PINEAPPLE VALUE CHAIN ANALYSIS AND MARKET ASSESSMENT FOR IMPHAL EAST DISTRICT, MANIPUR

Submitted to:

Mission for Integrated Development of Horticulture
MoA&FW, Govt. of India

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(A Govt of India organization under Ministry of Agriculture and Farmers welfare)
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PINEAPPLE VALUE CHAIN ANALYSIS AND MARKET ASSESSMENT FOR IMPHAL EAST DISTRICT, MANIPUR

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1 Introduction

1.1 Manipur State – At a Glance

Manipur is a land-locked state situated in the North Eastern Region of India. It is encircled by 9 hill ranges in all sides and has a small valley in the center (the capital Imphal is located in this valley). The State has 352 km long international border with Myanmar to the south-east and 502 km long border with the adjacent states of Nagaland on the North, Cachar District of Assam on the West and Chin Hills (Myanmar) and Mizoram on the South and the South-west and Surma Tract and upper Chindwin of Myanmar on the East. Manipur earlier had 9 districts. However, post reorganization of the state, now it has 16 administrative districts.

Figure 1: Administrative Map of Manipur

Manipur has a geographical area of 22,327 sq.kms, which constitutes 0.7 % of the total land surface of India. About 90% of the total geographical area of the state i.e. 20,089 sq. km is covered by hills, the remaining area is a small valley covering only about 2,238 sq. km and accounts for only 10% of the total area of the state.

The Gross State Domestic Product (GSDP) of Manipur for 2016-17 at current prices is estimated to be about Rs. 22,028 crores as against Rs. 19,889 crores for the year 2015-16 registering an increase of about 10.75%. At constant prices, GSDP in 2016-17 is estimated at about Rs. 16,812 crores as against Rs. 15,868 crores in the previous year showing an increase of 5.95 %. The average annual exponential growth rates between 2011-12 and 2016-17 are worked out to be 10.68 % and 5.27 % for current and constant prices respectively.

1.1.1 Demographic Profile of the State

The population of Manipur as per 2011 census was 28.56 lakhs comprising of 14.39 lakhs males and 14.17 lakhs females. Population of Manipur constitutes nearly 0.24 % of the total population of India. The density of population of Manipur as per 2011 census was 128 persons per sq.km as against 103 persons per sq. km. in 2001 census. The sex ratio for the state as a whole has improved from 974 females per 1000 males in 2001 to 985 females per 1000 males in 2011 which is higher than the national average of 940 females per 1000 males.

1Source: Economic Survey of Manipur 2016-17
1.1.2 General Infrastructure Availability

Availability of adequate and efficient general infrastructure (including railways, roadways, ports, aviation, power, telecommunication, etc.) also plays a major role in the overall development of the State. It is particularly important for development of agricultural sector in the State. Better connectivity can reduce the hassles in the evacuation mechanism of crops and can also usher in adequate post harvest and processing infrastructure to the state. In the context of Manipur, road connectivity and electricity are the two most critical general infrastructures for the agriculture sector.

**Transport and Communication** is the basic infrastructure needed for generation of economic activity and for bringing about prosperity and well-being in the state. A well developed transport and communication system plays a vital role in ensuring sustained economic growth. Manipur is served basically by two means of transport viz., roads and airways. The existing facilities of transport and communication in the state are not adequate which continued to be a major constraint in the development process of the state.

The main artery of road connectivity for the state is the National High-way No.39 connecting Imphal with Dimapur in the neighboring state of Nagaland. It runs through Mao in the extreme north of Manipur to the International border town of Moreh in the south-east. Dimapur is the railhead for road traffic to the state and in fact, this road has been the life line for the state. If this road is blocked/unoperational, then the entire valley is affected. High dependence on this road has hampered the linkage with distant market places and have hindered the value chain development in the state.

**Electricity** plays a key role in the industrial, agricultural and commercial sectors of the economy and is also the most crucial source of supplying domestic energy requirements. The power supply in Manipur depends on the share of power allocated from the Central sector plants. The economic survey 2016-17 states that the installed capacity in 2015-16 was 2.211 MW and the total quantity generated was 366.6 MKWH. It may be noted that the state has only hydel power generation capacity. Total power requirement in the state during 2015-16 was 301 MW out of which the state (from various sources) could meet only 167.19 MW resulting in a power deficit of 133.81 MW. Almost all the plants present in the state are hydro-electric plants and thus the power supply fluctuates on seasonal basis. As per state economic survey, sometimes, the availability of the power from these plants was so poor that even the demand of vital installations like hospital, radio station, Doordarshan Kendra and other telecommunication stations could not be met. The economic survey further states that, the shortage of power is the major cause for the slow development in the state. Electric energy in the state continues to be insufficient.

During the field study this was sighted as one of the major reasons behind the state not having a cold storage facility as on date. However, the farmers suggested that electricity for domestic users is now available for majority of the day.

1.2 Agro-climatic Conditions

Manipur is classified under AZ51 (sub-tropical plain) from the perspective of agricultural planning. The soil cover can be divided into two broad types, viz. the red ferruginous soil in the hill area and the alluvium in the valley. The soil generally contains small rock fragments and are of sand and sandy clay varieties. The top soil on the steep slopes are very thin. In the plain areas, the soil is of considerable thickness. Soil on the steep hill slopes is subjected to high erosion resulting into formation of sheets and gullies and barren rock slopes. The normal pH value ranges from 5.4 to 6.8. The climate of the state is salubrious with approximate average annual rainfall varying from 933 mm at Imphal to 2593 mm at Tamenglong. The temperature ranges from sub-zero to 36ºC.
Around 64% of the state is covered by natural vegetation. The vegetation of Manipur consists of a variety of plant life that ranges from Short and Tall grasses, Bamboos and Reeds to a variety of trees. The forest area of Manipur state is broadly classified into 4 types they are:

- Tropical Semi-Evergreen Forests
- Dry Temperate Forests
- Sub-Tropical Pines
- Tropical Moist Deciduous

Many of the hills in the state (especially the upper reaches) are under forest cover of deciduous trees while mixed forest species comprising wild bananas, bamboos etc. occur in the lower steep hills. Jhum cultivation is practiced in medium hill ranges with convenient slopes in normal cycles of 5-10 years. Maize, sesame, potato, ginger, tapioca and vegetables are grown under the shifting cultivation system. Horticultural crops like orange, pineapple, lemon, etc. are also terraced on hill slopes and used for permanent cultivation. Scars of Jhum fields with secondary growth of vegetation commonly occurs in the hills. Valley areas are generally used for intensive and permanent agriculture.

1.3 Agriculture Sector Overview

Agriculture sector has a vital place in the economy of the state. The agriculture and allied sector contributes about 22.13% to the state GDP at current price. About 52.81 % of the workers in Manipur are engaged as cultivators and agricultural laborers. However, the performance of agriculture in the state mainly depends on timely rainfall and weather conditions. Permanent cultivation is generally practiced in the valley districts while terrace cultivation is practiced in some pockets of the hills where “jhum” or shifting cultivation is widely adopted. Rice is the staple food and is grown in both hill and plain areas and it accounted for about 98 % of the total foodgrain production of the State. The production of rice in 2015-16 was estimated at about 4.33 lakh tonnes which is less than the preceding year’s rice output of 4.82 lakh tonnes. In case of maize, production in 2015-16 was estimated to be about 10.7 thousand tonnes as against 11.32 thousand tonnes in the preceding year.

