



Aligning  
Investment

## Scoping Analysis

# INDIA

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**Investment  
opportunities in  
five agricultural  
value chains**





# Scoping Analysis

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## Investment opportunities in five agricultural value chains in India

December 2019

SAFIN India Pilot Anchor





This scoping report was prepared by N. Srinivasan and commissioned by the SAFIN Secretariat. All views expressed in the document belong solely to the author.

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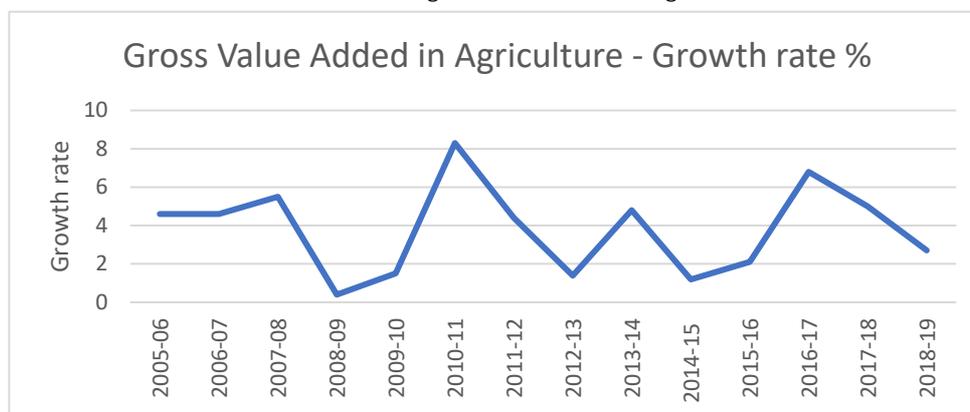
# Acronyms

APEDA	Agricultural Products Development Authority
CACP	Commission on Agricultural Costs and Prices
CGTMSE	Credit guarantee fund trust for micro and small enterprises
FAO	Food and Agricultural Organisation
FI	Financial Institution
FRI	Forest Research Institute
GDP	Gross Domestic Product
GVA	Gross Value Added
ICAR	Indian Council of Agricultural Research
IFAD	International Fund for Agricultural Development
IIMR	Indian Institute of Millets Research
IIOR	Indian Institute of Oilseeds Research
IISR	Indian Institute of Spices Research
IPGA	Indian Pulses and Grains Association
ISPRD	Indian Society for Pulses Research and Development
MIDH	Mission for Integrated Development of Horticulture
MOAFW	Ministry of Agriculture and Farmers Welfare
MOF	Ministry of Finance
MOFPI	Ministry of Food Processing Industry
MSP	Minimum Support Price
NABARD	National Bank for Agriculture and Rural Development
NAFED	National Agricultural Cooperative Marketing Federation of India Ltd
NBFC	Non-Banking Finance Company
NCML	National Collateral Management Services Limited
NFSM	National Food Security Mission
NMOOP	National Mission on Oilseeds and Oil Palm
NTFP	Non timber forest produce
RBI	Reserve Bank of India
SEA	Solvent Extractors Association
SIDBI	Small Industries Development Bank of India
TRIFED	Tribal Cooperative Development Marketing Federation of India Limited

# Country overview

India is a strong democracy with one of the globally high growth rates of the economy over the last decade. The recent slowdown of the economy can be seen more as a hiccup than as a secular decline. Performance of the agriculture sector has been very good over the years, with the country achieving self-sufficiency in food and producing exportable surpluses. Agriculture contributes a declining share of GDP with each passing year and currently (2018-19) the share of agriculture in GDP is ~ 16.1%<sup>1</sup>. The share of population dependent on agriculture is estimated at about 65%, all of it in rural areas. Of the country's workforce 49.9% is estimated to be engaged in agriculture<sup>2</sup>. 70 percent of its rural households still depend primarily on agriculture for their livelihoods, with 82 percent of farmers being small and marginalized. In 2017-18, total food grain production was estimated at 275 million tons (MT). India's annual milk production was 165 MT (2017-18), making India the largest producer of milk, jute and pulses, and with the world's second-largest cattle population 190 million in 2012. It is the second-largest producer of rice, wheat, sugarcane, cotton and groundnuts, as well as the second-largest fruit and vegetable producer, accounting for 10.9% and 8.6% of the world fruit and vegetable production, respectively<sup>3</sup>. While agriculture in India has achieved grain self-sufficiency, production is resource intensive, cereal centric and regionally biased. Within agriculture some sub-sectors, especially oilseeds and pulses, still do not produce enough to meet domestic demand, hence imports are resorted to. The annual growth rate of agriculture<sup>4</sup> ranged between (-) 0.4% to 8.8% during the period 2005-06 to 2018-19.

Chart 1: Trends in gross value added in agriculture



Year to year fluctuations in the performance of the sector have been sharp, influenced by the behavior of climate and excessive exploitation of soil and water resources. Indian agriculture is highly sensitive to climate change and large parts of the country would require to undertake effective mitigation and adaptation measures to protect farm based livelihoods.

<sup>1</sup> Economic Survey July 2019 – Ministry of Finance.

<sup>2</sup> Periodic Labour Force Survey 2017-18, Central Statistical Office.

<sup>3</sup> Data in this paragraph is sourced from Economic Survey – July 2019, Agricultural Statistics at a Glance 2018, Livestock Census of India 2012, Horticulture Statistics at a glance 2018.

<sup>4</sup> Economic Survey July 2019 – Ministry of Finance.

## Introduction to the scoping study

The scoping study covers five large value chains – Coarse cereals or nutri-cereals, Oilseeds, Pulses, Spices and Non-timber Forest Produce (NTFP). The first four value chains are significant in Indian agriculture; NTFP is significant for forest dwellers and tribal communities. These four value chains (excluding NTFP) account for 53% of area cultivated and 34% of production volumes in agriculture and horticulture. The four value chains span across several states in India covering millions of farmers in each value chain. The total number of farmers engaged in production operations in the four value chains is about 130 million; 89 million forest dwellers and tribals are dependent on NTFPs. Leaving NTFP aside, the other four value chains are typically located in rain-fed areas with coarse cereals in rain-scarce regions.

Indian agriculture is predominantly smallholder led and any of the four value chains will impact small and marginal farmers. Oil seed crops require a higher risk absorption capacity than pulses. Coarse cereals, especially millets are less risky than other crops but do not produce significant surplus for households. Governments at the federal level in the Centre and state levels have programmes and schemes to support these different value chains. There are agriculture sector specific interventions that aim at quality input supply at reasonable costs, investment in irrigation, adequate power supply at reasonable costs, improving access to credit at subsidized interest, reforming and augmenting market mechanisms, providing income support to farmers and offering crop insurance for crop losses. These schemes and programmes are run across the country, in the case of central government schemes, and in specific states in case of state government schemes.

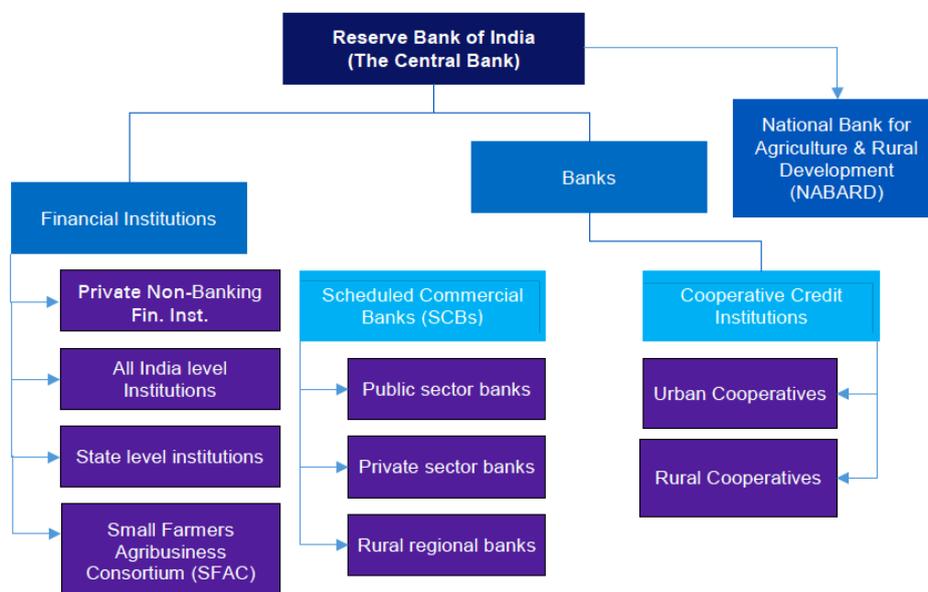
# Financial sector and agriculture

The financial sector has multiple agencies providing agricultural credit. The architecture of the sector includes Apex development banks, commercial banks (public and private), Cooperative banks, Regional Rural Banks (a smaller version of commercial banks operating in specific states), Small Finance Banks (a recent introduction focused on small customers) and Non-Bank Financial Institutions.

The financial sector is a key contributor to the agriculture development achieved by the country over the last 60 years. As explained later, bank credit helped farmers use improved inputs and methods of cultivation and also invest in productivity-enhancing assets. Credit supported 39% of Gross Value Added in agriculture (See Table1). The multi-agency approach adopted by the Central Bank to cater to agricultural finance needs was an important element in making credit access easier in the rural areas. Yet, a lot remains to be done.

Chart 1 provides an idea of the architecture of the Indian financial sector as it exists today. Among the private sector banks there are foreign banks, Small Finance Banks and Local Area Banks. Two other Apex Banks (at the same level as NABARD for agriculture), one for the small industries (Small Industries Development Bank of India - SIDBI) and one for housing finance (National Housing Bank - NHB) look after policy, bulk financing and sector development in their respective areas. SIDBI has a financing role in the processing activities, when the units set up are small or medium scale.

Chart 2: Financial Sector Architecture - India



The banking policy is slanted towards directing credit flows to sectors that may not be the first choice of banks. Banks (except cooperatives) are required to lend 40%<sup>5</sup> of their credit to borrowers falling within a defined Priority Sector. Out of the net bank credit of each bank, 18% should be for agriculture, 10% for weaker sectors and not less than 40% for the priority sector units and activities, which apart from agriculture

<sup>5</sup> Small Finance Banks are required to lend 75% of their loans for priority Sector

and weaker sectors include small units in industry and service sectors, affordable housing, farmer producer organisations, microfinance, etc. The priority sector lending guidelines ensure that small loans and sectors that are usually considered risky also get credit support.

