMT), India (1.3 MMT), Burma (267 TMT), Nigeria (265 TMT), and Brazil (162 TMT).

Figure 1. Peanut Oil Production, MY2016- 2024



Source: Production, Supply, Distribution (PS&D), USDA/FAS

Only 470 TMT of production was traded in the 2024 marketing year, or 7.5 percent of peanut oil production. India (200 TMT), Brazil (150 TMT), Argentina (79 TMT), Mali (19 TMT), and Nicaragua (13 TMT) together accounted for 91.8 percent of exports in the most recent marketing year. In the 2021 marketing year, Indian peanut oil exports totaled only 40 TMT, the massive increase in production that year was likely a contributing factor to the exports that have grown annually. Brazil, Argentina, and Nicaragua export almost all of their annual production.

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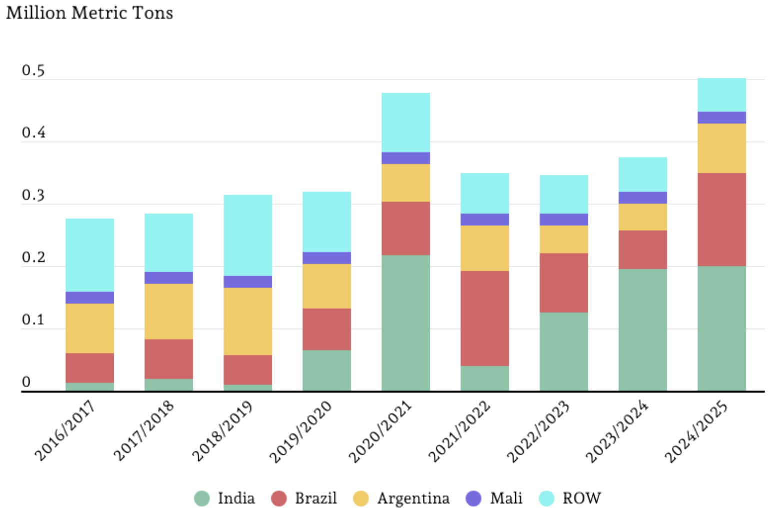
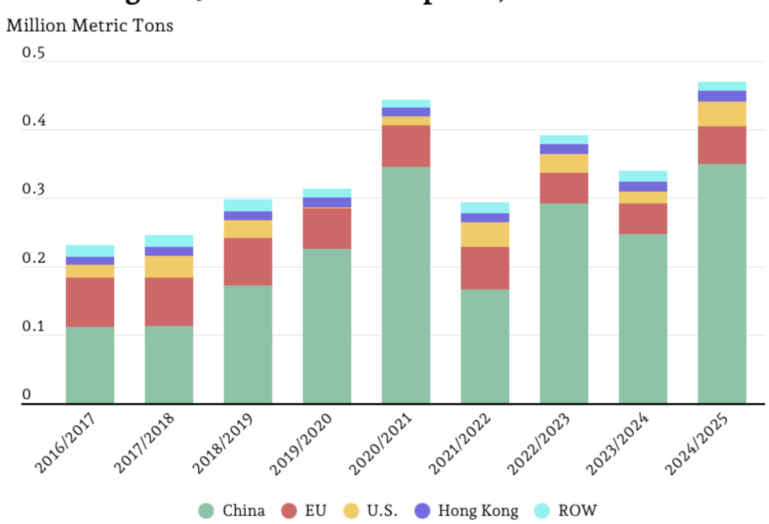
Figure 2. Peanut Oil Exports, MY2016- 2024



Source: Production, Supply, Distribution (PS&D), USDA/FAS

The five largest markets for imports account for 93.8 percent of global imports. China leads global imports, with 350 TMT in the most recent marketing year, or 74.4 percent of peanut oil imports. The European Union (55 TMT), United States (36 TMT) are the two other largest import markets with Hong Kong being reported as separate from China and importing 15 TMT.

