



Diverse Business Potential for
Castor Oil Chemicals and
Leveraging India's Advantage in
Castor Oil Products

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ABSTRACT

India is the world's largest producer of castor oil, producing over 75% of the total world's supply. There are over a hundred companies in India – small and medium – that are into castor oil production, producing a variety of the basic grades of castor oil.

Castor oil's unique oleochemical properties make it a potential feedstock for a variety of end applications. With the world becoming more environment conscious and with increasing replacement of synthetic products with naturally derived products, castor oil-based derivatives could find increasingly attractive markets worldwide.

All the above factors make it imperative that the Indian industry relooks at the castor oil sector in order to devise suitable strategies to derive the most benefits from such an attractive confluence of factors. This white paper has been developed in order to assist these industries in these efforts.

Aim of This White Paper

This white paper aims to provide the reader with an idea of:

- a. The excellent potential that the castor oil market & castor chemicals market offers, and
- b. The steps India should take to fully benefit from this potential.

The white paper is divided into the following sections:

1. Current Status of the Castor Oil Industry and India's Position
2. Existing and Future Potential for Growth in the Castor Oil Industry
3. What's Required for India to Exploit the Potential

Current Status of the Castor Oil Industry and India's Status

Castor oil is unique owing to its exceptional diversity of applications. The oil and its derivatives are used in over 100 different applications in diverse industries such as paints, lubricants, pharma, cosmetics, paper, rubber and more.

The Existing Markets and Applications for Castor Oil and Castor Oil Derivatives

AGRICULTURE

- ↵ Organic Fertilisers

PLASTICS & RUBBER

- ↵ Polyamide 11 (Nylon 11)
- ↵ Plastic Films
- ↵ Adhesives
- ↵ Coupling Agents
- ↵ Polyols
- ↵ Synthetic Resins
- ↵ Plasticizers

FOOD

- Surfactants
- Viscosity Reducing Additives
- Flavourings
- Food Packaging

COSMETICS & PERFUMERIES

- ↵ Perfumery Products
- ↵ Lipsticks
- ↵ Hair Tonics
- ↵ Shampoos
- ↵ Polishes
- ↵ Emulsifiers
- ↵ Deodorants

PAPER

- ↵ Flypapers
- ↵ Defoamer
- ↵ Water Proofing Additive

PHARMACEUTICALS

- ↵ Anthelmintic
- ↵ Antidandruff
- ↵ Cathartic
- ↵ Emollient
- ↵ Emulsifiers
- ↵ Encapsulants
- ↵ Expectorant
- ↵ Laxatives & Purgative

ELECTRONICS & TELE COMMUNICATIONS

- ↵ Polymers for Electronics & Telecommunications
- ↵ Polyurethanes
- ↵ Insulation Materials

PAINTS, INKS & ADDITIVES

- ↵ Inks
- ↵ Plasticizer for Coatings
- ↵ Varnishes
- ↵ Lacquers
- ↵ Paint Strippers
- ↵ Adhesive Removers
- ↵ Wetting & Dispersing Additives

TEXTILE CHEMICALS

- ↵ Textile Finishing Materials
- ↵ Dyeing Aids
- ↵ Nylon, Synthetic Fibers & Resins
- ↵ Synthetic Detergents
- ↵ Surfactants, Pigment Wetting Agents

LUBRICANTS

- ↵ Hydraulic Fluids
- ↵ Heavy Duty Automotive
- ↵ Greases
- ↵ Fuel Additives
- ↵ Corrosion Inhibitors
- ↵ Lubricating Grease
- ↵ Aircraft Lubricants
- ↵ Jet Engine Lubricants
- ↵ Racing Car Lubricants

Existing & Future Potential for Growth

Looking at the facts provided so far, the reader might be led to believe that India enjoys considerable revenues from castor oil exports. This is, however, not true. India's castor oil exports for 2007-08 were about \$ 175 million, which is not a very large value given the potential for this industry.

There are two reasons for this low quantum of export revenues:

- The total amount of castor oil production worldwide (and thus by India), is relatively very low when compared to production of other seed-oils.
- A large percentage of India's castor oil exports are the basic commodity grades with very little value addition.

Low Volumes of Castor Oil Production

The worldwide production of castor oil is about 500,000 T per annum. A look at the table below will show how small this quantity is when looked at from a larger perspective.