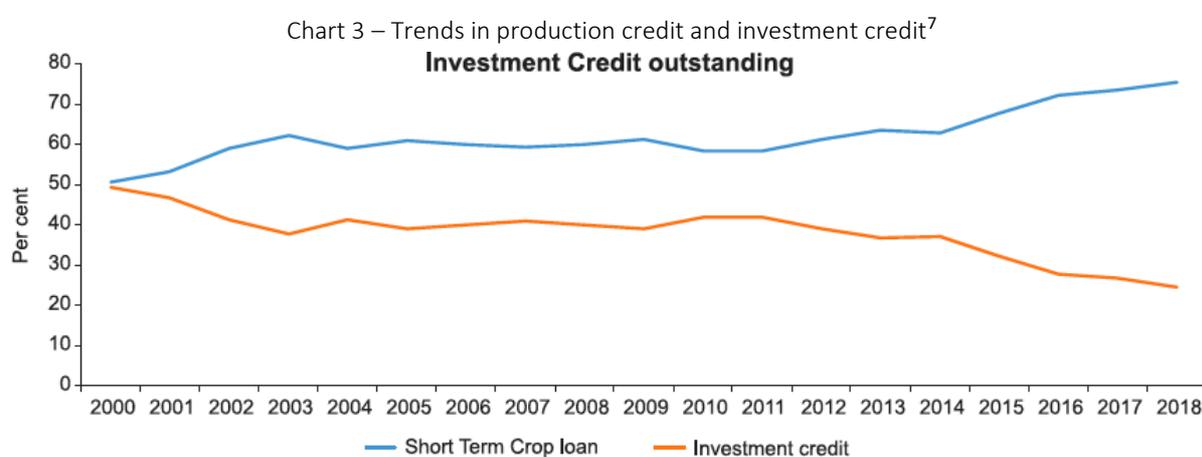
### Ground level credit flow for agriculture and sub-sectors

Agricultural lending is usually for short term agricultural operations with only part of lending going towards investment purposes with longer-term requirements.

Table 1: Agricultural credit flow<sup>6</sup>

Year	Credit flow to agriculture (Rs bn)	% of long term loans	Credit as % of GVA in agriculture
2014-15	8453.28	24.8	35%
2015-16	9155.09	27.3	36%
2016-17	10657.55	35.3	38%
2017-18	11626.17	35.2	38%
2019-20 (P)	12547.62	40.2	39%

The flow of agricultural credit in the last financial year (1 April 2018 to 31 March 2019) was about USD 180 billion. Long term loans as disbursed during the year were a share of 40%. However, loans for investment in agriculture (as distinct from long term loans) declined from 49% in 2000 to 25% in 2018.



This decline is significant, as it indicates that bank credit has been relatively scarce for value chain investments, as most has gone into production operations. Agricultural credit outstanding as a proportion of Gross Value added in agriculture was of the order of 51.5% in 2018. If an input to output ratio of 3 is assumed in agriculture, the credit outstanding supports about 20% % of value added from the harvest stage, which is a critical stage for value realization by farmers. The current credit to GDP ratio in agriculture is much better than the 20% figure of 2001-02, but still fails to meet full credit needs, and is thus one cause for

<sup>6</sup> NABARD Annual Report 2018-19 (GVA – Gross Value Added)

<sup>7</sup> RBI internal Working Group to Review Agricultural Credit Sept 2019

relatively low effort in post-harvest handling of produce by farmers, with consequent loss of potential incomes through value addition<sup>8</sup>.

In the context of value chain investments, there is considerable space for new players and new sources of finance. Value chain investments tend to go primarily towards aggregation facilities, storage, processing, logistics - including cold chains where necessary - and market infrastructure. Processing is a key aspect of value addition in the value chain and is financed as part of food processing industry activity. RBI's data sets provide information on credit outstanding for food processing units (as part of which credit data in edible oils sector is also provided).

Table 2: Outstanding Bank Credit of commercial Banks (Rs Billion)<sup>9</sup>

	June 2018	June 2019
Agriculture & Allied Activities	10292.0	11186.6
Food Processing	1497.6	1516.3
Edible Oils	211.9	201.0
Transport Operators	1223.4	1417.1

The key inferences from this data are that banks are familiar with financing agriculture and value chain activities, but do not cater to their credit needs adequately. There is a significant gap in credit, largely on account of the fact that most post-harvest effort prior to produce reaching consumers is widely distributed in small units with a high degree of informality. The large players in each of the value chains identified for this study are corporate units that can obtain credit from banks. Informal, smaller units do not always access credit and would need to organize themselves better in order to benefit from bank loans. In the last about 10 years there have been more units set up in commercially viable forms in processing and trading - this includes the transformation of some highly informal operations into formal entities such as Farmer Producer Organisations. Many startups have also entered the agro-processing and marketing space in the last five years. Many of these have been able to attract equity funding and thereafter also access loan funds from banks and NBFCs. More work needs to be done in innovating financial products (not limited to credit) and in market based trade finance instruments that can facilitate trading in commodity markets.

### Risk Mitigation - Crop insurance

The Government of India operates a crop insurance scheme<sup>10</sup> that covers major crops in each district (an administrative sub-unit of the State). The scheme is implemented by public and private sector insurance companies. There is also a weather index based insurance scheme, which has a small coverage in some pockets of the territory. All the insurance schemes put together cover about 25% of cultivated area, and coverage has seen a marginal decline over the last three years. The schemes are not too popular on account of low awareness on their nature, high expectations that insurance should be remunerative, and some cumbersome procedures, especially in proving claims and settlement. Some crop specific insurance schemes also operate - e.g. in case of coconut. In general, pulses and oilseeds farmers seem to take out insurance

<sup>8</sup> At harvest farmers need credit to hold the produce for either primary processing or marketing at a suitable time. Without credit to hold the produce, the farmers have to sell their crop immediately.

<sup>9</sup> RBI Database on the Indian Economy – Sectoral distribution of outstanding credit.

<sup>10</sup> Prime Ministers Crop Insurance Scheme (PMFBY).

more than producers of coarse cereals. However, given that coarse cereals are mostly produced in rain-fed conditions, the need for insurance against crop-loss is higher in this sub-sector.

Table 3: Crop Insurance Coverage <sup>11</sup>

Crop	2016-17			2017-18		
	Gross cropped area (Mn ha)	Area Insured (Mn ha)	% of area insured	Gross cropped area (Mn ha)	Area Insured (Mn ha)	% of area insured
Paddy	44.2	13.4	30.3	44.2	12.1	27.4
Wheat	32.1	10.5	32.8	32.1	9.1	28.2
Nutri-cereals	25.5	5.7	22.4	25.5	4.5	17.8
Oilseeds	28.4	11.2	39.3	28.4	11.1	39.0
Pulses	21.7	8.7	40.2	21.7	7.5	34.7
Total including other crops	198.4	56.2	28.4	198.4	51.5	26.0

### Price hedging

Price risks in the market can be hedged for some of the crops through the commodity exchanges<sup>12</sup>. Traders have been using the hedging facilities in futures and options markets, but the volumes traded in such markets have been about 30% of the total value of agricultural production<sup>13</sup>. Farmers' organisations have entered the commodity exchanges recently with active support from both the commodity exchanges for farmers and their organisations, through training and capacity building. In the crop clusters covered in this study, about 35 are considered major in terms of area and production, but only 11 of these crops are traded in the commodity exchanges. The commodity exchanges are on the look-out for inclusion of new crops and commodities each year, and hopefully in a few years a significant number of these will be traded on the exchanges.

Table 4: Commodities traded in the exchanges<sup>14</sup>

Commodities traded in NCDEX	Commodities traded in MCX
Barley, Maize	Palm oil, Castor seed
Chick Pea, Mung	Pepper, Cardamom
Soyabean, Castor Seed, Mustard	
Pepper, Turmeric, Coriander, Cumin seeds	

In conclusion, considerable opportunities exist in production, processing, and marketing through improved financing and risk mitigation in the identified value chains (see tables 10,16,22,28 and 31 in the sections relating to specific value chains for details). The availability of institutional mechanisms and active government support to capture such opportunities are also important to note.

### Other financial sector infrastructure<sup>15</sup>

To render credit decisions easier, RBI has ensured that credit information bureaus are functional and regulated by RBI. Individuals and entities that have credit exposure with a financial institution will have a

<sup>11</sup> Agricultural Statistics at a glance 2018, Ministry of Agriculture.

<sup>12</sup> There are four functional commodity exchanges – NCDEX, MCX, NMCE and ICX. Two more exchanges that deal with securities, namely NSE and BSE, are likely to take up commodities trading shortly.

<sup>13</sup> In mature markets, futures and options volumes are normally several times the underlying value commodities traded.

<sup>14</sup> The list is limited to commodities in the five focus value chains. There are more agricultural commodities traded in the exchanges.

<sup>15</sup> See annex 4 for information on players in the financial sector other than banks and FIs.

credit score and credit history, which can be referenced by lending institutions to inform their lending decisions. Other credit rating agencies operate under RBI regulation to rate commercial entities. These ratings are also a good guide for lenders. In addition, guarantee mechanisms are available for lenders to take cover on a portfolio basis. For instance, the Credit Guarantee for Medium and Small Industry loans (CGTMSE) covers most small loans and provides a measure of comfort to lenders against default. Rabobank and USAID also operate guarantee schemes against loans given to agri-enterprises and Farmer Producer Organisations, which play critical roles in these value chains.

### Loan products

In terms of financial instruments, working capital loans, investment loans, project loans and revolving credit limits are available for agriculture and related activities in India. There are government schemes that offer capital and interest subsidies routed through the banking system. To finance trade, traditional instruments such as Letters of Credit, discounting bills of exchange, advances against purchase and supply contracts, and factoring credit are available from banks and some non-bank financial institutions. A concerted effort (with NABARD backing) to provide loans against warehouse receipts had gained some traction. Work is ongoing to make warehouse receipts into negotiable instruments so that commodities can be easily monetized. To secure loans and keep information in circulation in the financial sector, credit and mortgage registries have been set up. Financial institutions are required to use both registries in respect of their exposures. In case of defaulted loans and impaired assets, statute based recovery mechanisms are available. Alternatively, the stressed assets can be sold to specialized Asset Recovery Companies.