Land utilization statistics for Manipur are not available. The plains of Manipur occupy about 2,238 sq. km which accounts for about 10 percent of the total geographical area. Accurate information regarding the land utilization of the entire state is difficult to gather since land records are available only for the valley areas were cadastral surveys have been conducted and for some small pockets in the hills, where no complete and regular land utilization survey have been undertaken by the authorities, such as Agriculture/Horticulture/Settlement and Land Records/Revenue Departments. As per the reported area, the land utilization is as follows:

- Net sown area (000 hect): 26.39
- Area sown more than once (000 hect): 24.24
- Total cropped area (000 hect): 50.63

Paddy is the major agricultural crop of the state and accounts for 98% of the food crop production.

The major fruits grown in the state are pineapple, orange, lemon, banana, guava, peaches etc. Nowadays apple is grown in some of the hills in the state. The average annual production of fruits and vegetables during the year 2016-17 was 4.78 lakh MT and 3.65 lakh MT respectively.

Table 1: Area and Production Horticultural Crops in Manipur (in ‘000 ha, ‘000 MT)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Area (000 ha)</th>
<th>Production (000 MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>26.39</td>
<td>4.78</td>
</tr>
<tr>
<td>Maize</td>
<td>24.24</td>
<td>3.65</td>
</tr>
</tbody>
</table>

2Source: Economic Survey 2016-17
### Area and Production of Different Fruit Crops in the State

<table>
<thead>
<tr>
<th>Crop</th>
<th>2011-12</th>
<th>2012-13</th>
<th>2013-14</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>49.5</td>
<td>405.9</td>
<td>51.9</td>
<td>440.6</td>
<td>54.1</td>
</tr>
<tr>
<td>Vegetable</td>
<td>20.8</td>
<td>200.3</td>
<td>21.7</td>
<td>219.8</td>
<td>25.2</td>
</tr>
<tr>
<td>Spices</td>
<td>10.5</td>
<td>24.1</td>
<td>10.5</td>
<td>24.1</td>
<td>10.5</td>
</tr>
<tr>
<td>Grand Total</td>
<td>80.8</td>
<td>630.3</td>
<td>84.1</td>
<td>684.5</td>
<td>89.8</td>
</tr>
</tbody>
</table>

Source: National Horticulture Board and State Horticulture Dept.

The area and production of different fruit crops in the state is pictorially depicted below. As can be seen in the graphs, pineapple has the highest area and production in the state among fruit crops.

*Figure 2: Share of pineapple area (In Hect.)*

![Pineapple Area Graph](image1)

As can be seen from the above figures, pineapple accounts for almost 25% of the total area under fruits.

*Figure 3: Share of pineapple production (In MT)*

![Pineapple Production Graph](image2)

Source: Horticulture Dept. Manipur

Pineapple has the highest production in the state among fruits, followed by banana, lime, passion fruit and mandarin orange.

### 1.4 Pineapple Production in Manipur

Manipur ranks 6th in production of pineapple, after West Bengal, Assam, Tripura, Karnataka and Nagaland. During 2013-14 the total area and production of pineapples in State was estimated at about 13,700 ha and about 136,310 MT respectively. However, its productivity is one of lowest in India and was 9.9MT/Hect during 2013-14. While low productivity can be attributed majorly to the variety that is being grown in the state, lack of appropriate cultivation practice also contributes towards lower productivity.
Table 2: State-wise Area and Production of pineapple in India in major Eastern/NE States of India (in ‘000 ha, ‘000 MT)

<table>
<thead>
<tr>
<th>State/ UT Name</th>
<th>West Bengal</th>
<th>Assam</th>
<th>Tripura</th>
<th>Manipur</th>
<th>Nagaland</th>
<th>All India</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area (‘000ha)</td>
<td>10.1</td>
<td>14.8</td>
<td>11.6</td>
<td>12.6</td>
<td>8.9</td>
<td>102.4</td>
</tr>
<tr>
<td>Production (‘000 MT)</td>
<td>309.9</td>
<td>231.4</td>
<td>153.7</td>
<td>116.6</td>
<td>100.6</td>
<td>1500.0</td>
</tr>
<tr>
<td>Productivity (MT/ha)</td>
<td>30.7</td>
<td>15.6</td>
<td>13.3</td>
<td>9.3</td>
<td>11.3</td>
<td>14.7</td>
</tr>
<tr>
<td>2012-13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area (‘000ha)</td>
<td>10.50</td>
<td>16.24</td>
<td>11.84</td>
<td>13.06</td>
<td>9.00</td>
<td>105.2</td>
</tr>
<tr>
<td>Production (‘000 MT)</td>
<td>310.00</td>
<td>268.82</td>
<td>165.01</td>
<td>124.14</td>
<td>85.00</td>
<td>1570.6</td>
</tr>
<tr>
<td>Productivity (MT/ha)</td>
<td>29.5</td>
<td>16.6</td>
<td>13.9</td>
<td>9.5</td>
<td>9.4</td>
<td>14.9</td>
</tr>
<tr>
<td>2013-14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area (‘000ha)</td>
<td>10.70</td>
<td>16.54</td>
<td>11.59</td>
<td>13.70</td>
<td>9.50</td>
<td>109.88</td>
</tr>
<tr>
<td>Production (‘000 MT)</td>
<td>316.00</td>
<td>288.60</td>
<td>162.26</td>
<td>136.31</td>
<td>142.50</td>
<td>1736.74</td>
</tr>
<tr>
<td>Productivity (MT/ha)</td>
<td>29.5</td>
<td>17.4</td>
<td>14.0</td>
<td>9.9</td>
<td>15.0</td>
<td>15.8</td>
</tr>
</tbody>
</table>

Source: National Horticulture Board

Despite of the availability of conducive agro-climatic conditions, the production of pineapple in Manipur has not attained higher proportions mainly because of un-remunerative market for the produce.

1.4.1 District-wise Area and Production of Pineapple in Manipur

Pineapple is cultivated in almost all the districts of the state with various levels of production. Imphal East and West Districts, Churachandpur, Senapati and Thoubal are the prominent pineapple producing districts with higher productions. However, considering the remoteness of other districts, Imphal East and West and Thoubal districts have emerged as the major pineapple trading centres. Senapati district reports the highest area and production of pineapple in the state contributing about 30% of the State production and area under pineapple cultivation. In 2016-17, apple production in the Uttarkashi district was recorded as 38.2 thousand MT from an area of about 3.7 thousand hectare.

Figure 4. District-wise Area and Production of Pineapple in Manipur, 2016-17

Source: State Department of Horticulture, Government of Manipur
The focus districts of East Imphal and West Imphal reported a pineapple production of 15.6 thousand MT and 10 thousand respectively in 2016-17. It was learnt during the field surveys that in terms of trade Imphal East and West Districts and Thoubal are the major contributors.
2 Approach & Methodology

2.1 Study Area

Pineapple producing areas of Imphal East district are mostly located in hill slopes. These regions are mostly located in remote villages without having proper connectivity. Moreover, most of the villages are sparsely populated and thus the overall farmer number (in absolute terms) is quite low. This also results in low scale of production which sometimes are not at a level to initiate in value chain activities. In view of these it was important to find a location which has some sizeable number of growers and have some scale of production to initiate certain value chain development activities. In view of these and as suggested by Dept. of Horticulture Kairo Bitra tehsil was selected which contributes almost 40% of the total pineapple production. It may be noted that in Manipur block/tehsil wise production details are not available. So the selection was done solely on the basis of discussion with various stakeholders.