However, the fact that an oil with use as versatile as that of castor oil has a share of less than 0.5% shows what tremendous potential it has for future growth.

Below are provided figures for worldwide production of fixed oils

Oilseed	Approximate Annual Production (in million T)
Soybean Oil	34
Palm Oil	35
Rapeseed Oil	17
Sunflower Oil	10
Cottonseed Oil	4
Groundnut Oil	4
Palm Kernel Oil	3.5
Coconut Oil	3
Corn Oil	2
Sesame Oil	0.7
Linseed Oil	0.5
Castor Oil	0.5

Note: Figures for 2005-06

The total volume of oils and fats produced was about 145 million T in 2007-08, among which oils from oilseeds would be about 120 MT (CastorOil.in estimate).

One can see that castor oil has less than 0.5% of total world market for oils from oilseeds.

Admittedly, one cannot compare castor oil volumes with the volumes of oils such as palm oil or soybean oil because these are edible oils and hence they have much larger usage and demand in the food market. However, the fact that an oil with use as versatile as that of castor oil has a share of less than 0.5% shows what tremendous potential it has for future growth.

Low Value Addition by the Indian Castor Oil Industry

The basic grades of castor are the commercial grade, first special grade etc.

The generation I castor derivatives include hydrogenated castor oil, 12-hydroxy stearic acid, dehydrated castor oil acid, and ethoxylated castor oil among others.

Generation II castor oil derivatives include more value added chemicals such as sebacic acid, undecylenic acid, heptaldehyde, polyols and dimer acid.

Generation III derivatives include the esters and salts of generation II derivatives as well as derivatives such as methyl-12-hydroxystearate.

The basic and generation I derivatives are essentially considered commodities and incorporate small value additions, and provide thin margins (in the range of 5%). The value additions and profit margins for generation II & III derivatives are significantly higher and these are very attractive.

In spite of being the largest castor oil exporter by far (75% of global exports), India is able to capture only about 25% of the total value from the market.

The global market for generation II castor oil derivatives is estimated at about \$300 million. For generation III derivatives the estimated market worth is close to \$350 million. The combined revenue potential from the generation II & III derivatives is thus about \$650 million.

Data based on 2007-08 exports show that generation II & III derivatives accounted for less than 20% of India's castor oil exports (by value). It is estimated that value for generation III derivatives alone will be almost an insignificant percentage of the total Indian castor oil exports.

What is the Existing & Current Potential that the Indian Castor Industry should Capitalize on?

Compare \$650 million to \$175-200 million - the value of India's castor oil exports - and the value India is losing out becomes clear. *In spite of being the largest castor oil exporter by far (75% of global exports), India is able to capture only about 25% of the total value from the market.*

Thus, while India could gain a lot more from both higher production of castor oil as well as higher value addition, *it is most likely that a higher focus on value added products will be the most optimal method for the short and medium term*, owing to a number of structural and market related factors.

Let's look at the potential in specific market segments that exists in the value-added castor oil derivatives market.

Growth of Key End-User Segments

The major end-use industries for higher level derivatives castor oil are:

- ↪ Lubricants & Greases
- ↪ Coatings
- ↪ Personal Care & Detergent
- ↪ Surfactants
- ↪ Oleochemicals

Over the past one decade, the growth in demand for castor oil and derivatives has been about 4-5% per annum (CAGR). If one looks at the table above, this % growth seems to be in line with the CAGR for the various industries.

However, one must remember that a very large percentage of the high value added derivatives are produced by companies outside India, and India simply supplies the commodity oils to them. That is, while the demand in quantity for Indian castor oil has been growing at 4-5%, India gets a small share of the actual profits that result from high value add.

Apart from this, there are other emerging segments that could hold even more significant potential for castor oil derivatives.

Growth of Key End-user Industry Segments for Castor Oil Derivatives

Industry	% Growth (CAGR), based on 2005 data	Potential
Lubricants & Greases	2	44 million T by 2012
Coatings	4.9% (about 11% in Asia!)	-
Personal Care & Detergent	6%	\$375 billion by 2012
Surfactants	4%	\$16.65 billion by 2012
Oleochemicals	4%	8.5 million T by 2012

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- ↪ Oleochemicals

Growth Prospects for Bio-based Products

A McKinsey & Co. 2006 survey provides the following data for the potential for bio-based materials in 2010

Market segment	Market size in 2010 (\$billion)	Growth % 2005-10	CAGR 2005-10
Biofuels	42	100	15%
Plant extracts	23	20	3.7%
Pharma ingredients	20	100	15%
Bulk chemicals and polymers	15	50	8.5%
Food ingredients	11	35	6.1%
Oleochemicals	8	6	1.1%
Enzymes	4	100	15%

An analysis of the above table shows that there are some market segments that have much higher growth potential and in which castor oil could play a significant role.