Table 5 Gaps in financial services and products

Where are the gaps?	What are the gaps?
Access to credit for farmers in general and small farmers in particular	Based on a 2018 survey, 30% farmers had to borrow from informal sources; another 10% borrowed from informal sources also as formal credit was not adequate; small farmers with less than 0.4Ha of land had 41% loans from non-institutional sources, farmers with 2 ha of land or more could avail 78% of their loans from institutional sources. <sup>16</sup>
Adequacy of credit at farm level	Only 30% of farm households that made significant investments could do so with institutional credit. The remaining 70% had to rely on informal sources or own funds.
In different parts of the value chain, e.g. farm or aggregation levels	In production, crop loans are not adequate for adopting improved cultivation practices. Post-harvest aggregation, sorting and grading do not get adequate support. Primary processing that can add value to farmers does not find adequate support.
Farmer organisations, agri-enterprises	Working capital for procuring inputs, storing them, trading or marketing is not easily available. Infrastructure and processing facilities do not provide adequate support – for transport, warehousing including cold stores, sorting, grading, hulling, milling, pulverising, packing equipment need credit support. Of about 7500

<sup>16</sup> NAFIS survey 2018 ([https://www.nabard.org/auth/writereaddata/tender/1608180417NABARD-Repo-16\\_Web\\_P.pdf](https://www.nabard.org/auth/writereaddata/tender/1608180417NABARD-Repo-16_Web_P.pdf))

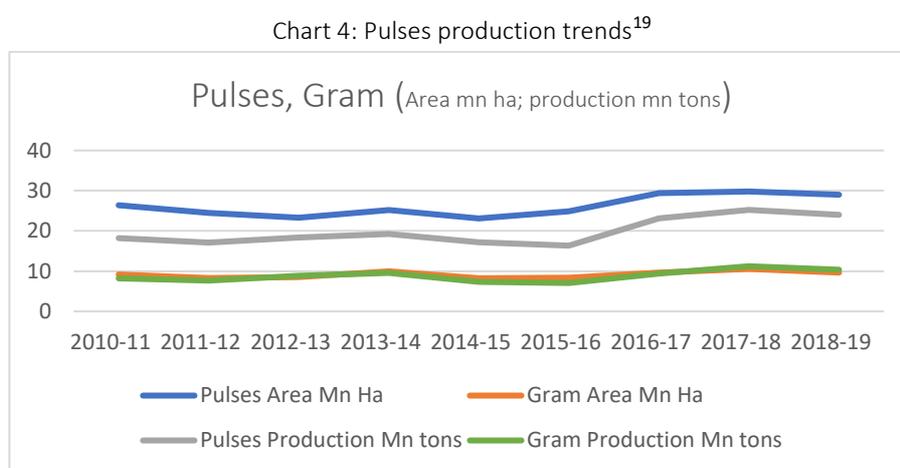
	farmer producer companies, only about 450 are estimated to avail loans from financial institutions.
Equity, Quasi equity	Agri-enterprises providing technology services, aggregation and marketing, processing, warehousing (infrastructure and services), logistics, etc., do not have adequate access to equity or quasi equity, which limits the number of players and volume of produce handled.
On-lending funds, refinance for non-bank finance companies	There is dearth of bulk funds from the larger financial institutions for on-lending to retail customers that are not catered to by banks and financial institutions.

### Regulation

The stock exchanges and commodity exchanges are regulated by a separate market regulator (Securities and Exchange Board of India) and function well on reliable technology platforms. The settlements happen with certainty and problems with a few players in the market are easily dealt with by the exchanges. A separate exchange (SME stock exchange) facilitates the issuing of shares by medium and small sized entities, in order to improve their access to capital. The financial sector and commodities and securities markets are well regulated to ensure institutional solvency, good market conduct, protection of customers (especially the smaller ones). Well-laid processes for enforcement of discipline have been developed. The existing financial sector infrastructure coupled with competent regulations constitute enabling conditions for funders to take equity or debt exposures.

# Pulses value chain

Pulses are a major source of protein in Indian diets<sup>17</sup> and the country is the largest producer of pulses in the world. Pulses are 20 to 25 per cent protein by weight, which is double the protein content of wheat and three times that of rice. They are an important part of the consumption basket in India (5% of household food expenditure), with demand outstripping domestic production. Besides being the largest producer (25% of global production), India is also the largest consumer (27% of world consumption) and importer (14%) of pulses in the world. Grown over 9.6 million hectares, pulse crops are mostly rain-fed, with 82% of them grown in unirrigated conditions. Growth in production has averaged 6% over last 12 years. Pulses prices have also increased at an average of 12% over the last 12 years<sup>18</sup>. Some data related to major pulses production in the country is in the following chart.



Madhya Pradesh in Central India and Rajasthan in Western India have the largest share of cultivated area in this sector. In general the produce is sold postharvest to local millers and market agents who aggregate it for wholesalers. Processing is carried out through several small and medium-sized hulling units with varying levels of technological sophistication.

There are five significant pulses crops – Chickpea (Gram), Pigeon Pea (Tur), Lentil (Masur), Mung beans (Moong) and Black Matpe (Urad) that are grown in the country. Despite significant production, domestic demand continues to outstrip supply<sup>20</sup>, a gap that is expected to continue for the foreseeable future. Projections of demand and domestic supply indicate that supply would be about 1.3 million tons less than demand in 2032, necessitating continued imports.

Table 6: Demand and supply of pulses<sup>21</sup>

	Demand 2021	Supply 2021	Demand 2032	Supply 2032
Pulses (Mn tons)	26.05	23.73	35.23	33.95

<sup>17</sup> <https://pulses.org/future-of-food/pulses-nutrition>

<sup>18</sup> Pulses and Rhythms, 2017 – CRISIL Research Report.

<sup>19</sup> Agricultural Statistics at a Glance 2018, Ministry of Agriculture and Farmers Welfare

<sup>20</sup> Pulse India Quarterly journal July-September 2019 IPGA

<sup>21</sup> Demand and Supply Projections towards 2033 – crop, livestock, fisheries and agricultural inputs working group report NITI Aayog 2018.

Market opportunities to build up the domestic pulses value chain are very strong. Despite the total domestic pulse production being at 24 million tons in 2018-19, the country had net imports of 1.9 million tons of pulses, and it exported 0.27 million MT of pulses valued at USD 242.66 Million during the same period<sup>22</sup>. Traditionally sold without any quality differentiation or branding, pulses have come to be sold increasingly in branded consumer packs with quality, colour, place of origin and food safety differentiators. The growing consumer demand for specific quality has led to branding of the pulses. Consumerism has also led to value added products like branded unpolished pulses and flour. Food processing is picking up, with pigeon pea for instance being supplied in paste form to the restaurant industry. Pulse-based processed products such as paste, papad, and flour are in demand and they are manufactured in small and medium industrial units. The size of pulses market is about INR 2 Trillion (USD 30 Billion), and it is characterized by numerous small players. The large players with branded, value-added products have a turnover of about INR 3.5 billion (USD 0.5 billion). However, the sector has large potential for further value addition and better organisation<sup>23</sup>.

Chickpea (Gram) is the most widely cultivated pulse specie. It accounts of 33% of area under pulses and 43% of production in 2018-19<sup>24</sup>. Chickpea is also a profitable crop with net returns being 73% above costs. However, in irrigated areas it is not the most profitable crop, its returns being 81% of wheat, which grows during the same season. In rainfed areas, gram is one of the better alternatives as a winter crop. It also lends itself to value addition in the form of flour. Furthermore, gram processing yields valuable by-products useful in the animal feed industry. Roasted gram, considered a healthy snack, is popular in South and Southeast Asia, and it is also a value-added product. It can be seen from consumer studies that the preference for branded products is highest across categories such as flour.

The processing of pulses is undertaken at three levels i.e. Primary, Secondary and Tertiary. Primary processing consists mainly of the production of cleaned, graded and packaged pulses. Secondary processing consists of de-husking, splitting, polishing, turmeric coating and milling into flour. Tertiary processing consists mainly of the preparation of roasted or fried pulse and other associated products. The by-products from pulses processing consist of husk and fine powder, which can be used as raw materials for the cattle and poultry feed industry. Some processors of pulse have integrated cattle feed units to maximize returns through an extended value chain.

### Production of pulses

Pulses in India are grown in several states with favorable agro-climatic conditions. The top producing states are listed in the following table.

Table 7: Pulses – top producing states <sup>25</sup>

State 2017-18	Area Mn ha	% to All- India	Production Mn tons	% to All- India	Yield kg/ha
Madhya Pradesh	7.48	24.94	8.11	32.14	1084
Rajasthan	5.33	17.77	3.39	13.42	635
Maharashtra	4.35	14.51	3.30	13.09	759

<sup>22</sup> Pulse India Quarterly journal July-September 2019 IPGA

<sup>23</sup> <http://ipga.co.in/value-chain-in-indias-pulses-sector/>

<sup>24</sup> Agricultural Statistics at a Glance 2018, MOAFW

<sup>25</sup> Agricultural Statistics at a Glance 2018, MOAFW

Uttar Pradesh	2.27	7.56	2.21	8.75	974
Karnataka	3.02	10.07	1.86	7.35	614

Productivity varies across states, even among the top five producers. Productivity in two states is about 60% of that in the top-most state – Madhya Pradesh. Factors such as seed replacement, quality inputs, good practices in crop husbandry need attention to raise productivity. While Indian productivity at 841 kg/ha is higher than the global average of 754 kg/ha, it is well below productivity in Australia, which is 5537 kg/ha<sup>26</sup>. This points to the considerable scope for investments even at the production stage of the value chain.

Table 8: Chick Pea (Gram) – Top producing States (2017-2018)

State	Area Mn ha	% of All-India	Production (Mn tons)	% of All-India	Yield kg/ha
Madhya Pradesh	3.59	33.99	4.60	40.92	1280
Maharashtra	2.00	18.94	1.78	15.89	892
Rajasthan	1.57	14.89	1.67	14.87	1062
Karnataka	1.27	11.98	0.72	6.42	570
Andhra Pradesh	0.52	4.92	0.59	5.21	1125

Productivity variations are also seen in the case of chickpea across states. States such as Maharashtra and Karnataka have much to gain from focusing on productivity improvement measures. Madhya Pradesh, Maharashtra and Rajasthan have the major shares in area and production of this crop.

### Financing and economics

Financing of pulses production is done as part of agricultural lending by banks. Separate data on lending for pulses is not available. That said, being a crop grown in rain-fed regions, pulses typically receive less credit compared to paddy, wheat or sugarcane, but they receive more support than millets for instance. Post-harvest processing also gets good support with about 2000 pulse mills across the country. Again there is scope for more pulse processing mills nearer production clusters, integrated with animal feed units that can utilize husk as by-product. Short term production loans and long term loans for irrigation systems and implements are needed. After harvest, short term loans are required to holding produce till farmers are ready to sell, and ideally this should be financed through farmer collectives so that produce can be warehoused. Long term loans for warehouses and primary processing equipment can improve value realization. Trade finance instruments (such as bill discounting, finance against warehouse receipts, etc.) are also needed if farmer collectives aggregate the produce for marketing. If secondary and high-end processing is taken up, then long term loans as well as working capital are needed.

Table 9: Costs and Returns on pulses production<sup>27</sup>

Crop	Arhar (Pigeon Pea)	Moong (mungbean)	Urad (black matpe)	Gram (chickpea)
Return over cost of cultivation %	88	48	104	100
Cost of cultivation Rs/ha	34700	18200	19260	25200

<sup>26</sup> Commission on Agricultural Costs and Prices –Price policy - Marketing Season Kharif 2019-20.

<sup>27</sup> Commission on Agricultural Costs and Prices –Price policy - Marketing Season Kharif 2019-20 and Rabi 2019-20.

For processing and marketing, the larger players are able to get trade loans for aggregation and marketing, and some get industrial loans to set up processing facilities (part of the food processing industry). Smallholder farmers can gain higher prices and reach better markets if they are able to access suitable infrastructure and loans against stock of produce. While to a small extent such loans are available for farmers, most such post-harvest handling of produce is financed to wholesalers and processing and marketing entities in the private sector. Under a scheme of the Ministry of Food Processing, investments in “food parks” can be made, providing a common infrastructure for a number of units to carry out food processing activities.