![Map of Imphal East District](image)

2.2 Sampling Methods

The stakeholder sample selected for the interview and discussion included pineapple grower, aggregators, processors and local retailers. Discussion and consultations were also carried out with State and district level officials of various departments including horticulture, industry, etc. to understand the overall scenario and seek suggestions. The sample of pineapple growers for fieldsurvey were identified and mobilized with assistance of State Mission Management office, MIDH and AHO, Imphal East. Group discussion were conducted with the farmers using structured questionnaire to collect information on value chain activities undertaken by the farmers, package of production practices, cost of cultivation, value addition at farm level, marketing of produce and associated costs, access to services for procurement of inputs, technical guidance, transport, market information and infrastructure access, constraints in production and marketing etc. Information was gathered from 55 individual farmers on their socio economic aspects including land holding, income; pineapple cultivation practices, issues, etc. Discussions were also carried out with other value chain players such as traders in local markets, aggregators, etc. Secondary data and information was...
3 Primary Survey: Result & Discussion

Pineapple is one of the most important horticultural crop in the district. Based on the field survey it is assessed that a sizable number of farmers are associated with pineapple cultivation in the District. The production clusters of pineapple are spread along the hill slopes of the district with almost all the tehsils contributing towards pineapple production. The studied cluster produces approximately 6000 MT of pineapple (40% of the district production) worth approximately Rs. 6 crore. Despite the sizable area and share in overall farmer income, the average farm productivity and returns to pineapple growers remains low. This may be attributed to multiple factors such as:

- Small and marginal landholdings. Thus, low volumes of individual marketable surplus.
- Low density plantation
- Absence of nutrition management leading to low productivity
- Limited of know-how among farmers on emerging best practices for production. Lack of exposure visits and in-depth trainings of farmers
- Lack of technical advisory services due to manpower constraint
- Inadequate labour force during cultural practices hampering growth of the fruit leading to low productivity
- Difficulty in evacuating produce from the hilly slopes due to lack of appropriate infrastructure leading to loss of the produce at the field itself
- Lack of farm proximate post-harvest infrastructure leading to no primary processing in the form of sorting, grading or even appropriate packing.
- Poor road infrastructure (especially in the production areas) and lack of adequate transport vehicle to transport the produce to markets
- Lack of appropriate marketing infrastructure (in terms of display, storage of surplus produce, ripening) to sell the produce
- Absence of farmer producer groups/companies/cooperative structures. Thus, integration into value chain and benefits of negotiation not availed by the farmers
- Absence of branding and promotion of pineapples grown in the State. There may be a potential of branding the organic nature of the produce

Integrated development of pineapple value chain in the State is important for socio-economic growth of the associated farming community as well as future sustainability of pineapple cultivation in these regions. There is also scope for development and promotion of secondary processing of pineapple that would create higher value for the produce and improve realization at the farm level, promote investments in agribusiness in the region, foster backward and forward linkages. For planning and implementation of sustained interventions along the value chain, it is important to understand the key characteristics of the targeted farmer group, their participation along the value chain, inter-linkages between various stakeholders, marketing channels and constraints. The results and discussion of the primary survey is detailed in the following section.

3.1 Pineapple Production in Imphal East District

The agro-climatic condition of Imphal East district allows favourable cultivation of various horticultural crops. Pineapple is one of the main fruit crop grown in abundance in the district especially in the hilly
slopes. Out of the 2977 hect.of area under fruit cultivation, pineapple is reported to be grown in 1254 hect accounting for about 42.12% of the total fruit area. Similarly of the total fruit production of 37525 MTs in the district, pineapple accounts for 15630 MTs (about 41.65%). Banana, Passion fruit are the other major fruit crops grown in the district.

It was understood during the field survey that State Horticulture Department is continuously encouraging farmers to bring more area under pineapple cultivation. As a result the production has also increased over the years. However, in the absence of appropriate market, the Department has also not been able to aggressively promote increase in area under pineapple.

On the other hand, the State Industries Department is also trying to develop pineapple processing (primary as well as secondary) as a cluster for promoting livelihood activity. While its current focus is Imphal West District, under this initiative the Department is also trying to bring in more area under pineapple.

Pineapple is cultivated across all the tehsils of the district. Kairao and Langtha are the major producing sub-clusters in the district. Kairao contributes approximately 40% of the production in the district.

### 3.2 Socio-Economic Profile of Respondent Farmers in the Study Area

During the primary survey, interactions and interviews with 55 farmers were held. It may be noted that in Manipur, there is a high participation of women in the work force. The same was also observed in the studied area. About 32 among the respondents were females who are actively participating in cultivation of pineapple. During the market visits it was observed that almost all the retailers were women. However, it was learnt that the women do not have land ownership. The respondents were mostly middle aged men/women. All of them have adopted cultivation as a traditional profession.

#### 3.2.1 Land Holding Size

The average landholding size of pineapple growers in the study area is estimated to be about 0.82 ha. Of the surveyed farmers, 63% were reportedly marginal farmers (less than 1 ha); and remaining 37% were found to be small (1-2 ha). None of the farmers have reported to have more than 2 Ha of land. Discussions during the survey revealed that small landholding is mostly due to the difficult terrain in the study area. The average landholding of the respondents is little less than the average size of land holding in Manipur and East Imphal district where the average landholding is about 1.14 ha and 1.04 ha respectively.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Category</th>
<th>Operated Area</th>
<th>% of Farmers from Sample</th>
<th>As per overall State Statistics&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Marginal</td>
<td>Less than 1 ha.</td>
<td>63%</td>
<td>50.91%</td>
</tr>
<tr>
<td>2</td>
<td>Small</td>
<td>1 - 2 ha.</td>
<td>37%</td>
<td>32.45%</td>
</tr>
<tr>
<td>3</td>
<td>Semi-medium &amp; medium</td>
<td>2 - 4 ha.</td>
<td>-</td>
<td>16.55%</td>
</tr>
<tr>
<td>5</td>
<td>Large</td>
<td>More than 10 ha.</td>
<td>-</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

<sup>3</sup>Source: Statistical handbook Manipur 2016-17  
<sup>4</sup>Source: Economic Survey of Manipur 2016-17
Given the dominance of small and marginal farmers, their smaller outputs, fragmented landholdings and often-distant location from markets along with lack of evacuation facilities deprive the farmers to access markets. The situation becomes more critical when one considers the fact that there is almost no post harvest infrastructure such as storage/sorting and grading facility in the cluster. There is not a single operational cold store in the state. Small scale of operations further reduce the bargaining power of farmers adversely affecting the overall economic return.

3.2.2 Education Status

The literacy rate in Manipur has gone up from 11% in 1951 to 76.94% in 2011. In the state, the rate of male literacy was as high as 83.58% while rate of the female literacy stood at 70.26% in 2011. Out of the total literates, the percentages of male and female are 54.49% and 45.51%. Among the districts, Imphal West has the highest number of literates followed by Imphal East and Thoubal while Tamenglong recorded the least. The highest number of illiterate is recorded in Senapati (2,14,671) followed by Thoubal (1,52,844) and Imphal East (1,31,499) and the lowest in Chandel (53,880) District.

It may be noted that none of the respondent farmers reported an education above standard X. Majority of the respondents have passed class VIII. However, it was also observed that there was no illiterate farmer among the respondents.

Table 5: Education Status

<table>
<thead>
<tr>
<th>HIGHEST QUALIFICATION</th>
<th>PRIMARY SCHOOL</th>
<th>JUNIOR HIGH SCHOOL (UP TO CLASS X)</th>
<th>SENIOR HIGH SCHOOL</th>
<th>GRADUATE</th>
<th>POST GRADUATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>% OF FARMERS</td>
<td>9%</td>
<td>91%</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Some of the respondents also reported to have undergone training on pineapple cultivation. However, they suggested that the training was more appropriate for cultivation in plain lands and not on slopes. Some of the female farmers also reported to have undergone short term training on pineapple processing.

Moreover, it was understood that while the farmers are not much educated they are receptive to new ideas and technologies.