Among the segments in the table above, it is doubtful whether castor oil can have a significant role in the biofuels industry, given castor oil's relatively high cost as well as the small quantities of castor oil produced when compared to the massive volumes required for transportation fuel. However, in high growth segments such as pharma ingredients, biopolymers and food ingredients castor oil could have a considerable role to play. While in some of these segments (pharma for instance), castor oil already is a contributor, it is expected that there will be many more segments within pharma as well as the other two in which castor oil can significantly increase its presence.

Future Potential for Higher Generation Castor Oil Derivatives

Looking at the future potential for specific castor oil derivatives, the following table provides CastorOil.in estimates of the current demand / consumption for select higher generation derivatives of castor oil and future demand supply gaps for these.

Demand-Supply Gap Estimates for Selected Higher Generation Derivatives of Castor Oil

Product	Current Demand	Demand Supply Gap
Hydrogenated Castor Oil (HCO)	Medium	Medium
12 Hydroxy Stearic Acid (12 HAS)	Medium	Medium
Methyl 12 HSA (Hydroxy Stearate Acid)	Low-Medium	Medium
COLM (Urethane Grade)	Medium-High	Medium-High
Ethoxylated Castor Oil	Medium	High
<i>C-7 Derivatives of Castor Oil</i>		
Heptanoic Acid	Low	Medium
Heptaldehyde	Low	Medium
Heptyl Alcohol (Heptanol)	Low	Medium
<i>C 11 Derivatives of Castor Oil</i>		
Undecylenic Acid	Low-Medium	Medium-High
Zinc Undecylenate	Low	Medium
<i>C 18 Derivatives of Castor Oil</i>		
Ricinoleic Acid	Medium	Medium
Methyl Ricinoleate	Low-Medium	Medium
Sebacic Acid	Low-Medium	High
2-Octanol	Low	Medium

Notations for Demand

Very High: 25,000 T and above per year

High: 10,000 T and above per year

Medium-High: 5,000-10,000 T per year

Medium: 2,500-5,000 T per year

Low-Medium: 1,000-2,500 T per year

Low: Less than 1,000 T per year

Notations for Demand-Supply Gap

Medium: There exists some demand over and above supply, but there has not been a significant amount of demand that has gone unmet

Medium-High: There have been some instances where a significant demand has gone unmet

High: There have been many instances where a significant demand in the market has gone unmet

Low: There have been very few instances when a significant demand has gone unmet

NA: denotes that info on demand supply gap is not available owing to the negligible demand volumes

In the above table, please note that even though many of the higher generation derivatives have relatively low current demand when compared to the basic grades, their prices and profit margins are much higher thereby making the total value added on par with or higher than those for the basic grades.

Inference on the Existing & Future Potential for Castor Oil Derivatives

Data and inputs provided in this section clearly show that there is significant potential for higher growth in India's castor oil exports if the industry re-jigs itself and tunes itself to catering to these high growth markets.

What Needs to be Done to Exploit the Potential?

Today, when the world is becoming more energy and environment conscious, the potential for bio-feedstock such as castor oil can only increase even further. The Indian castor oil industry needs to recognize the key advantages it has in this industry and restructure itself to graduate to the higher-growth path.

Key Advantages for India in Castor Oil

- ↪ India produces over 75% of the total world supply of castor oil
- ↪ All the top 5 companies worldwide (by volume of castor oil output) are in India
- ↪ By virtue of being present in the industry for over five decades as a leading player, India has a terrific amount of scientific and practical knowledge of the castor crop, oil and derivatives. The country has hence achieved the status of the foremost competence center for castor oil.

What can be done by India in order to ready itself to benefit from these opportunities?

- ↪ Move up the castor derivatives value chain
- ↪ Greater thrust on R&D
- ↪ Make management more professional
- ↪ Curb volatility in prices
- ↪ Provide more support to the castor farmers
- ↪ Encourage growth of castor in other geographies in India.