Table 10: Key players and government priorities

Players	Government initiatives
Production: Seed companies (Rallis, National Seeds Corporation, IFFDC, NAFED, HIL, KRBHCO), input sellers, farmer cooperatives and FPCs	<a href="#">National Food Security Mission</a> in 635 districts in 29 states - and Crop Diversification Programme – focus on seeds, new varieties and technology input linkages
Post –harvest – 2000 pulse mills and 1000 feed units – Procurers (Tata Chemicals, NAFED), traders (24 Mantra, processors) export agency- APEDA	Minimum support prices announced for PigeonPea, Chickpea - procurement through NAFED and FCI Public procurement through NAFED 1.3 million tons, Chickpea procured from 1.04 million farmers in 2018-19
Research and training: Indian Society of Pulses Research and Development (ISPRD)	Indian Institute of Pulses Research
Industry bodies: Indian Pulses and Grains Association.	

The Minimum Support Prices fixed by the government for some of the pulses crops are not effective for most farmers, and buying at the announced prices does not take place. The price support scheme also needs better implementation.

Table 11: Investment opportunities

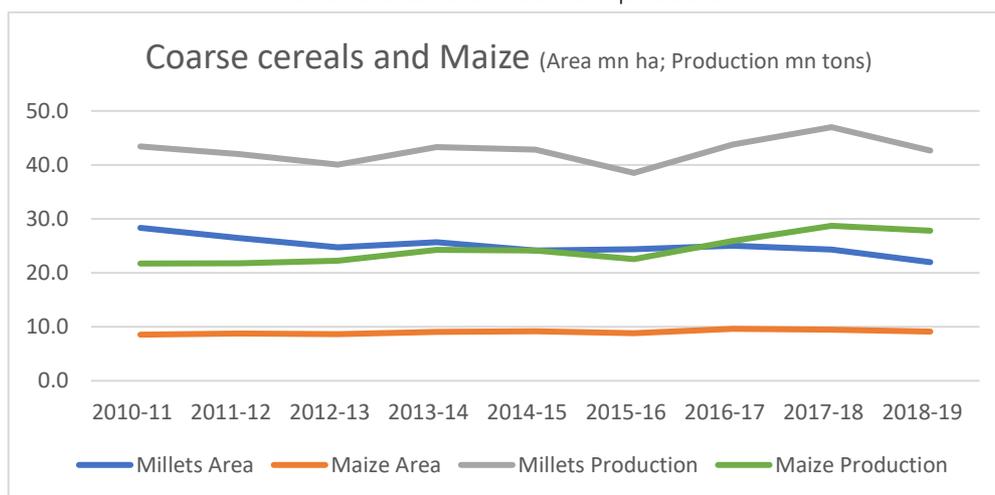
Segment	Nature of investment opportunity
Production	Seeds manufacture/marketing – Low replacement rates and large yield gap, inputs manufacture, especially micronutrients and plant protection, irrigation systems.
Post - harvest	Milling, storage, food processing, – large demand, focus on quality products, convenience foods, special needs of hotel/restaurant segment.
High-end value addition	Ready to eat food and snacks, health/wellness products – protein rich “super foods”.
Bye-product value addition	Animal and poultry feed manufacture – large market demand
Focus States	Madhya Pradesh, Maharashtra, Rajasthan.

# Coarse cereals value chain

A variety of coarse cereals are grown throughout the country in different ecological and agro-climatic condition, but mostly as rainfed crops. Sorghum, pearl millet, maize, barley, finger millet and several small millets such as kodo millet, little millet, foxtail millet, and barnyard millet are called coarse cereals. Sorghum, pearl millet, finger millet, maize and small millets (barnyard millet, proso millet, kodo millet and foxtail millet) are also called nutri-cereals. These crops are adapted to a wide range of temperatures, moisture regimes and input conditions, supplying food and feed to millions of dryland farmers. Moreover, they provide raw material for potable alcohol and starch production in industrialized countries. The production of millets (or nutricereals as now renamed) has been declining in terms of acreage, on account of greater focus on producing paddy rice, wheat and maize in many contexts.

In India, coarse cereals are grown over 22 million hectares, with production reaching 42 million tons,<sup>28</sup> but production levels fluctuate, reflecting the impact of uncertain rainfall. A downward trend in area cultivated under cereals and the increasing share of maize in the cultivated area reflects the relative economics of cultivation with generally better returns from maize.

Chart 5: Coarse cereals trends in production<sup>29</sup>



The nutricereals (which do not include maize) have traditionally been retained for home consumption, with small surpluses sold in the local markets. In the past decade, there has been increasing awareness of the health effects of nutricereals, which have come to be seen as superfoods. As a result, the production of millets is now more oriented towards markets, and processing has assumed more importance. Campaigns by the government have increased awareness levels and guided the choice of species, variety and cultural practices. Some large players have been marketing nutricereals in raw and processed forms, as these crops can be converted into breakfast food, ready to cook forms and snack foods (e.g. as flakes, puffed grains, multi-grain bread flour, porridge flour, vermicelli and pasta, roasted, salted and flavored snacks, cookies, etc.). In processed foods, some nutricereal content has been added to create a unique selling proposition by some large players such as Britannia, ITC and Kellogg's. Post-harvest processing has a lot of scope for these

<sup>28</sup> Agricultural Statistics at a Glance 2018, MOAFW.

<sup>29</sup> Agricultural Statistics at a Glance 2018, MOAFW.

crops, from simple hulling and polishing of grains to derivatives to be used by a number of industries, primarily for processed food.

Table 12: Demand and supply – coarse cereals<sup>30</sup>

	Demand 2021	Supply 2021	Demand 2032	Supply 2032
Coarse Cereals (mn tons)	45.44	46.96	67.48	61.79

The demand supply scenario indicates that there would be shortage of domestic supply to meet demand in the next 13 years. The shortage in domestic supply is projected to increase from 2.5 million tons in 2021 to 5.7 million tons in 2032. Strong domestic demand thus underpins the need for more investments in this value chain.

Table 13: Coarse Cereals – top producing states

State 2017-18	Area Mn ha	% of All- India	Production Mn tons	% of All- India	Yield kg/ha
Rajasthan	5.91	24.40	6.57	13.99	1113
Karnataka	3.42	14.12	6.27	13.35	1836
Maharashtra	4.16	17.18	6.09	12.96	1465
Madhya Pradesh	2.21	9.13	5.30	11.29	2399
Uttar Pradesh	1.99	8.23	3.89	8.29	1955

The variations in productivity across states are high. Dryland conditions in some states reduce productivity; in others, some irrigation support is available with positive impact on productivity.

Maize is grown throughout the year, but it is predominantly a kharif crop with 85 per cent of the area under cultivation in the season. Maize is the third most important cereal crop in India after rice and wheat. It accounts for around 10 per cent of total food grain production in the country. In addition to being a staple food for humans and quality feed for animals, maize serves as a basic raw material as an ingredient for many industrial products, including starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries. About 1 million tons of maize were exported, for a value of USD 276 million, in 2018-19.

Table 14: Maize – top producing states<sup>31</sup>

State 2017-18	Area Mn ha	% to All- India	Production Mn tons	% to All- India	Yield kg/ha
Karnataka	1.29	13.60	3.55	12.36	2755
Maharashtra	1.16	12.21	3.54	12.33	3062
Madhya Pradesh	1.35	14.28	3.54	12.32	2615
Tamil Nadu	0.34	3.60	2.64	9.20	7744
Telangana	0.63	6.67	2.57	8.94	4061

Maize productivity in Tamil Nadu is very high and almost double that of next best state. The scope for

<sup>30</sup> Demand and Supply Projections towards 2033 – crop, livestock, fisheries and agricultural inputs working group report NITI Aayog 2018.

<sup>31</sup> Agricultural Statistics at a Glance 2018, MOAFW

productivity improvement can be a starting point of investment in this value chain. 15 million farmers are engaged in maize cultivation across the country. Cultivation of maize is less profitable than paddy in the Kharif season, with the relative returns being 69% of that of paddy, thus there is need to invest in productivity enhancement. Average maize yield in India is actually well below the global average, and there is scope for increasing productivity from 2.5 tons per ha to 5 tons per ha.

Maize has a variety of downstream products with value addition, requiring considerable investments. Processing units are able to operate around the year, given the suitability of the crop to any season. Maize is also traded on the commodity exchanges facilitating price discovery as well as price hedging.

In terms of backward linkage investments, large scale adoption of Single Cross Hybrid (SCH) technology, cluster based seed production through seed producer groups and forging Public Private Partnership (PPP) opportunities to ensure availability of quality maize seeds seem feasible. The creation of enabling infrastructure through dedicated seed cold storages is an area requiring attention for improving the back-end support system infrastructure for maize.

Installation of Maize dryers and promoting modern storage techniques like silos are needed as infrastructure for better storage and PHM (post-harvest management). The creation of such enabling infrastructure would improve the quality of produce and thereby lead to better price realization for farmers. Several large players in processing and marketing of maize and derivatives are active - to name a few: Gujarat Ambuja Proteins, K G Glucobiols, Gulshan Polyols, Hindustan Maize Products, Indian Maize & Chemicals, International Best foods and Jayant Vitamins.

### Financing and economics

The production of millets is not adequately financed compared to other crops, primarily due to risks in millet production on account of its rain-fed nature. The cost of cultivation and credit requirements are also low compared to other crops, and the resulting small size of loans required is not attractive to banks. Some FPCs focusing on millets exclusively have been able to obtain bulk loans from financial institutions for lending to members. Millet processing facilities are usually located at a distance from production areas. In many locations specialized milling units are not available, existing paddy mills are used for milling coarse cereals, which erodes yield of grains and reduces quality. Financing of new dedicated, customized mills will improve value realization.

As in the case of pulses, there are opportunities for short term production loans and long term irrigation and equipment loans. At the level of farmer collectives, long term loans for storage, milling plants and primary processing are also required, and so are short term loans for procurement and marketing of produce and well as trade finance. The role of food parks under the scheme of the Ministry of Food Processing can also be significant to move the value chain forward.

Coarse cereal crops (except barley) exhibit moderate returns over costs of cultivation. The data below is a three year average ending in 2017<sup>32</sup>.

Table 15: Costs and returns in millets

Crop	Jowar (sorghum)	Maize	Bajra (pearl millet)	Barley
Return over cost of cultivation %	24	33	24	86
Cost of cultivation Rs/hectare	24700	36800	24600	31900

Table 16: Key players and government priorities

Players	Government initiatives
Production: Seed companies (Syngenta, Monsanto), input sellers, farmer cooperatives and FPCs	National Food Security Mission – for Coarse Cereals in 265 districts in 25 states
Post –harvest – processors (Gujarat Ambuja Proteins, Hindustan Maize Products, KG Glucobiols, Jayant Vitamins,etc, Modern Silos (NCML)	Minimum support prices announced.– high level of procurement in some years and limited quantity in others
Research and training: Maize Technologists Association of India	Indian Institute of Maize Research, Indian Institute of Millets Research
Industry Association: Indian Pulses and Grains Association	
Focus States	Rajasthan, Karnataka, Maharashtra

The Minimum Support Prices fixed by the government for some of the coarse cereals crops are not effective for most farmers and buying at the announced prices does not take place. Many farmers are not aware of the MSP and procurement mechanisms.