3.2.3 Annual Income

The farmers in Imphal East are predominantly dependent on agriculture and government jobs for their livelihood. In the surveyed region dependence on agriculture was found to be higher. Median income reported from pineapple cultivation was reported to be around Rs. 30-35000 per acre

Table 6: Income Status of Surveyed Farmers

<table>
<thead>
<tr>
<th>Annual Income</th>
<th>1-2 Lakhs</th>
<th>2-3 lakhs</th>
<th>3-5 lakhs</th>
<th>More than 5 lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Farmers</td>
<td>69%</td>
<td>31%</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Majority of sampled farmers in the study region fall under the income scale of Rs. 1-2 lakhs. Others farmers reported to have an income up to Rs. 3 lakhs. None of the farmers reported income in excess of Rs. 3 lakhs.
3.3 Varieties Grown & Seasonality of Production

3.3.1 Varieties Grown

Two major varieties of pineapple are grown in the district, which are queen and kew. The predominant variety is queen. While fruits of queen variety are smaller in size, they have better aroma and flavour. Fruits are golden yellow in colour and have spines. Average weight of the fruits is approximately 600 gms. The harvesting season of queen starts from end of May/beginning of June and can go up to the end of August. Kew variety is generally bigger in size and can weigh up to 1.5 Kg. They do not have spines and are used mostly for processing purpose. It was observed that queen variety contributes for about 90% of the pineapple production in the cluster.

3.3.2 Seasonality of Production

The month of July and August are the peak months of pineapple supply in the market which sometimes extended up to early September. Harvesting starts from May and the lean months are May and June. The supply of pineapple in Manipur peaks in July and August. Comparison with seasonality of pineapple of some other North Eastern states reveal that pineapple harvesting starts early in Manipur and continues after the season has ended in other states such as Tripura and Meghalaya.

As can be seen from the above table Manipur has the distinct advantage over other North-eastern states such as Tripura and Meghalaya due of its long harvesting season. However, at present due to lack of appropriate market linkages, this is leading to a glut in the local market which in turn is resulting in distress sell by many farmers in Manipur.

3.4 Analysis of Pineapple Value Chain

3.4.1 Structural Analysis

In general, the pineapple value chain in the district begins with farmer producers (who produces, harvest, pack, load and transport the produce to the road side markets). From thereon the produce flows to aggregators/traders (who procure and trade pineapple in fresh form) and to the cottage/small processors (who procure the fresh pineapple stock either directly from producer or through traders). The processors process the product to develop products such as squashes, jams and RTE/RTS products (juices/candies).

Figure 6. Structure of the Value Chain of Pineapple in Imphal East District
3.4.2 Functional Analysis

The role played by various members of the value chain is as follows:

- **Grower**: The pineapple growers undertake cultivation throughout the year. The main operation carried out by the farmers includes land preparation, sourcing and planting of planting material (for development of new fields/ replacement of suckers), nutrient application in form of manure/fertilizers, weeding, harvesting and post harvest management including evacuation from the hilly slopes, and packing. No farmers/ growers association was observed during the field surveys.

- **Aggregator/Trader**: Considering the small quantum of produce at individual level the aggregator/trader plays a key role in ensuring the product reaching the semi-urban/urban markets in and around the cluster. The aggregator collects the produce from the individual farmers and takes up the responsibility of transporting the same. In rare occasions some sorting happens at the aggregator/trader level. Interactions with the traders and farmers revealed that there are both local traders and traders from outside markets such as Guwahati and Dimapur who procures pineapple from the farmers.

- **Processor**: There are about 7-8 cottage/small scale producers who have their processing facility in and around Imphal which is approximately 30 Km from the cluster. All these units (except Likla) are mostly cottage (micro)/small scale industries. The average crushing/pulping capacity of these units vary from 0.5 to 1 MT/day. These units, apart from pineapple, are also processing orange, passion fruit, bamboo shoot, etc. The product profile of such units include juices, jams, pickles, etc. It may be noted that State Government is planning to set up a medium scale processing unit at Nilakuthi Food Park, Imphal which is under construction.

Besides the above stakeholders, the State Directorate of Horticulture is responsible for providing extension services to the farmer including guidance on package of practice, supply and distribution of organic fertilizers and training on post harvest management.
Table 7: Functional analysis of value chain

<table>
<thead>
<tr>
<th>Activity</th>
<th>Agent</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Supply- Planting Material</td>
<td>Fellow farmers</td>
<td>Planting Material</td>
</tr>
<tr>
<td>Input Supply- Farm Yard Manure/ Organic Fertilizer</td>
<td>Fellow farmers Self-produced Department of Horticulture</td>
<td>Organic Fertilizer and farm yard manure</td>
</tr>
<tr>
<td>Training</td>
<td>Department of Horticulture</td>
<td>Training on pineapple cultivation practices</td>
</tr>
<tr>
<td>Production/ pineapple supply</td>
<td>Farmers</td>
<td>Fresh Pineapple</td>
</tr>
<tr>
<td>Secondary Processing (very low quantity)</td>
<td>Various cottage /small industries in Imphal</td>
<td>Squash, Jam, Juices, etc</td>
</tr>
<tr>
<td>Trading</td>
<td>Traders (within and outside the cluster) Retailers</td>
<td>Fresh pineapple</td>
</tr>
</tbody>
</table>

3.4.3 Commodity Flow Analysis

Based on the stakeholder interaction four major marketing channels have been identified to be operating in the study area. The selection of marketing channel by the farmer is dependent on factors as scale of production and ability and accessibility to market information by the farmers.

Figure 7. Commodity Flow
Farmer → Aggregator/Trader in local villages → Regional big trader/ vendors/ Wholesaler in distant markets → Retailer → Consumers

**Channel 2.**
Farmer → Consumers (in road side semi-urban/urban markets and Wholesale market of Imphal)

**Channel 3.**
Farmers → Aggregators → Processors

**Channel 4.**
Farmers → Processors

**Channel 1** is observed to the most prevalent channel, where farmer harvest and evacuate the produce till the nearest road point/village either on headloads or on bicycles. Generally no sorting and grading is done at this level. As at this point the quantum of produce is very small, the aggregator comes into picture. The aggregator collects the produce from several small farmers and packs it in gunny/PP bags and transport the produce using pick up vans to the nearest market place. It may be noted that the aggregator himself may be a farmer as well. The aggregator, at this point, buys the produce on a per piece basis and the price can be as low as Rs.3/piece (Rs.5/Kg assuming a fruit weighs approximately 600 grams). Transportation to the nearest market costs approximately Rs.50 or Rs.1/piece. It may further be noted that no sorting or grading happens at the end of aggregator. This channel accounts for almost 80% of the produce.

**Channel 2** is particularly true for those farmers who have pineapple fields alongside the road. For them it is easier to evacuate the daily harvest to a roadside hut and solicit customers who are using that state/national highway. It may be noted that here the unit of sale is normally a lot comprising of 5 or 6 pieces of pineapple. No sorting or grading happens here also and the produce is generally fully ripened unlike in channel 1 where partially ripened fruits are harvested. A lot is sold at a price as low as Rs.20 during peak season while the same can be up to Rs.100 during the lean period. Some farmers also bring the produce to main market of Imphal (typically post mid-night/early in the morning) sell the produce till the noon. Any unsold item is generally not carried back by the farmers and left to be wasted. The wastage sometimes can be up to 10-15% of the total produce. Direct selling by farmers accounts for about 15% of total production

**Channel 3** is an extension of channel 1 only where the aggregator sells the produce (normally low grade products) to the processor in bulk quantity. However, here the sales unit is typically on the basis of weight and not the number of fruits. In this case also the fruits are sold without any sorting or grading.

**Channel 4** was understood to be the preferred channel by the farmers, not because of higher value realization but due to easy hassle free sale and less time consuming transactions. However, the overall quantity going through this channel is very limited as the processing capacity in the state is limited and most of the processors are outside the cluster.

Both the channels together accounts for remaining 5% of the production.