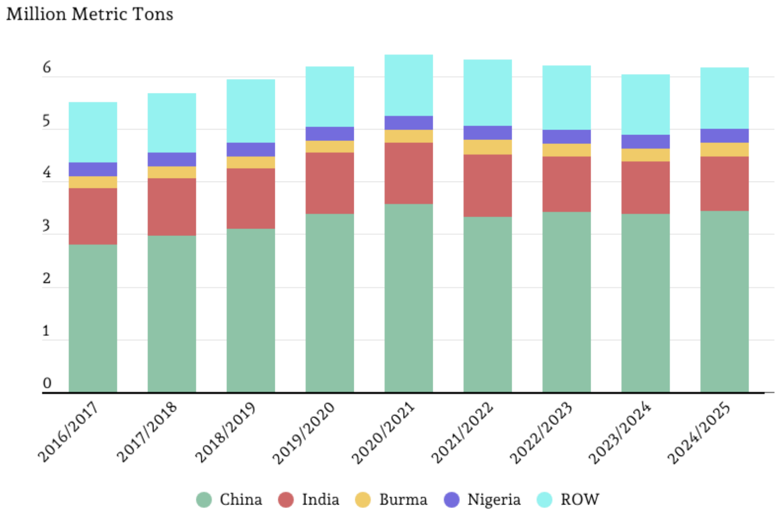
Figure 3. Peanut Oil Imports, MY2016- 2024



Source: Production, Supply, Distribution (PS&D), USDA/FAS

In the 2024 marketing year, global demand for peanut oil totaled 6.16 MMT with 83.7 percent going to the five largest markets. More than half of global demand for peanut oil can be attributed to China. India ranks second, despite being a recurring leader for global exports, with just over one million metric tons. Together, the five markets following India reach the same one million metric tons of peanut oil demanded for the 2024 marketing year Burma, Sudan, the United States, Burkina Faso, Tanzania.

Figure 4. Peanut Oil Demand, MY2016- 2024



Source: Production, Supply, Distribution (PS&D), USDA/FAS

Figure 5. Demand of Peanut Oil and Origin Source, MY2024/2025

Total Demand of Peanut Oil: 6,157 Thousand Metric Tons

Source: Production, Supply, Distribution (PS&D), USDA/FAS

Economic Feasibility Study

In order to analyze the economic feasibility of peanut oil extraction plants in the U.S., a *Monte Carlo financial statement model* was developed. These models are very useful because they estimate probability distributions for key output variables (KOVs) of interest to business managers and investors. Business managers need to know the probability distributions for annual net cash income and annual ending year cash flows to understand the risks for a new business. Of primary interest is, "What is the chance that the business will have a negative annual cash flow and What is the chance of two such years in a row?" Also of interest is the question, "Will the investment generate a rate of return that is greater than the opportunity cost of capital?" This last question is answered by estimating and analyzing the investment's net present value (NPV) probability distribution.

It is assumed that the peanut oil extraction plant capacity is 100 metric tons (MT) per day for about 350 days needing around 20,000 acres of peanuts. The peanut oil plant will buy in-shell peanuts from producers and sell peanut oil, meal and hulls. The proposed peanut oil plant will produce between 12.5 and 15 TMT of oil using hexane extraction. The cost of the plant, including building, land and huller is set at $23.8 million. Two scenarios will be compared, one using conventional peanut varieties with 48 percent oil content and the second scenario will be using OilMax varieties with 57 percent oil content.

The simulation model to analyze the peanut oil extraction plant is an annual Monte Carlo financial statement model. Similar simulation models have been used by Richardson and Mapp (1976), Cochran, et al. (1990), and Outlaw, et al. (2007) to analyze proposed businesses. The model consists of a production section which annually calculates conversion of peanuts into oil, meal and hulls using stochastic values for prices of peanut oil and meal. The second section of the model calculates the variables for the income statement, i.e. annual receipts, production costs, fixed costs, and interest expenses. The third section calculates the cash flow financial statement variables including annual interest earnings, principal payments, income taxes, investor dividends, and ending cash reserves. The final section of the model calculates the balance sheet with an annual updating of asset values, liabilities, and net worth. The model is recursive in that positive ending cash reserves for the current year are beginning cash reserves for the next year. If ending cash reserves are negative the firm obtains a one-year loan to cover the deficit and repays the principal plus interest the next year. The final segment of the financial model calculates the NPV as:

$$\text{NPV} = -\text{Beginning Net Worth} + \sum \text{Dividends}_t / (1+i)^t + \text{Ending Net Worth} / (1+i)^{10}$$

This formula for NPV quantifies the real change of net worth from retained earnings and changes in net worth, as well as the value of the earnings extracted from the firm, in current purchasing power. Peanut yield data comes from irrigated land in central Texas. Historical peanut oil prices are from USDA AMS. Historical soybean meal prices with a 21 percent discount were used as a proxy for peanut meal prices. Finally, hulls prices were fixed at $27.55/MT.