Table 17: Investment Opportunities

Segment	Nature of investment opportunity
Production	Seeds manufacture/marketing – Low seed replacement rates and large yield gap, Irrigation systems
Post - harvest	Procurement and marketing, Hulling and destoning, sorting and grading, food processing, storage, silos, flour mills– rising demand, resurgence of ethnic food in consumer basket, animal feed – Setting-up food parks
High-end value addition	Starch, fermented products, malted foods, Breakfast food, baked products, Ready to eat food and snacks.
By-product value addition	Animal and poultry feed manufacture – large market demand

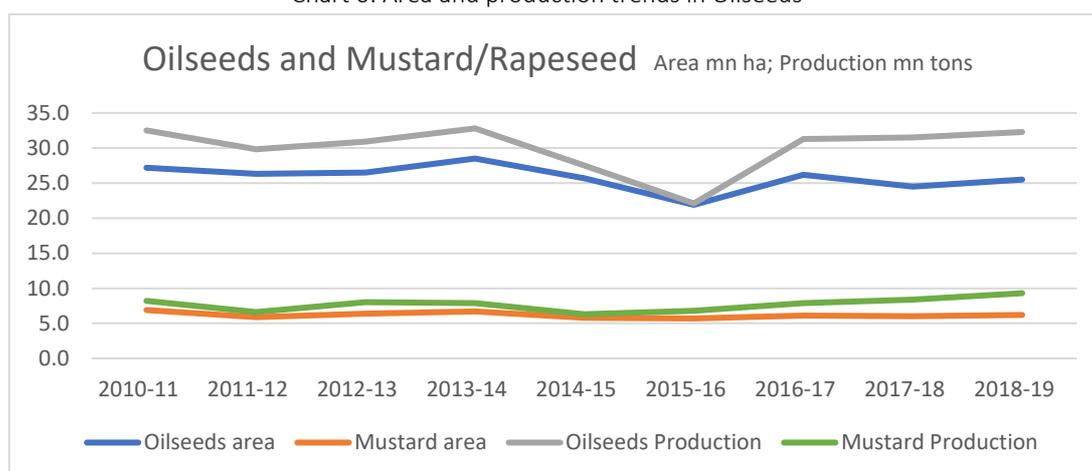
<sup>32</sup> Commission on Agricultural Costs and Prices –Price policy - Marketing Season Kharif 2019-20 and Rabi 2019-20.

# Oilseeds value chain

Despite being the fifth largest oilseed crop producing country in the world, India is also one of the largest importers of vegetable oils today. There is a spurt in the vegetable oil consumption in recent years in respect of both edible as well as industrial usages. Nine oilseeds are the primary source of vegetable oils in the country, which are largely grown under rain-fed conditions over an area of about 26 million ha. The area under oilseeds has experienced a decrease in general, due to their relative lower profitability against competing crops like maize, cotton, chickpea etc., under the prevailing crop growing and marketing situations. The productivity gap across the nine major oil seed crops is of the order of 51%. The mean yield is 1041 kg/ha currently as against 1500 kg/ha achievable through improved technology adoption. Increased productivity can improve profitability and make oilseed crops compete with other crops.

In terms of consumption, the consumption was about 23 Million tons in 2018-19 of which only 7.3 million tons were domestically produced. Two thirds of consumption was met by imported oils, mostly in the form of Palm Oil. The Oilseeds Mission of the government is trying to bridge the gap in supply with oil palm cultivation, which over the medium term can boost domestic oil production, but there are significant challenges to expansion of oil palm acreage that need to be overcome.

Chart 6: Area and production trends in Oilseeds <sup>33</sup>



The area under oilseeds has been declining from 2010, but for a brief spike in 2016-17. Productivity gains have increased production level, and the projections are that with higher prices oilseeds production will continue to increase. Within oilseeds, mustard is a major crop accounting for 24% of area cultivated and 29% of production. Since 2014-15, there has been a reversal of a declining trend, and acreage and production of mustard/rape seed has been gradually increasing.

Table 18: Demand Supply Oilseeds<sup>34</sup>

	Demand 2021	Supply 2021	Demand 2032	Supply 2032
Oilseeds (Mn tons)	58.92	37.81	99.59	59.96

<sup>33</sup> Agricultural Statistics at a Glance 2018, MOAFW.

<sup>34</sup> Demand and Supply Projections towards 2033 – crop, livestock, fisheries and agricultural inputs working group report NITI Aayog 2018.

The demand – supply gap is very large and unlikely to be bridged despite the efforts taken by the government to augment domestic production. Dependence on imported oils will continue, as palm oil provides a cost-effective option to the poorer sections of people in India.

Oilseeds require both primary and secondary processing before use. Sorting and grading are followed by oil extraction – ranging from crushing and expelling oil to solvent extraction. The oil produced is filtered and refined to improve quality for cooking purposes.

A number of large players are in the edible oil industry. On account of stagnant production of oil seeds and influx of imports, the capacity utilization of oil extraction units has been poor. Oil mills have been operating at 20 to 30% capacity, solvent extraction units at 40% capacity and refinery units at 59% capacity. The marketers are more into refining and blending of oils than oil extraction. Unless domestic production increases significantly, the current installed capacities are likely to remain underutilized, making further investments unlikely.

Oil crushers and extractors also deal in de-oiled cake which has many uses, principally in animal feed industry. Soyameal (de-oiled cake from soya) had been exported in the past, but in recent times quality issues have reduced such exports. Soya crushers have always looked at their economics from value of soya meal rather than from the oil. The market players in the oilseed / edible oil sector are many. There are about 15 listed companies that deal in edible vegetable oils. There are also conglomerates such as ITC group, Adani group, Coromandel group with a large presence. The site [www.fundoodata.com](http://www.fundoodata.com) lists 369 companies in the edible oils and derivatives business. Investments in the oilseeds and edible oils sector should therefore be more focused on production and productivity. Unless capacity utilization of existing processing units improve, prospects of further investments in post-harvest stages do not seem bright.

Table 19: Oilseeds – Top producing states<sup>35</sup>

State 2017-18	Area Mn ha	% to All-India	Production Mn tons	% to All-India	Yield kg/ha
Madhya Pradesh	6.64	26.95	6.95	22.20	1046
Rajasthan	4.11	16.68	5.97	19.07	1453
Gujarat	2.76	11.19	5.86	18.71	2123
Maharashtra	4.22	17.13	4.27	13.63	1010
Uttar Pradesh	1.09	4.41	1.15	3.66	1054

The difference in productivity between Gujarat and other states clearly indicates the potential for productivity enhancement. Achieving the yield potential will improve profitability and make the crop competitive against other possible crops. Within oilseed crops there are also regional preferences. Gujarat has traditionally grown groundnut. Soyabean is popular in Madhya Pradesh and sunflower in Karnataka. Minimum Support prices (MSP) have an impact on the farmers' crop planning. However, lack of assured procurement at MSP at times discourages farmers from relying on them.

<sup>35</sup> Agricultural Statistics at a Glance 2018, MOAFW

Table 20: Mustard and Rapeseed<sup>36</sup>

State 2017-18	Area Mn ha	% to All-India	Production mn tons	% to All-India	Yield kg/ha
Rajasthan	2.18	36.64	3.40	40.87	1558
Haryana	0.55	9.21	1.11	13.31	2018
Madhya Pradesh	0.75	12.55	0.98	11.73	1305
Uttar Pradesh	0.68	11.40	0.95	11.36	1392
West Bengal	0.62	10.32	0.72	8.68	1175

In the case of mustard, productivity in Haryana is considerably higher than in other states, which indicates the potential yield towards which actions should be taken. The net returns from mustard over cost are estimated to be currently at 102%. However, returns from mustard cultivation are only 81% of returns from wheat, but factoring in irrigation, farmers might grow wheat in the Rabi' season instead of oilseeds.

A National Mission for Oilseeds and Oil Palm has been under implementation by the Government of India. This was launched to raise production to 35.5 million tons, but it fell short of targets by 10% in 2017-18. The mission promotes productivity and improved oil extraction, with special focus on oil palm. Though this crop is a priority for the Government, suitable land in a conducive agro-climatic eco-system has been difficult to find, on account of the fragmented nature of holdings, according to Solvent Extractors Association (SEA). Govind Patel, former president of SEA reckons that of all the oilseeds, mustard and rapeseed value chain has better potential for post-harvest value addition, especially in Rajasthan.

Soya bean oil extraction units have not been able to function even at low capacities; new oil units may not find enough raw material. Oil refining especially of imported oils might find traction, but imported oils do not produce favorable impacts on local farmers. Rajasthan with its large area coverage under mustard and a yield gap may be a state of choice for follow up consideration in the form of an Investment Prospectus under SAFIN, followed by Madhya Pradesh.

### Financing and Economics

Traditionally oilseed farmers have been able to get better access to bank credit on account of the fact the oilseeds are mostly not directly consumable but rather sold to a processor. Opportunities to extend short term loans to improve variety and technology of cultivation exist. Oilseed crops do well with drip irrigation and long term loans for such systems will be a good enabler of higher productivity. Oil milling is not a good asset class for loans or equity investments given low capacity utilization. However, cold pressed oil units for crops such as mustard in some locations might require long term loans. For trade in oil seeds, there are opportunities for short term loans, mostly through the trade finance instruments. Downstream processing units that make use of de-oiled cake (except for soyabean, where there is adequate capacity) to make protein based foods for human consumption or animal feed will do well given large demand. These units will require long term loans.

<sup>36</sup> Agricultural Statistics at a Glance 2018, MOAFW

Table 21: Costs and returns on oilseeds<sup>37</sup>

Crop	Groundnut	Soyabean	Sunflower	Mustard
Return over cost of cultivation %	51	20	34	95
Cost of cultivation Rs/hectare	49200	28650	20700	26300

Table 22: Key players and Government Priorities

Players	Government initiatives
Production: Seed companies Dupont PHI seeds, Mahyco, Kaveri Seeds, National Seeds Corporation), input sellers, farmer cooperatives and FPCs	<a href="#">National Mission on Oilseeds and Oil Palm</a> , now a part of NFSM.
Post –harvest – Procurers (NAFED), Oil mills, (Marico, Cargill, Mother Dairy, Patanjali) GCMMF, Godrej Agrovet for oilcakes.	Minimum support prices announced every year for Rapeseed/Mustard. Public procurement through NAFED 0.77 million tons mustard from 0.32 million farmers in 2018-19 – Price Deficiency Payment Scheme in some states
Research and training: Indian Society for Oilseeds Research	Indian Institute of Oilseeds Research
Industry Association: Solvent Extractors Association	Indian Oilseeds and Produce Export Promotion Council

Solvent Extractors Association (SEA) is an industry body that is active in networking, information dissemination and advocacy. SEA could be a useful partner in the oilseeds sector. The sale of stocks procured under MSP by NAFED at times disrupts the market with unseasonal fall in oilseed prices.