3.4.4 Quantification of Physical Flow of Pineapple along different channels

Based on the commodity flow assessment, the district level physical flow of overall production may be quantified as represented below:

*Figure 8. Quantification of Physical Flow of Produce*
It is notable that despite significant production potential, there is minimal value addition in terms of primary as well as secondary processing of pineapple into other products. Moreover, due to lack of evacuation almost 20% of the produce is reported to be wasted. Thus, there is immediate requirement of strengthening the farm proximate evacuation and primary processing infrastructure. Subsequent to this vertical integration with processing units both within and outside the cluster may also be planned out.

3.4.5 Technical Analysis of Various Functions

Production

Most of the pineapple plantations are on slopes of the hills. Given the climatic condition including heavy rainfall and the gradient of the slope, heavy top soil erosion happens in these areas. The average cultivation cycle of the pineapple field comprises of various farm management activities.

3.4.5.1 Land Preparation

It may be noted that limited quantum of land in the cluster is revenue land. Most of the land is forest land. However, with the change in policy since last few years the farmers have been given right of this land. This particular aspect affects the land preparation also. Earlier (even today in some cases) shifting cultivation was being practised thus not much effort was given to land preparation. However, post having right of land, farmers have started investing in land preparation especially in terms of application of manure.

Before planting the orchard is cleared of unwanted vegetation and ploughed. The land is prepared for planting by ploughing or digging followed by levelling. Post leveling FYM is applied to ensure nutrition in the top soil.

3.4.5.2 Planting material

Planting is done usually in the month of January and February after land preparation. It was observed that the pineapple is usually being propagated by sucker. The planting materials are being procured either from fellow farmers or from own fields. In case it is procured from the fellow farmers it may cost up to Rs.2/sucker. None of the respondents reported to have procured planting material from any Government/Private agency. Treatment of planting material was also not reported by any of the respondent farmers. None of the farmers also reported to use tissue-culture based planting material.
It was learnt during the stakeholders’ consultations that there are no Government or private nursery in the cluster which are supplying planting material to the farmers. The farmers informed that there is a demand for planting material but the supply of quality planting material is a major challenge in the cluster.

3.4.5.3 Spacing and Number of plants per unit hectare

For commercial viability high density cultivation is recommended. Planting density of 63,400 plants/ha (22.5 x 60 x 75 cm) is ideal for sub-tropical and mild humid conditions, whereas for hot and humid conditions a plant density of 53,300 plants/ha spaced at 25 cm. from plant to plant within a row, 60 cm from row to row and 90 cm. from trench to trench (25 x 60 x 90 cm) provides high yield.

It was observed that the farmers of the region are adopting a low density plantation with approximately 12000 suckers/acre (30000 suckers/ha) which is much lower than the recommended number of plants. During the field survey it was learnt that the low density plantation is being undertaken mainly because adequate labour force is not available. Un-remunerative pricing and uncertainties involved in evacuation and trading is also adding to this.

3.4.5.4 Nutrition

It may be noted that the top soil erosion in the hilly slopes can be very high and hence appropriate nutrition management is very important for pineapple cultivation. The soil requires timely input of nutritional contents and organic matter for the growth of the plant. In case of irrigated conditions, a dose of N, P2O5 and K2O at 12, 4 and 12 gm/plant/year respectively is optimum. Plants receiving 12 gm K2O/plant/crop give higher yield without any adverse effect on fruit quality both under irrigated and rainfed conditions. The dosage is slightly lower in case of rainfed cultivation. For medium fertile soils N (12-16gm), P2O5 (2-4gm) and K2O (10-12 gm)/plant are optimum. It is recommended to apply N and K2O each @ 2gm/plant. Generally there is no need for P application in case the P content. However, if the soil is poor in P, 4 gm P2O5/plant can be applied. N should be applied in 6 split doses. The first dose of N can be given two months after planting and the last one 12 months after planting. The K should be applied in two split doses. Entire P and half of K can be given at the time of planting and the remaining K, 6 months after planting. Application of fertilizers under rainfed conditions should be done when moisture is available.

However, it was noted that no fertilizer is being generally applied in the crop. Of the 55 respondents only 4 reported to have applied organic fertilizer provided by horticulture dept. in their plantations. The reason behind non application of fertilizer is mostly the unwillingness/non-affordability of the farmers as the prices are not remunerative.

3.4.5.5 Irrigation

Pineapple in the state is cultivated mostly in rain-fed conditions with rare use of irrigation facility. The same was observed in the cluster also. None of the respondent farmers reported to have use irrigation facility ever in their fields.

3.4.5.6 Plant Protection

No major disease or pest attack was reported by the farmers. None of the farmers also reported to ever adopting any plant protection measure.

3.4.5.7 Intercultural Operations

Major Intercultural operations include weeding, mulching, removal of suckers and application of growth regulators. Weeding is done at least three to four times in a year. Hand weeding can be
partially eliminated by application of weedicides. Earthing up is an essential operation in pineapple cultivation aimed at good anchorage to the plants. Soon after harvest, earthing up is done leaving one to two suckers only. Weeds are effectively controlled by application of Diuron (@ 2 kg./ha.) or a combination of Bromacil and Diuron @ 2 kg./ha each as pre-emergent spray and repeated with half of the dose, 5 months after first application. It was learnt that the farmers are mostly adopting hand weeding that too in limited extent.

Dry leaves or straw is used as a mulching material. Mulching with black polythene and saw dust has been found to be effective. The maturing fruits may be covered with rice straw or pineapple leaves in order to reduce both sun burn and damage caused by the birds. It was understood that while Dept. of Horticulture is supplying polythene its use very limited. Mulching was found to be a major concern among the farmers. No practice of applying growth regulators was observed in the cluster. It was observed that farmers are removing suckers, slips or crowns. It may be noted that the suckers are also sold to the fellow farmers.

3.4.5.8 Harvesting

Harvesting of pineapple starts around end of May and can extend up to end of August/ early September. During the season, owing to high temperature and humidity (and sometimes heavy rainfall), harvesting of the produce requires significant effort. Harvesting is done early in the morning or later afternoon depending on availability of labour and overall weather conditions.

Fruits are harvested (cut) manually with the crown. Both male and female labourers participate in harvesting activity. It may be noted that a pineapple festival is celebrated in Imphal towards the end of the pineapple harvesting season.

Figure 9. Physical flow of Input and Output
The above diagram shows the inputs/ factors for pineapple cultivation in the cluster based on actual practices being followed by majority of farmers in the cluster (per Ha), inputs for recommended practices (per Ha) and that of recommended practices for the present total area of cultivation in the identified district (cluster). As it can be seen, there is significant gap between the inputs used in the actual practice and recommended practice.

3.4.6 Post-Harvest Management

The post harvest management in case of pineapple in the cluster starts from evacuation till the nearest road point and includes activities such as packing and transportation.

3.4.6.1 Evacuation

Evacuation is the key post-harvest management activity in the context of Imphal East pineapple cluster. Considering that the crop is grown in hill slopes which are normally located away from all weather roads/habitations, farmers face great difficulty in evacuating the produce. Evacuation in the cluster is a labour intensive activity and lack of road connectivity with the farms further adds to the difficulty.

It was observed that most of the times farmers bring the produce as head loads and some farmers use their bicycle to bring the produce. However, in circumstances when there is no labour available,
evacuation does not happen (or happens late) and this in turn results in 20-25% wastage at the farm itself.

3.4.6.2 Primary Processing (Sorting, Grading & Packing)

Primary processing in case of pineapple consists of sorting, grading (based on size and colour) and appropriate packing. It may be noted that no such activity is happening in the cluster. The harvested produce, post evacuation to the nearest road, is being packed into gunny/pp bags or being transported in bulk to nearest market. No primary processing is done in the markets as well. Awareness about sorting grading practices are also low in the cluster.