Move Up the Castor Derivatives Value Chain

Castor companies should move up the value chain. Currently, much of the value addition after processing of castor oil is done overseas; and a handful of international trading houses that regularly buy the oil in bulk from India are able to reap windfall gains because

of their tie up with the end users of derivative products.

When major countries of the world continue to promote production of and trade in value-added products, India has been content with export of raw materials with limited value addition despite an expanding world market.

Here's an interesting comparison between India's performance in processed and value added agricultural products and those for many other countries. For instance, India's share of processed products in agricultural exports is only about 20%, while this for Malaysia, Mexico & China are 65%, 45% & 45% respectively. What is even more revealing is how they have grown in the last 10 years. This share for each of the three countries grew in the range of 50-100% between 1991 and 2005. For India however, this share increased from about 18% in 1991 to 20% in 2005.

This number clearly indicates that we need to place significant emphasis on value added products, especially in the agricultural sector.

This is especially true for the castor oil industry, where India is almost a monopoly, with China a distant second. It is a great pity if we cannot add much higher value in an industry in which we have absolute leadership.

Opinion is gaining ground that the industry should consciously go slow on raw oil exports and promote sale of derivative products. Unfortunately, unmonitored growth, unregulated trading and lack of unified vision among

industry participants have combined to result in the country’s failure to exploit a natural advantage.

There is also another opinion that the government should discourage castor oil export in bulk and should actively encourage export of derivatives through some policy initiatives.

If the Indian industry starts producing a much higher percentage of derivatives than what it is currently doing, end-users of derivative products from many countries would begin to source their requirement from India directly, rather than through western intermediaries as at present.

Indian’s Contribution in the Castor Industry Value Chain

	Farming	Oil Extraction	Derivatives Production	Marketing	Use in End Products
Value Added/Generated					
India's Contribution					

Greater Thrust on R&D

A much higher thrust on research and development is required. Higher research is required both for the scientific and product research aspects as well as for market research.

Make Management More Professional

Except in a few cases, the companies in the castor industry in India are mainly family-run businesses. Such a structure seriously restricts global growth of companies because without professional experts for each division, the companies are not able to produce world class research, manufacturing and marketing efforts that are required to grow the business into new and emerging segments.

Curb Volatility in Prices

Many castor oil buyers around the world have repeatedly complained about the instability in castor seed and castor oil prices. This volatility especially affects the small and medium buyers the most, and overall results in a perception that the Indian castor industry cannot be relied upon to produce stability in prices. Efforts ought to be taken in order to change this scenario.

Provide More Support to Castor Farmers

As mentioned earlier, once the companies have been able to access the high growth segments of the end-user markets, much higher consumption and sales of castor crop and castor oil becomes possible. This will not be possible in the short run but if managed

meticulously, could be a reality in the next 5-10 years.

In order to ready the industry for much higher production of crop, the Indian

government and the industry participants should look at ways to provide more support to the farming community in order to increase the area under castor crop farming.

Encourage Growth of Castor in Other Geographies in India

Currently, castor crop is grown predominantly in Gujarat, and to a much smaller extent in Andhra Pradesh. The rest of the states contribute little. Such a lop-sided growth in cultivation geography has made the industry vulnerable to natural and man-made factors that affect the castor crop in specific geographies. If we want the world to increase the consumption of castor oil insignificantly and to rely on India as its key partner for this product, India needs to consciously encourage the growth of castor crop in many more regions in the country.

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Profile of CastorOil.in

[CastorOil.in](#) is the leading global intelligence and information resource for the castor oil and castor derivatives industry. In addition to providing comprehensive information assistance online, the [Comprehensive Castor Oil Report](#) is the most comprehensive report on castor oil, providing essential inputs for businesses, entrepreneurs and investors interested in exploring the castor industry.

Comprehensive Castor Oil Report

Those interested in knowing more about the castor oil and derivatives industry will find the [Comprehensive Castor Oil Report](#) an indispensable guide. This report provides comprehensive details on all the segments of the castor industry value chain – from cultivation of castor crop to production of high end derivatives. It contains critical investment and production process intelligence relevant to investors and businesses, and has a detailed section on the production of second and third generation derivatives from castor oil.

Get to know more about the *Comprehensive Castor Oil Report* form here -

<http://www.castoroil.in/reference/report/report.html>