Table 23: Investment Opportunities

Segment	Nature of investment opportunity
Production	Seeds manufacture/marketing – Low seed replacement rates and unrealised yield potential, irrigation systems, new oil palm plantations.
Post - harvest	Procurement and marketing, cold press oil mills, storage, consumer packing – demand for cold pressed oils – mustard offers most opportunity – Setting-up Food parks Normal oil extraction and refinery units may not be profitable on account of excess capacity
High-end value addition	Niche marketing of organically produced oils and speciality oils from safflower, niger. Protein from soya and groundnut meal
Bye-product value addition	Animal and poultry feed manufacture from oilcakes – large market demand
Focus states	Rajasthan, Madhya Pradesh, Uttar Pradesh

<sup>37</sup> Commission on Agricultural Costs and Prices –Price policy - Marketing Season Kharif 2019-20 and Rabi 2019-20.

# Spices value chain

India produces 75 varieties of spices of the 109 listed by ISO and is the world's largest producer of spices. The Spices Board, a statutory body set up by Government of India for the development of the sector, has the responsibility to deal with 52 notified spices, which includes the most important ones for both domestic consumption as well as exports. In terms of area coverage, spices occupy only 4 million hectares, but the value of about 8 million tons of different spices produced is high. The value of spices production in 2015-16 was USD 10 billion. In 2017-18 spices exports were at 1.02 million tons valued at USD 2.78 billion<sup>38</sup>. Unlike the pulses and oilseeds value chains, there is net exportable surplus in spices. The high unit value and the vibrant demand in the global markets are positive factors in this value chain.

A number of spices are grown in the country, some of them location specific on account of agro-climatic and soil conditions.

Table 24: Major spices produced in India<sup>39</sup>  
(Area Ha; Production Tons)

Spice	2013-14		2014-15		2015-16		2016-17		2017-18	
	Area	Production								
Pepper	122400	37000	123900	70000	131790	48500	134280	57000	135915	64000
Cardamon (small)	69970	16000	69970	18000	70080	23890	69357	17990	69330	20640
Cardamom (big)	26060	4465	26387	4850	26387	5325	26617	5570	26617	5430
Chilli	791930	1376400	766620	1621480	742950	1497440	864730	2394320	824790	2302670
Ginger	138200	683160	153100	795820	156910	1025110	160480	1047190	160860	1043130
Turmeric	207570	1092630	178470	846250	183480	967060	248050	1215520	224260	1107920
Coriander	516070	496240	604090	546800	624780	572990	672760	863530	665190	866800
Cumin	690080	445030	701560	372290	808230	503260	780920	500360	780950	500380
Celery	4070	5510	4070	5510	4010	5510	4010	5510	4010	5510
Fennel	94070	135930	46760	78570	76000	129350	89540	148560	89580	148640
Fenugreek	90500	110530	124710	134100	227960	248350	220670	310070	219720	311280
Ajwan	39260	26610	24010	17180	26600	16010	34340	27840	34500	27940
Garlic	238760	1221380	261510	1424860	295600	1603500	302980	1722750	322340	1716920
Tamarind	58720	191750	54120	200390	47660	190780	49660	202150	48830	199860
Clove	2060	1060	2380	1260	2340	1210	2200	1230	2230	1230
Nutmeg	19690	13210	21110	14400	22360	15170	22670	14020	22640	14060
Cinnamon	277	50	277	50	320	70	240	150	265	80
Total Including other spices	3145610	5833870	3192640	6169900	3457000	6901780	4031700	8610810	3969390	8413980

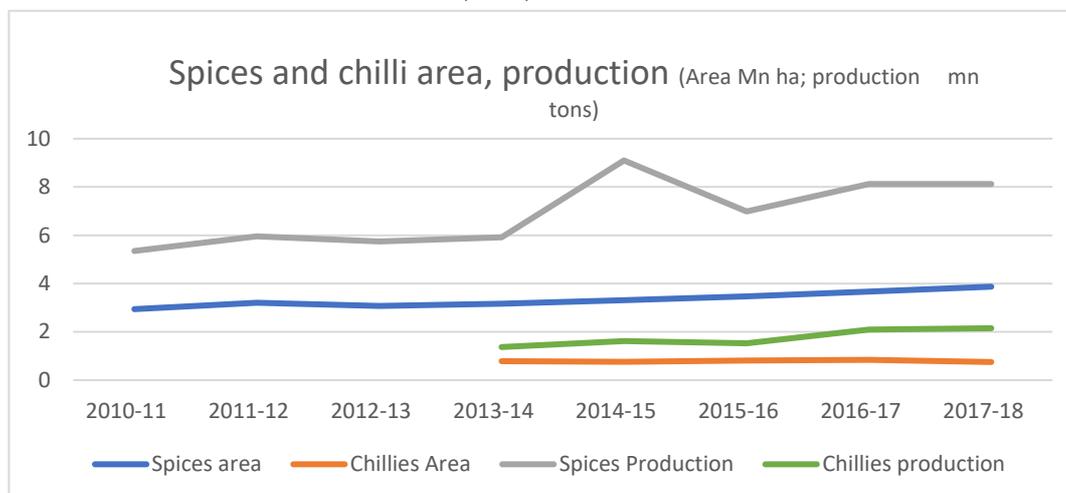
Chili, ginger, turmeric and garlic are dominant. The total area cultivated under spices has been steadily increasing, responding to market demand. Productivity of spices has been consistently increasing over the years. Chili in particular is a major spice in terms of volumes and value. While acreage under chili has been stagnant, productivity has been increasing. In spices too yield potential has not been realized fully.

<sup>38</sup> Spices Board website, Agricultural Products Export Development Authority (APEDA)

<sup>39</sup> Spices Board Web site - <http://www.indianspices.com/>

Technology inputs and improved agricultural practices are needed to increase productivity.

Chart 7: Spices production trends<sup>40</sup>



In terms of area and production, the arid state of Rajasthan occupies the top place. Andhra Pradesh and Telengana have very high productivity (especially for chili). The top five states account for 56% of volumes produced and 55% of the area under cultivation of spices. Productivity of spices in India is low, however - even the gap between national average and the realizable yield is very wide. In pepper, it is around 2445 kg/ha, in cardamom 1625 kg/ha national average is 290 kg/ha and 120 kg/ha respectively. Bridging this gap is sufficient to increase country's production manyfold.

Table 25: Spices – Top Producing states<sup>41</sup>

State	Area (Mn ha)	% to All India	Production (mn Tons)	% to all India	Productivity Kg/ha
Rajasthan	1.00	25%	1.39	17%	1390
Andhra Pradesh	0.25	6%	1.1	13%	4400
Gujarat	0.51	13%	0.91	11%	1784
Telangana	0.18	5%	0.79	9%	4389
Karnataka	0.24	6%	0.49	6%	2042
All India	3.96	-	8.41	-	2124

The largest crop in spices is chili. It is grown over 19% of area covered by spices and 26% of volume of production of all spices. Chili contributes to 24% of value of spices exported. Andhra Pradesh and Telengana in south India have 63% share of chili produced in the country with high productivity from 37% of the area under this crop. The other three states in the top five, despite having large area under cultivation, have low productivity. Investments in production part of the value chain will yield positive results as the yield gap is substantial.

<sup>40</sup> Horticulture Statistics at a Glance 2018, MOAFW

<sup>41</sup> Horticulture Statistics at a Glance 2018, MOAFW

Table 26: Chili – Top five states<sup>42</sup>

State	Area	% to All India	Production	% to all India	Productivity
Andhra Pradesh	0.21	28%	0.99	46%	4714
Telangana	0.07	9%	0.34	16%	4857
Madhya Pradesh	0.09	12%	0.24	11%	2667
Karnataka	0.13	17%	0.26	12%	2000
West Bengal	0.06	8%	0.1	5%	1667
All India	0.75		2.15		2867

In the global market which has traditionally been buying spices from India that is more competition for some spice varieties today from countries such as Vietnam, Sri Lanka and Indonesia.

A number of opportunities for setting up processing units of different size and sophistication exist. Spices value chain offers several entry points for investors and financiers. Spices can be sold raw or in processed form. A variety of processing options are available accompanied by significant value addition. Simple sorting and grading can generate higher value depending on the quality of the produce and its grade. Spice powders either of single spice or a mix (the popular Indian curry powders) are sold in consumer packs. The last decade has seen a trend of branding of spice powders. Spice pastes especially of ginger and garlic are also marketed to consumers in branded packs. Spice extracts – such as essences, oleoresins and essential oils are high value items popular in the export markets. Processing of spices thus involves sorting, grading, packing, pulverizing, wet milling, oil extraction through distillation and solvent extraction processes. The extraction of oils and oleoresins necessitates attention to varieties of the spices and their essential oil content. Most manufacturers provide backward linkages relating to seed material selection and cultural practices as also harvesting protocols. For example, Synthite Industries Limited (Based in State of Kerala in south India) manufactures and markets oleoresins from 25 different spices in the global market. It claims to have 30% of the world maker for oleoresins.

More than 1400 processors and marketers of spices are listed in trade portals<sup>43</sup>. Some larger players in the spices processing marketing space are Synthite, AVT McCormick, MDH Foods, MTR Foods, Jabs, Bafna and Kishore enterprises. Spices Board, the government entity responsible for the development of the sector, can be a valuable partner should an Investment Prospectus be developed for this value chain.

### Financing and Economics

In spices a number of opportunities for financing are available on account of the high unit value, large export market and high end processing requirements. Apart from short term and long term loans for production as in case of other crops, long term loans in processing are possible. Spices exported as essential oils, oleoresins and cryogenically ground powders carry a very high value. These processes are accompanied by very high quality standards requiring expensive manufacturing systems. Profitability is also high on account

<sup>42</sup> Horticulture Statistics at a Glance 2018, MOAFW

<sup>43</sup> <https://www.indiantradeportal.in/>

of the fact that the sources of such value-added products globally are limited. Spices attract less state controls on production and export trade and hence has seen the presence of large private sector players willing to make investments. The Spices Board provides support for setting up of spice parks for processing. Already eight such parks are functional that offer a variety of common facilities to the processing units set up in the parks. Investment in spice parks can be remunerative with the right product mix. Farmer collectives in spices can benefit from investing in storage and primary processing and investments are possible in this space.

Table 27: Costs and returns of some spices<sup>44</sup>

Crop	Chili	Turmeric	Garlic
Return over cost of cultivation %	139	122	119
Cost of cultivation Rs/hectare	46000	45000	140000

Spice grinding units that pulverize chili, coriander, etc., for sales can be set up at a capacity of 120 MT per annum at a cost of about Rs 4 million with a profit margin of about 20%. Such installations are possible at farmer collective level in spice growing clusters.