3.4.6.3 Secondary Processing

There are about 7-8 cottage/small units and 1 medium size unit (Likla) for pineapple processing in Imphal. It was learnt through stakeholders’ consultation that these units process pineapple (1500-1700 MT/ annum) and other fruits (round 300 MT/annum) such as orange, passion fruit, etc. into products such as juices and squashes. They are catering mainly to the regional market and their off-take of pineapple from the study cluster is limited. As the units are not present in the cluster, many times the farmers in the cluster do not benefit from the units as pineapple is sourced by these units from other areas in Manipur.

3.4.6.4 Transportation and Logistic

Transportation through proper insulated vehicles is required to minimize the loss during transit. However, this requires appropriate road connectivity. It may be noted that last mile connectivity with the farms is mostly absent in the cluster. The situation is grave when one considers the connectivity with farm lands. This hampers both evacuation and transportation to nearest market. It was observed that the produce is being transported in pick-up vans with/without any packing. This is leading to 3-5% loss during transportation. Moreover, limited availability of vans is also affecting the cost of transportation adversely. Typical transportation cost to Imphal (about 30 KM away from the cluster) is approximately Rs.40-50 per 100 pieces of pineapple. The cost is borne by the farmers in case they themselves market the produce or else it is borne by the trader/aggregator. In most of the cases, the cost is borne by the traders/ aggregators.

Given the terrain, it was understood that during heavy rainfall, some of the connecting roads do not remain fit for vehicular movement and thus transportation is affected adversely. As the peak harvesting season falls during the monsoon, farmers do face the difficulty in transportation. Due to lack of suitable infrastructure, farmers are unable to properly store the produce. Temporary raised shed structures and other facilities for storage may be set-up at common identified assembling points in the sub-region for safe storage of the produce at the time of harvesting and minimizing the transportation related issues to an extent.

3.4.6.5 Markets and Price information

It was observed that there is no mechanism of price discovery in the cluster by the farmers. Prices are arbitrarily fixed by the buyers and farmers have very low negotiating ability on this. Also, as there is no regulated market in the cluster, little information is available with the farmers regarding market wise price fluctuations. During the stakeholder consultations, it was noted that fair and transparent price fixation of pineapple crop is one of the major demand of the farmers. Farmer lack awareness on market intelligence tools to be used tapping the real time price information in different markets.
3.4.6.6 Market Infrastructure & Cold Chain

There is death of market infrastructure (including sorting/grading yards, trading platforms, auction/price discovery center, storage, etc.) in the cluster. Available market infrastructure in the cluster can be broadly classified into:

1. Temporary structures along side the road
2. Kutcha/Semi-pucca structures in semi-urban areas
3. Wholesale trading center in Imphal

None of the above has any facility other than trading platforms. The trading platforms available in Imphal wholesale market can withstand harsh weather conditions such as heavy rainfall, whereas in other places it is not possible. Absence of market infrastructure adversely affects the overall value realization from the crop. Also, there is no cold chain/ cold store in the entire state. There is also no refrigerated/ insulated transport available for transportation of pineapple.

Role of all the stakeholders in the value chain is summarized and diagrammatically represented below:

Figure 10. Technical Analysis

3.5 Economic Analysis

Pineapple sucker start bearing fruits from 12-15 month onwards. Each plant/sucker can bear fruit only once and after that its offset/crown can grow to bear fruit. However, continuing with offsets may hamper the productivity in the long run. The mother plant may be replaced after third year.
The initial investment in pineapple plantation (apart from land) consists of land preparation and planting material. The recurring expenditure includes cost towards manures/fertilizers, labor for weeding/mulching, harvesting and evacuation. As mentioned above after every three years the mother plants are also replaced and this requires certain expenditure. In case of pineapple, the initial investment can be considered only for year-1 operation is detailed out below:

Table 8: Cost of initial investment & maintenance of pineapple orchard (in Rs./Ha)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Assumption</th>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Preparation</td>
<td>125 labours @ Rs. 300</td>
<td>1000</td>
</tr>
<tr>
<td>Planting</td>
<td>Rs. 2 per plant for 30000 plants per hectare</td>
<td>60000</td>
</tr>
<tr>
<td>Fertilizer and Chemical Input</td>
<td></td>
<td>5000</td>
</tr>
<tr>
<td>Labor for horticultural operation</td>
<td>(50 Manday @Rs.200), Year 5 (75 Manday) and Year 6,7,8 (Again 50 Manday)</td>
<td>15000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>81000</td>
</tr>
<tr>
<td>Yield (kg per plant)</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Gross Return</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Net Earnings</td>
<td></td>
<td>-81000</td>
</tr>
</tbody>
</table>

The recurring costs have been provided below for two cycles of planting material for better understanding. Various cost factors are depicted below:

Table 9: Cost of maintenance of pineapple orchard & annual returns (in Rs. / Ha)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Assumption</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Preparation</td>
<td>125 labours @ Rs. 300</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Planting</td>
<td>Rs. 2 per plant for</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fertilizer and Chemical Input</td>
<td>2625</td>
<td>2756</td>
<td>2894</td>
<td></td>
</tr>
<tr>
<td>Labour Cost (including cost of planting and weeding operation)</td>
<td>(50 Manday @Rs.200), Year 5 (75 Manday) and Year 6,7,8 (Again 50 Manday)</td>
<td>10500</td>
<td>11025</td>
<td>11576</td>
</tr>
<tr>
<td>Transportation (to aggregation point)</td>
<td>12600</td>
<td>13230</td>
<td>13892</td>
<td></td>
</tr>
<tr>
<td>Total (A)</td>
<td>25725</td>
<td>27011</td>
<td>28362</td>
<td></td>
</tr>
<tr>
<td>Total Production (no. of piece)</td>
<td>30000</td>
<td>30000</td>
<td>30000</td>
<td></td>
</tr>
<tr>
<td>Average Price (Rs. Per piece)</td>
<td>3</td>
<td>3.121</td>
<td>3.184</td>
<td></td>
</tr>
<tr>
<td>Revenue (B)</td>
<td>91800</td>
<td>93636</td>
<td>95509</td>
<td></td>
</tr>
<tr>
<td>Earnings (B – A)</td>
<td>66075</td>
<td>66625</td>
<td>67147</td>
<td></td>
</tr>
</tbody>
</table>

The payback period is 2nd year and IRR is calculated 61%. As is evident from the above table, the major investment in pineapple cultivation in the cluster is in the form of planting material. Expenditure towards other inputs is almost negligible. The other prominent expenditure is in the form of labour. However, given the scarcity of labour force in the cluster, farmers are using limited labour force in the cultivation process. Many times the Farm Yard Manure is mostly sourced from own household. However, its imputed cost is included in the cost benefit analysis.
3.6 Analysis of price build up

The price build up in pineapple in the cluster is mainly on account of transportation and losses. There is hardly value adding activities in the cluster and thus they do not have any impact on the overall price movement across the supply chain. A typical cost build up for per piece of pineapple is indicated as below:

Figure 11. Price Build-up for 1 Kg of Pineapple

As is evident from the above figure, the overall share of farmer price in the final price of the produce is only about 15%. The overall value loss is almost 10% of the consumer price whereas transportation cost is almost 25% of the final price. Such high transportation cost and wastage is affecting the overall value realisation for the farmers.

Also as evident from the above figure, there is hardly any value addition happening in the produce (except for the change in point of sale). Moreover the distant market (for the produce) as of now is within other North Eastern states. Integration with other major national markets seems almost absent.