Results

The results of simulating the peanut oil extraction plant using conventional and OilMax peanut varieties are shown in Table 1. The peanut plant using a conventional peanut variety has a mean NPV of -$2.2 million with a minimum of -$14.8 million and a maximum of $12.7 million. The plant has a 34.3 percent chance of NPV being positive or the plant being an economic success. The peanut plant using OilMax varieties have a mean NPV of $12.8 million with a minimum of -$3.3 million and a maximum of $35.2 million. The plant has a 97.1 percent chance of NPV being positive or the plant being an economic success.

Table 1. Summary of Simulation Results for Two Peanut oil Extraction Plants Using Conventional and Oil Max Varieties

Statistical Summary of Net Present Value		
	Conventional	**OilMax**
Mean	$ (2,224,376)	$ 12,873,696
St.Dev	5,424,679	7,734,394
Min	$ (14,839,518)	$ (3,260,123)
Max	$ 12,684,167	$ 35,249,544
Probability of Success		
P(NPV>0)	34.3%	97.1%

The Cumulative Distribution Functions CDFs of NPV for the two businesses suggest that the peanut oil extraction plant using OilMax variety is first degree stochastic dominant over the one using conventional variety (Figure 6). This means that at any risk level and preference the plant using the OilMax variety is preferred to the one using a conventional variety. Moreover, the CDF chart shows the probability (on the y-axis) of NPV being less than a particular level on the x-axis as well as the spread or variability of NPV. Another way of showing these results are using stoplight graphs (Figure 7). Stoplight graphs show probabilities of the NPV to be above or below specific target levels. To illustrate, the probability of the NPV for the peanut oil plant using a conventional variety to be negative is 66 percent, to be between 0 and $1 million is 5 percent and above $1 million is 29 percent. Conversely, the probability of the NPV of the plant using OilMax variety to be negative is 3 percent, between 0 and $1 million is 1 percent ad above $1 million is 96 percent.

Figure 6. CDF of Net Present Value for Peanut Oil Extraction Plant Using Conventional and OilMax Peanut Varieties