Table 28: Key Players and Government Priorities

Players	Government initiatives
Production: Seed companies (National Seeds Corporation, Kaveri Seeds, Mahyco), input sellers, farmer cooperatives and FPCs	Mission for Integrated Development of Horticulture (MIDH), Spices Board
Post – harvest – Procurers, processors and traders (Synthite, Akay flavours, MTR foods, MDH, Jabs, AVT McCormick, Bafna, Kishore enterprises).	Post harvest Improvement Programmes – subsidies for installing machinery and equipment for primary processing. Pack houses, Storage and primary processing facilities under MIDH. Spices parks with common infrastructure in 8 locations.
Research and training: Synthite Industries Limited, Calicut (in-house research)	Indian Institute of Spices Research, Kozhikode National Research Centre on Seed Spices, Ajmer
Industry Association: All India Spice Exporters Forum, Essential Oils Association of India	National Horticulture Board, Spices Board, APEDA

Table 29: Investment opportunities

Segment	Nature of investment opportunity
Production	Seeds, Planting material manufacture – Low seed replacement rates and unrealised yield potential, , plant protection inputs
Post - harvest	Sorting, grading, packing lines near production clusters, Making spice powders and spice mixes, setting-up spice parks
High-end value addition	Essential oil extraction, oleoresin manufacture, cryogenic grinding, ready to use pastes for hotel/restaurant industry
Bye-product value addition	Limited scope
Focus states	Andhra Pradesh, Rajasthan, Gujarat

<sup>44</sup> From the database of Tamil Nadu Agricultural University

# Non Timber Forest Products value chain

Non Timber Forest Products (NTFPs) contribute significantly to rural livelihoods. It is estimated that about 100 million people, especially communities living inside and on the fringes of forest areas depend on NTFP for food, shelter, medicine, cash income etc. Studies conducted in some states have shown that contribution of NTFPs to the total income of the households varied between 10 to 70 percent and majority of the forest dwellers depend on forests for 25 to 50 percent of their food requirements.

Table 30: Major Non timber Forest Products<sup>45</sup>

S.no	Product	Production 000 tons	Value INR bn	Important states for the product
1	Tendu Leaf	8000	10.40	Madhya Pradesh, Chhattisgarh, Jharkhand, Odisha, Gujarat, West Bengal,
2	Bamboo	4800	12.00	Madhya Pradesh, Chhattisgarh, Gujarat, Andhra Pradesh, Odisha, Maharashtra,
3	Mahuwa (butter tree) Flower	150	1.22	Madhya Pradesh, Chhattisgarh, Gujarat, Jharkhand, Andhra Pradesh, Maharashtra, Odisha,
4	Mahuwa Seed	100	1.10	Madhya Pradesh, Chhattisgarh, Gujarat, Jharkhand, Andhra Pradesh, Maharashtra, Odisha,
5	Sal Leaf		1.00	Jharkhand, Chhattisgarh, Odisha, Madhya Pradesh
6	Sal Seed	160	1.60	Chhattisgarh, Odisha, Jharkhand, Madhya Pradesh,
7	Lac	25	1.50	Chhattisgarh, Andhra Pradesh, Jharkhand, Gujarat, Rajasthan, Madhya Pradesh,
8	Chironjee	10	2.30	Jharkhand, Chhattisgarh, Madhya Pradesh, Andhra Pradesh,
9	Wild Honey	30	2.70	Madhya Pradesh, Chhattisgarh, Odisha, Maharashtra, Andhra Pradesh, Karnataka
10	Myrobalan	130	0.78	Maharashtra, Chhattisgarh, Odisha
11	Tamarind	200	2.40	Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Jharkhand
12	Gums (Gum Karaya)	5	0.62	Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Maharashtra, Gujarat, Jharkhand
13	Karanj Seed (Pongamia)	40	0.40	Madhya Pradesh, Jharkhand, Odisha, Rajasthan, Chhattisgarh
	<b>Total</b>		<b>38.02</b>	

<sup>45</sup> Tribal Cooperative Development Marketing Federation, TRIFED

### The NTFP Value chain

Primary collectors, due to their remoteness and distance from markets, cannot sell their goods directly to the end users or consumers. Between the producers and the end users stands a host of marketing intermediaries performing a variety of functions and bearing different tags like traders, commission agents, retailers, suppliers, wholesalers and exporters. There are groups and subgroups within the trade channel with various levels of bargaining power. But the mechanism of business control is different from that of traditional business systems denying benefits to the procurers. The price of NTFPs is most often determined by the traders – depending on the margin they need. It is not based on demand/supply. Generally, the prices paid to NTFP gatherers are only slightly higher than daily wages – not attaching any value to the forest produce or its relative scarcity. Since organized private sector is not in a position to invest in the primary links of the value chain, the inefficiencies in collection, indifferent quality and low prices to the collectors persist.

The following aspects adversely impact the NTFP market.

- Lack of value chain knowledge and market informally linked.
- Demand from across the country and also abroad met by informal market players.
- Wide swings in prices depending on season and factors outside the local domain.
- Lack of scientific quality parameters or standards – traders go by physical characteristics giving scope for reducing prices arbitrarily.
- Absence of scientific weighing and volume assessment at the harvesters/*Haat* traders level resulting collectors not getting fair prices.
- Prevalence of adulterants in the market (also called substitutes) which are difficult to identify but put added pressure on forest resources.
- Practice of even Rare and Endangered and Threatened species (banned items) being traded and even billed under different names.

### State institutions and programmes

NTFPs are largely managed by State Forest Departments, who hardly have access to “big picture” information on current and anticipated market trends, value addition and ex-situ cultivation possibilities. Only a fraction of NTFPs that are harvested pass through organized channels of trade, and statistics based on volumes clocked in these channels are grossly inadequate for planners and policymakers. In most states, the forest department or a forest development corporation or a Tribal development entity is involved in marketing and administering the market mechanisms. In most cases these do not work efficiently in favor of NTFP gatherers. Working in the NTFP value chain thus entails streamlining the marketing process and also the payment process. The produce has good demand, but in the absence of awareness on the part of gatherers of the value, they cannot realize such value in practice. With state forest departments involved with regulatory powers involving gathering and moving usufructs from forests, uncertainty clouds the functionality of the value chain.

TRIFED (Tribal Cooperative Development Marketing Federation of India Limited) is one organization at the national level that markets NTFP. It has a development programme for NTFPs. However, its scope is limited to marketing, excluding production and procurement at the primary level. TRIFED has good outreach both in

the domestic and export markets. In a number of states either a state government corporation or a public sector organization undertakes marketing of NTFP. In some others, rights over produce collection and marketing have been given to the village panchayats.

### Value Chain investments in NTFP

The production base and productivity in NTFP are not controllable variables, unlike for other crops. Even if efforts are made to improve availability of some NTFP, collection is entirely at the discretion of the forest department. Value chain investments should thus factor in the uncertainties in supply. Typically, post-harvest handling and processing are done by small units or as a small part of more organized players.

Table 31: Key Players and Government Priorities

Players	Government initiatives
Production: Harvesting and tapping only	
Post –harvest – Procurers Tribal Cooperative Marketing Dvelopment Federation of India (TRIFED), State Minor Forest Produce Cooperative Federation – Chhatisgarh and Madhya Pradesh, Odisha Forest Development Corporation, Maharashtra State Cooperative Tribal Development Corporation, Rajasthan Tribal Area cooperative federation	At times minimum prices announced for specific crops in some states
Research and training: TRIFED, Regional Centre for Development Cooperation, Bhubaneshwar	Indian Council of Forestry Research and Education; – Forest Research Institute, Dehradun and seven other institutes; Kerala Forest Research Institute
Industry Association: Shellac and Forest Products Export Promotion Council (SHEFEXIL)	

Table 32: Investment Opportunities

Segment	Nature of investment opportunity
Production	Very limited
Post - harvest	Standardisation, sorting, grading, (Honey, eri and tassar silk, gums, lac) – Small scale widely distributed units
High-end value addition	Essential oils, perfumes, etc. Small volumes and widely distributed
Bye-product value addition	Very limited scope
Focus States	Madhya Pradesh, Chhatisgarh, Odisha

Specific products such as gum, honey or lac might offer space for investments for aggregation, processing marketing. However, volumes and value are likely to be too low to sustain the interest of most investors.

# SAFIN partners’ interests in India in the context of the five reviewed value chains

Of the many SAFIN partners, a few have direct presence in India. IFAD, Rabobank, IFC, USAID, CGAP, WFP, ILO, Oikocredit, Olam International, Technoserve, Palladium, AFC, APRACA, ADFIAP, Mastercard Foundation, and Yes Bank are some of these partners. These fall into four categories – 1) those who have active financing interest; 2) those who engage in policy and advocacy; 3) those who implement projects and build capacities; and 4) networks. A future Investment Prospectus for one of the value chains assessed in this scoping study can be of most direct use to those with an active financing interest - such as Rabobank, Oikocredit, IFAD, IFC, Yes Bank – and indirectly useful to networks such as ADFIAP and APRACA. A prospectus can also be used for advocacy and to design projects by institutions such as FAO, ILO, USAID, WFP, CGAP, or Mastercard Foundation. Institutions such as Olam International, Technoserve and Palladium might have business interests arising from the prospectus. The following table contains the interest expressed by some of the partners in relation to the subject of this scoping study.

Table 33: SAFIN Partners’ expressed area of interest

Name of partner	Nature of interest
IFAD	NTFP, Spices
Palladium	Spices (Turmeric, Ginger)- but also interested in working on other value chains including millets/maize.
Rabobank	They finance most value chains and have a guarantee facility for agro-forestry and also for credit to FPOs and agri-enterprises
Oikocredit	Being a financier, might be interested in any viable value chain
Yesbank	Being a financier, might be interested in any viable value chain
Technoserve	As a technical service provider, might be interested on any chosen value chain subject to confirmation
For the following partners, their business profile suggests a possible interest in the following:	
ITC	Spices and essential oils

## Feedback from validation workshop

A validation workshop was held on 13 December 2019 on an earlier draft of this scoping report, which brought valuable feedback. While the macro situation and investment opportunities were judged as having been articulated comprehensively in the draft, participants flagged the need for identification of specific gaps and investment opportunities and of ways to fill the gaps for specific crops and in specific geographies. Crop specific issues and opportunities have to be superimposed on geographic advantages and enabling conditions to come up with an actionable plan for facilitating investments and financial solutions. Partners also reconfirmed the need to frame the analysis around the criteria governing the Investment Prospectus process – notably development impact potential associated from improved access to finance for agri-SMEs in a given value chain (where impact can be via improved incomes for small farmers, supporting crops in marginalized geographies, impact on nutrition) as well as clear government support to transformative investments in a given value chain. Many participants underlined the need to work with state Governments and bringing them on board in developing a prospectus. A recommendation came to make Farmer Producer

Organisations the focal point of value chain investments to be articulated in the prospectus, given their capacity to serve farmer members and their role as aggregators. In this regard, it was noted that FPOs need funds in the form of quasi-equity and loans for both investments and working capital. Another key point made was the importance of millets to India in the context of climate change resilience and for nutrition.

In terms of geographical focus for a prospectus, participants agreed that while the Indian North East is rich in both NTFP and spices, investments in these sectors and this region are likely to be more difficult compared with other states or crops, as well as involving significant logistic costs. The fact that NTFP does not have a production base in which investments can flow to boost productivity and the impact of state control and current forms of collection of products on market transparency for these products were also recalled. In conclusion, partners tentatively converged around millets as the value chain most likely to deliver against the criteria for selection for a prospectus, and around Rajasthan (with the largest acreage for these crops) and Madhya Pradesh (with the highest productivity) as most likely focus states.