3.7 Identified Gaps and Constraints

3.7.1 Production related

- The productivity of the cluster is lower than that of the national average and the productivity in adjoining districts. While the low productivity may be partially attributed to the variety (queen) that is being predominantly grown in the region, the major reason behind low productivity is lower number of suckers and limited use of manures and fertilizers. Queen variety of pineapple is smaller than the kew variety and in absence of proper nutrition the weight goes down further. Moreover, due to inappropriate package of practices and limited use of labour the number of suckers is also limited. This further reduces the productivity.

- As mentioned earlier, planting material is procured mostly from the fellow farmers. Tissue-culture based nurseries are not present in the state. None of the respondents reported to have procured planting material from any Government/Private agency. Treatment of planting material was also not reported by any of the respondent farmers. None of the farmers also reported to use tissue-culture based planting material. It was learnt during the stakeholders’ consultations that there are no Government or private nursery in the cluster which are
supplying planting material to the farmers. The farmers informed that there is a demand for planting material but the supply of quality planting material is a major challenge in the cluster.

- As mentioned above application of appropriate nutrition management is almost absent in the cluster. Soil nutrient requirement is not assessed by the farmers. Soil testing is generally not conducted by the farmers. While absence of chemical fertilizer and pesticides in the cultivation practice ensures that the product remains organic in nature, the productivity is hampered because of this. Moreover, the amount of manure provided to plant varied across farmers, which shows that some farmers do not have enough knowledge regarding the cultivation practices. This leads to lower price realization for the farmers. Mostly farmers themselves buy/ prepare FYM or the FYM is bought from fellow farmers. This many times lead to shortage of manure.

- Mulching is an important practice in pineapple cultivation. This helps in retention of soil moisture and in rainfed conditions it is quite useful. However, due to shortage of labour, farmers are not adopting mulching practices properly.

- Farmers are not aware of various practices especially related to nutrition management and post harvest management. Improper nutrition management leads to lower productivity.

3.7.2 Post Harvest Management

- It was observed that the pineapple fields are located in the hill slopes which are sometimes at a distance of 2-3 Kms from the nearest road. The terrain along with the distance makes it difficult for the farmers to evacuate the produce for transportation. In absence of adequate labour force (at affordable price) the degree of difficulty increases further. In absence of appropriate infrastructure, farmers at present evacuating the produce mostly as head-loads or on bicycles. This sometimes results in non-harvesting of the produce itself or delayed in harvesting.

- It was observed that no primary processing such as sorting, grading or proper packing is being undertaken by the farmers. The produce, immediately after harvesting, is simply being packed in jute/PP bags and getting transported to the nearest market. This leads to high resource cost, wastages and time loss. Common service centres as that for collection of produce, sorting, grading, packing are lacking.

- It was observed that no pack house or for that matter simple collection centers having transit storage facilities are operational in the cluster. In absence of integrated cold chain infrastructure, the produce is sold to the markets at prevailing rates.

3.7.3 Road connectivity and transportation

- Transportation infrastructure is thus one of the major concern for marketing of produce in the regions. As mentioned above, last mile connectivity with the farms are mostly absent in the cluster. This hampers both evacuation and transportation to nearest market. It was observed that the produce is being transported to the nearest markets in pick-up vans with/without any packing. This is leading to 3-5% loss during transportation. Moreover, limited availability of vans is also affecting the cost of transportation adversely. Poor connectivity not only adds to cost, time and resource but also limits timely farm operations.

- It was learnt that during heavy rainfall, some of the connecting roads do not remain fit for vehicular movement and thus transportation is affected adversely. As the peak harvesting season falls during the monsoon, farmers do face the difficulty in transportation. Hence, all weather roads are very important for timely evacuation of pineapple in the cluster.

3.7.4 Marketing Related

- At present, there are no regulated markets in the cluster. Farmers have the option of either selling the produce in nearby rural/semi-urban markets or in the main market of Imphal. It was
observed that some of the farmers are also selling the produce in small huts alongside the major district/state roads. There are also no collection centres, packhouses and other related infrastructure in the cluster. The overall marketing infrastructure in the cluster is insufficient for pineapple produce.

- Majority of farmers sell the produce themselves, and hence, many times the farmers have limited bargaining power. Moreover, due to limited quantum of production and issues related to evacuation and transportation they are not in a position to hold the produce for more than a day or two. This further reduces their bargaining power. Moreover, the information flow from traders to the farmers is generally not transparent. Except a few progressive and large farmers, others are yet to develop direct linkages and negotiation skills with wholesalers in distant markets. Majority farmers lack market information about price and demand in distant markets resulting in lower value realization for them.

- Despite of the fact that the produce is almost organic in nature, no effort towards brandings has been done by any agency till date.

### 3.7.5 Processing

- While the cluster does not have any pineapple processing facility, some cottage/small industries are processing the produce in limited quantity in Imphal. However, their total intake is only a fraction of the production which is about 1500-1700 MT from the district against a total production of more than 15600 MT.

- Moreover, it was understood that the processors are procuring mostly the cheapest produce (often of poor grade) and thus are hardly adding any value to the overall realization from the produce.

### 3.7.6 Others

- It was understood that farmers are cultivating pineapple mostly because it does not require any significant attention. The only effort that the farmers are putting is in planting and harvesting/evacuation. Also, as there is no immediate remunerative market for the produce, farmers are reluctant to incur required investment in the cultivation. All these are leading to a vicious circle of low productivity - low value addition - unremunerative market - low return - low investment.

- It was learnt that the budget allocation under different schemes for horticulture development in the state is limited and hence, due to lack of funds the pineapple farmers are generally unable to avail any subsidies/ grants from the Horticulture Department.

- It was also observed that there are no Farmer Groups/SHGs in the cluster which lead to low bargaining power of the farmers. There is a potential to promote such groups in the cluster to increase cooperation and bargaining power.

- None of the surveyed farmers have availed agricultural loans for pineapple cultivation. Also, most of the respondent farmers do not have Kisan Credit Cards. The farmers in the cluster do not insure their crop as well. There is very limited awareness amongst the farmers about agricultural loans, insurance and other financial products. Limited access to finance acts as a demotivating factor for pineapple cultivation for farmers. It is also one of the reasons for slower increase in area of pineapple cultivation in the district.
4 Demand Assessment

4.1 Pineapple Products Map

Pineapple is a tropical edible fruit abundantly grown in the regions of South America and Central America. Its cultivation originated in the country of Brazil and Paraguay and later spread across the globe. There are numerous cultivars of pineapple grown and are grouped into four main classes: Smooth Cayenne, Red Spanish, Queen and Abacaxi⁵. Pineapples are rich in Vitamin C and manganese helping in immune system support, bone strength and digestion. Pineapples are majorly consumed in raw form but are also available in preserved cans, squash and juices. Pineapple trade all over the world takes place in following forms⁶.

![Figure 12: Pineapple Products Hierarchy](https://www.hort.purdue.edu/newcrop/morton/pineapple.html#Varieties)

*Source: International Trade in Goods Statistics by Product Group, International Trade Centre*

The export and import of pineapples generally takes place in raw or preserved form. Other forms of trade are pineapple products such as jams, marmalades, jellies etc., pineapple squash and juice⁷.

4.2 World Trade of Pineapples

4.2.1 World production & consumption of pineapple

Over 25 million metric tonnes of pineapple is produced annually across the globe. Costa Rica is the leading producer with approximate market share of 11% in 2014. Other leading producers of pineapple are Brazil and Phillipines with approximately 10% of market share. India is the 7th largest producer of pineapples. In 2014, India’s pineapple production was 1.74 million MTs with a market share of 6.8%. Pineapple production all over the world has seen an overall annual growth rate of 3.5% from 2011 to 2014. The top two leading producers of pineapple i.e. Costa Rica and Brazil from the South American region are responsible for more than 20% of the world production. Moreover, Costa Rica has shown an annual growth rate of 5.7% in annual production, which is significantly

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higher than overall world growth rate. While Philippines, China, Indonesia and India have shown growth every year in the production, Thailand has shown an annual decrease of 10% in production every year. The graph below shows the production statistics of leading producers of pineapple from 2011 to 2014\(^9\).