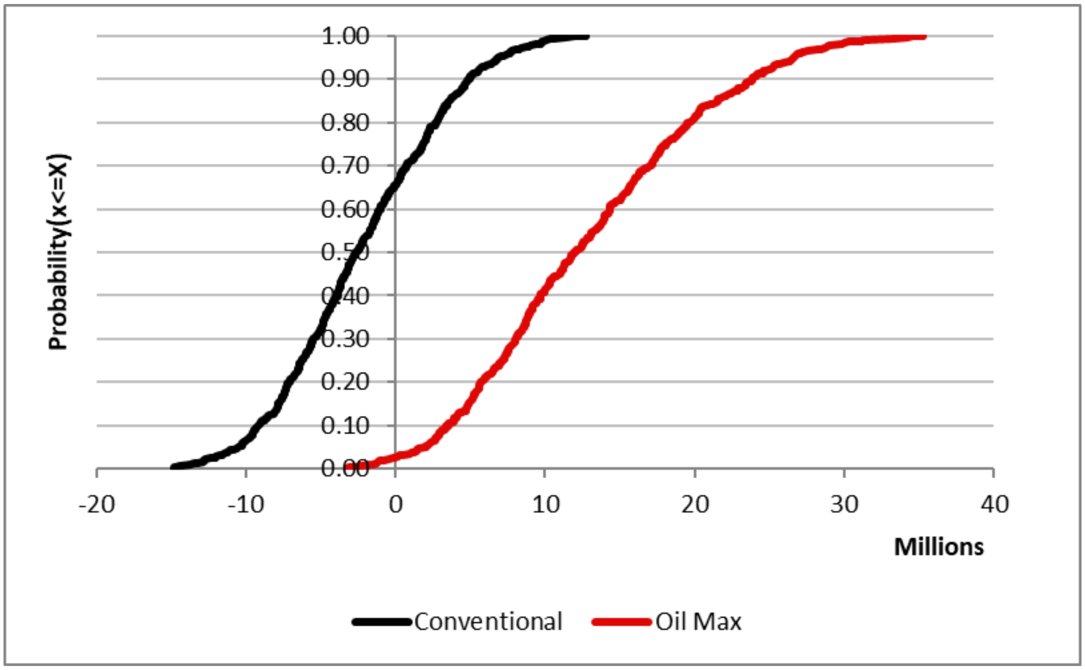
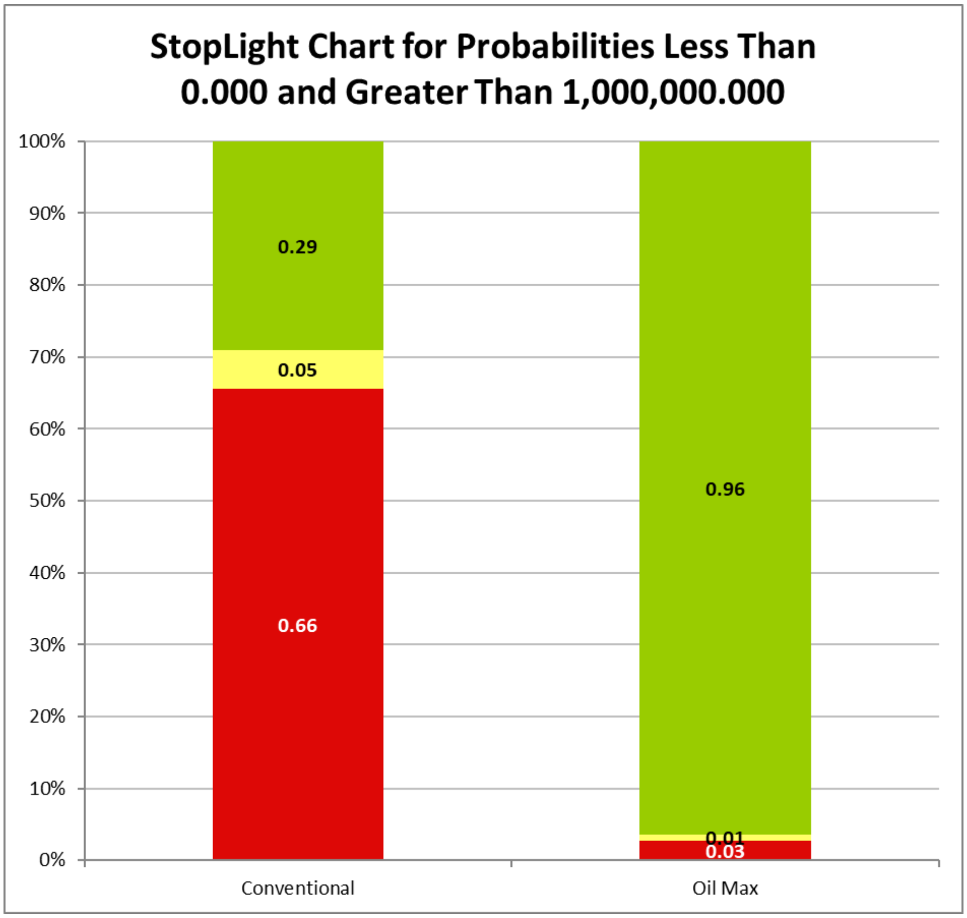


Figure 7. StopLight Chart for NPV of Peanut Oil Extraction Plant Using Conventional and OilMax Peanut Varieties


StopLight Chart for Probabilities Less Than 0.000 and Greater Than 1,000,000.000
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.29
0.05
0.66
0.96
0.01
0.03
Conventional
Oil Max

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