# Conclusion

There are significant investment opportunities that arise from both demand and supply side factors in the studied value chains, both in production and in post-harvest activities, including high-end processing. Yield gaps and the possibility of improving profitability through investments in seeds and quality inputs, productivity enhancing equipment and irrigation systems are one first area of possible focus. Another arises from rising consumer demand and changing food habits, requiring value addition to make crops ready for consumption.

Food safety concerns, growing preference for processed food, and rising demand in edible oil, pulses and in some coarse cereals offer scope for profitable investments in optimizing the existing production base as well as improving processing capacities. While production level investments should be routed through aggregators of some kind (including financial institutions and Farmer Producer Organisations (FPOs)), post-harvest investments are possible in agri-enterprises in different forms including FPOs.

Different types of financing and a variety of instruments are feasible. The market can absorb equity, quasi equity, short term and long term loans, trade instruments such as letters of credit, guarantees and insurance products. Government policy is supportive of both improved productivity efforts and enhancing quality processing capacity, as evidenced by different programmes and budget allocations. A number of public sector institutions in research and technical advisory, private industry bodies that look after sector interests and mechanisms for financing and procurement are in place, which can facilitate new investments.

Farmer Producer Organisations offer the best scope for routing investments in both production and post-harvest stages. While more than 7500 companies have been formed in recent times, there are also agricultural cooperatives that aggregate demand from farmers for both inputs and outputs. The Government of India and several State Governments have programmes for the development and strengthening of FPOs. Apart from providing equity grants to such organisations, State Governments are providing the different licenses to market agricultural inputs as also market produce on preferential terms. Some banks and financial institutions have already provided loans to some FPCs and this trend is likely to become strong. In the chosen geography and value chain, opportunities of working with FPOs should be identified and integrated.

# Annexes

## Annex 1 – Financing different parts of the value chain

	Aggregator financing	Input supplier financing	Marketing Company Financing	Lead Firm financing	Warehouse receipt financing
<b>Actors</b>	Producer (borrower) Aggregator(lender)	Producer (borrower) Input supplier (lender)	Producer (borrower) Marketing company (lender)	Producer (borrower) Lead firm(lender, processor aggregator,) -Value chain enablers – technology and extension service providers	Producer (borrower) Banks, formal and informal financiers(lender) Warehouses (receipt issuers)
<b>Financing Mechanism</b>	Advance against purchase of produce	Advances in the form of input supplies- repayable with produce or cash	Advances against purchase of produce	Advances, input supplies and services against buy-back of produce	Loans against stored produce in certified warehouse
<b>Inter relationship</b>	Trust based	Trust based	Formal contract	Buyback agreement	Warehouse receipt based
<b>Risk Mitigation</b>	Loan based on aggregators knowledge of market, production capacity and risk appetite	Based on long-time relationship	Contract terms and legal remedies	Buy-back agreement terms, regular monitoring and legal remedies	Collateral of produce in warehouse
<b>Costs</b>	Aggregator gets produce at a lower price than market	Nominal interest on loan	Purchase price fixed in advance – can have +ve and –ve results	Purchase price fixed in advance	Warehousing (storage) costs and costs of lending
<b>Benefits</b>	Easy loan process, assured market for produce	Inputs given in kind, limiting misapplication of loan	Assured buyers for produce	Assured buyers for produce; value added services	Reduce post-harvest losses, possible higher price on account of storage
<b>Disadvantages</b>	Seasonal short term loans, limited bargaining power for producers	Limited financing meets only crop loan needs – not other lifecycle needs	, limited bargaining power for producers	, limited bargaining power for producers; small producers may not be able to enter such agreements	Moral hazard – collusion between producer and warehouse

## Annex 2: Comparison of the value chains

Features of the valuechain	NTFP	Spices	Coarse cereals	Oilseeds	Pulses
Acreage (mn ha 2018)	na	3.9	22.0	25.5	29.0
Number of people (mn) engaged in production/tapping	89 Mostly women	~10	48	50	30
Proportion of small-holders	100%	~75 to 85%	~80 to 90	~75 to 80	~75 to 85
Is production area rain-dependent	To some extent	Varying conditions	82% area rain fed	80% area rain fed	72% area rain fed
Production (Million tons 2018)	NA	8.12	42.6	32.3	24.02
Number of major crops/species	7 (\$ 30 mn min market value)	12 (Spice Board classification)	5	5	5
Number of states in which significant	6 (account for 70% of NTFP collected)	5 (55% of total country production)	3 (30% of national production)	3 (60% of national production)	3 (60% of national production)
Top three states in volume/value	Orissa, Jharkhand, Madhya Pradesh	Rajasthan, Andhra Pradesh, Gujarat	Rajasthan, Karnataka, Maharashtra	Madhya Pradesh, Rajasthan, Gujarat	Madhya Pradesh, Rajasthan, Maharashtra
Is there an organized market	Mostly unorganized in primary levels	Yes, but not price efficient for producers	Not well organized at primary level	Well organized – good link to processors	Well organised
Exports USD bn	NA	2.8	0.25	-	-
Imports USD bn	NA	-	-	10.5 (veg oils)	2.6
Is there processing before sale in bulk	Mostly none	yes	No	no	sometimes
Is there processing before sale in retail	Yes, In most products	yes	yes	yes	yes
Scope for secondary processing	High	Very high	Very high	high	high
Sources of finance at production stage	negligible	Banks	Banks - negligible	Banks – good access	Banks – good access
Sources of finance post-harvest	Low, that too for private sector players	Banks (credit and trade finance )	High as part of food processing industry	Banks – in case produce is warehoused	Banks
Adequacy of finance for the VC	low	inadequate – about 50% producers do not have access; also in post harvest stage.	Not adequate except in some crops, especially in post-harvest	Reasonable	Not adequate in production and primary processing
Specific law if any on the VC	Forestry Act, Forest rights Act	None - except some part of	No specific regulation –	Generic Food Processing	No-specific regulation

		spices coming as NTFP	Essential Commodities Act	regulation, exim trade regulation	
Ease of compliance with regulations,	Difficult	Easy	easy	Moderate	easy
Significance to food security	Income for gatherers forms 20 to 70%	Producer incomes define their food security	High significance – nutritional balance	High significance – strategic self-reliance	High significance strategic Self-reliance
Nutritional value	High in some products	In a few products such as Honey	High – part of govt's objective	moderate	High _ part of Govt's objective
Comparative advantage and competitiveness	Low cost of collection, competitiveness arising from very low prices paid to collectors	Comparative & competitive adv, on account of climate and nearness of consumer markets	No comparative /competitive advantage – high potential for yield and income improvement	Net imports – potential for improving yield and incomes – import substitution	Net imports – potential for improving yield and incomes – import substitution
Export competitiveness	Competitive in many products on account of limited supply	In several spices	No except select crops	No – except select oils and deoiled cakes	no
Opportunity for value addition – upgradation of industry	high	Very High – high end processing for exports -	High – processing and new consumer products	High – Processing, bye-product optimisation	High- Processing, bye-product optimisation
Significance to govt policy, strategy	Pradhan Mantri Van Dhan Yojana	Export earner – crop and region specific programmes	National Food Security Mission (NFSM) focus on nutrition	National Mission on Oilseeds and Oil Palm – NFSM	National Food security Mission Nutrition objective
Market Institutions in the value chain	TRIFED, APEDA	Spices Board, APEDA	APEDA, India Pulses and Grains Association	Solvent Extractors Association of India	India Pulses and Grains Association
Support institutions if any	National Afforestation and Eco-development board, Forest Research Institute	All India Spice Exporters Forum, Indian Institute of Spices Research	Indian Institute of Millets Research, Indian Institute of Maize research, Maize Technologists Association	Indian Oilseeds and Produce export promotion council; Indian Oilseeds Research Institute	Indian Society of Pulses Research and Development, Indian Institute of Pulses Research
Investment Interest from possible SAFIN partners	Palladium, Rabobank, USAID, ITC, Technoserve	Palladium, Rab bank, Oiko, ITC, Technoserve	Oiko, Rabo, IFC, IFAD, Palladium, Technoserve	Oiko, Rabo, IFC, IFAD, Palladium, Technoserve	Oiko, Rabo, IFC, IFAD, Palladium, Technoserve

### Annex 3 - Challenges and opportunities in key crops

Challenges	Opportunities
<p><b>Gram</b></p> <p>Rainfed and cultivated in marginal lands; production uncertainties arising from climate variations; Alternatives such as cotton more profitable; lack of processing facilities near production areas hamper remunerative marketing; low level of processing for value addition; wide varietal differences rendering aggregation difficult.</p>	<p>Significant yield improvement potential, continuous growth in demand and price realised over last few years, value addition possibility for farmers from sorting, grading to flour, snack foods and animal feed from husk, government priority from import substitution point of view, entry of private sector easier, good prospect for Farmer Organisations to take up processing and value addition. Price hedging possible through commodity exchange.</p>
<p><b>Mustard/rapeseed</b></p> <p>Oil demand is more from east and north of India; Production volatility arising from climate variations; Food safety concerns arising from inorganic inputs in some major states</p>	<p>Scope for yield improvement, area expansion in non-traditional states, Possibility of value addition, High demand for cold pressed oil, especially from urban areas, technology availability for oil extraction.</p>
<p><b>Chilli</b></p> <p>Competition from other crops can limit area expansion, rain-fed nature, susceptible to insect attacks and significant insecticide use. No support price from government, not traded in commodity exchanges (price hedging not possible presently)</p>	<p>Scope for yield improvement, which can drive increased acreage, high value processing in to Oleoresins with an export market, a good domestic market and export demand. Long term storage possible in cold stores, enabling raw material stocking for round the year processing. Small scale processing in FPOs</p>
<p><b>Maize</b></p> <p>Not seen as a commercial crop, mostly grown in rainfed condition in many states, low yields (except Tamil Nadu) on account of traditional variety of seeds and cultivation practices</p>	<p>High yield potential in many states, utilised for human food, animal feed and industrial raw material, high value product derivatives – such as glucose, alcohol, scope for investments in processing, export demand for products and domestic demand especially for animal feed.</p>

#### Annex 4 - Some key players in financial sector and sector infrastructure

Name of institutions	Role	Ownership
Securities and Exchange Board of India	Stock and commodities market regulation	Autonomous, statute based - public sector
Insurance Regulation and Development Authority of India	Insurance regulator	Autonomous, statute based - public sector
CIBIL, CRIF Highmark, , Equifax, Experian	Credit information and Reference bureaus	Private sector – licensed by central bank
Deposit Insurance Corporation	Insuring retail deposits	Affiliate of the central bank
CRISIL, ICRA, CARE, India Ratings, SMERA	Credit rating agencies	Private sector, accredited by central bank
National Credit Guarantee Trust Company Limited -	Operating 'Credit Guarantee for Medium and Small Industry loans'	Public sector

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