\(\text{Figure 13. World production of Pineapple (in million metric tonnes)}\)

Source: FAO

4.2.2 Global Import-Export of Pineapples

4.2.2.1 Global Export Market

In 2016, total world exports of pineapple was 3.6 million metric tonnes of 25.4 million metric tons produced. Export market for fresh pineapple is significantly concentrated with Costa Rica. In 2016-17, Costa Rica exported approximately 2 million metric tonnes of pineapple accounting for more than half of global exports of pineapple. Philippines is the second largest world exporter of pineapple accounting 15% market share. The country exported 0.56 million MT of pineapple in 2016-17, almost twice of its previous year export. Other key exporting countries are Netherlands, Belgium and USA. **India exported approximately 4000 MTs of pineapple during 2016-17 accounting for only 0.1% of the world export. It is notable that while Costa Rica exports approximately 70% of its pineapple production, India’s exports only 0.23% of its production.** The graph below compared the export quantity and values of leading exporters of the world\(^10\).

\(\text{Figure 14: Major Exporters of Fresh Pineapple in the world in terms of quantity and their corresponding values}\)

Source: ITC Calculations based on UN Comtrade Statistics

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10ITC calculations based on UN Comtrade Statistics, International Trade Centre ([Quantity: http://www.trademap.org/Country_SELProduct_TS.aspx?nvpm=1|||080430|||6|1|12|2|2|12|2|1|2|1|1|1|1|1|1|1|1 accessed on 29.08.2017, Values: http://www.trademap.org/Country_SELProduct_TS.aspx?nvpm=1|||080430|||6|1|12|2|2|12|2|1|2|1|1|1|1|1|1|1|1|1 accessed on 29.08.2017](http://www.trademap.org/Country_SELProduct_TS.aspx?nvpm=1|||080430|||6|1|12|2|2|12|2|1|2|1|1|1|1|1|1|1|1|1 accessed on 29.08.2017))
It may be noted that the largest world exporters of pineapple are trade wise so dominant there is hardly any change in the composition of top exporting countries over the years.

### 4.2.2.2 Global Import Markets

The import market for fresh pineapple shows similar statistics as the export market. The overall imports observed in 2016 was 3.16 million tonnes. USA is the biggest importer of pineapple accounting for 34% of the import market. It imported 1.07 million tonnes of pineapple worth 0.7 billion USD. Netherlands is the second biggest importer with 8.9% market share, significantly lower than USA. Other key importers are Germany, Spain and UK. It may be noted that India is not an importer of pineapple as per the trade statistics. The graph below shows the import quantity and their corresponding values for the top 5 importers of fresh pineapple form 2012 to 2016.

![Graph showing import in major countries](image)

**Figure 15: Import in Major Countries**

**Source:** UN Comtrade Statistics

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### 4.2.3 Domestic Demand and Trade

#### 4.2.3.1 Production and Consumption of pineapples in India

While India is among the top 10 pineapple producing countries, the export market for fresh pineapple is low as compared to its production. India ranks at 22\textsuperscript{nd} position in terms of quantity of pineapple exported. Exports from India, is mainly into the South Asian markets such as Nepal, Qatar, Saudi Arabia, UAE and Maldives. It may be noted that these regions are not major markets of pineapple as such. Moreover, India’s share of export to these countries is ranges only 10-20\% of country’s total import of pineapples.

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\textsuperscript{11}ITC calculations based on UN Comtrade Statistics, International Trade Centre (Quantity: \url{http://www.trademap.org/Country_SelProduct_TS.aspx?nvpm=1|||080430|||6|1|1|1|2|1|2|2|1} accessed on 29.08.2017, Values: \url{http://www.trademap.org/Country_SelProduct_TS.aspx?nvpm=1|||080430|||6|1|1|1|2|1|2|1} accessed on 29.08.2017)

\textsuperscript{12}Top Destination APEDA, International Trade, APEDA (\url{http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx} accessed on 29.08.2017)
India imports very low quantum of pineapple and thus rarely considered as a market for other countries. India recently imported pineapples form Thailand. The quantity of pineapple imported was 2.92 tonnes worth 6.58 thousand USD. Before that, India has not imported pineapple form anywhere else in high quantity. 

4.3 World Trade of Preserved Pineapple

Preserved pineapple is the second largest form of pineapple traded all over the world. While the quantity exported is approximately one-third of fresh pineapple, the value is higher as compared to it. Preserved or prepared pineapple is processed in industries and have higher shelf life. The processing adds value to the product making it more valuable than fresh pineapples.

4.3.1 World Import and Export of Preserved Pineapples

Countries as USA (32%), Germany (8%), Spain(5%), Netherland(4.4%), United Kingdom(3.5%), Japan (3%), Russian Federation (3%) are the major importer of preserved pineapple across the world. Whereas exports of prepared pineapples is mainly dominated by Thailand (over 40%) and Philippines (25%). Thailand contribute 40% of the total export market. However, a significant decline has been observed in its export quantity. It has reduced from 0.58 million tonnes in 2012 to 0.49 million tonnes in 2016, 4.1% reduction every year. On the other hand, Philippines has expanded its market from 0.27 million tonnes in 2012 to 0.37 million tonnes in 2016, a yearly increase of 8.2%. It is notable that countries like Kenya & Vietnam, though currently have smaller share in world export of preserved pineapple, have shown significant export growth over last 5 year. Kenya is emerging as one of the leading exporter of preserved pineapple in European market as Germany, Spain, United Kingdom, Netherland. Kenya is the largest exported of preserved pineapple to Italy. Similarly Vietnam has emerged at second largest export of preserved pineapple to Russian Federation (accounting 25% of country import).
4.3.2 India Import and Export of Preserved Pineapples

Indian export market for preserved pineapple is not developed much. **India ranks at 56th position in terms of quantity of preserved pineapple exported.** Moreover, the importing countries are not consistent and quantities depend on production significantly. Chile has been the recent biggest exporter from India with export quantity of 71.1 tonnes worth 78.8 thousand USD. The table below shows the export data for preserved pineapple to leading importing countries for India.\(^{15}\)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>711.24</td>
<td>78.82</td>
</tr>
<tr>
<td>Egypt</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>348.96</td>
<td>34.47</td>
</tr>
<tr>
<td>Nepal</td>
<td>86.36</td>
<td>21.34</td>
<td>0.1</td>
<td>0.06</td>
<td>0.7</td>
<td>0.24</td>
<td>0.8</td>
<td>0.13</td>
<td>142</td>
<td>28.24</td>
</tr>
<tr>
<td>Spain</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.32</td>
<td>0.03</td>
<td>0.15</td>
<td>153.42</td>
<td>17.39</td>
</tr>
<tr>
<td>Greece</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>11.84</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>607.72</strong></td>
<td><strong>87.22</strong></td>
<td><strong>109.5</strong></td>
<td><strong>60.9</strong></td>
<td><strong>1481.04</strong></td>
<td><strong>192.94</strong></td>
<td><strong>2348.74</strong></td>
<td><strong>327.97</strong></td>
<td><strong>1703.62</strong></td>
<td><strong>190.89</strong></td>
</tr>
</tbody>
</table>

*Source: India Export Statistics, APEDA*

India imports preserved pineapples majorly from Philippines. In 2016-17, Philippines exported 1.84 thousand tonnes of preserved pineapple worth 2.2 million USD to India. The import has gained a significant boost. In 2012-13, India imported only 237 tonnes of preserved pineapple whereas the number reached 2182 tonnes in 2016-17. The increasing imports signify the need of preserved pineapples in India. The table below further illustrated the details of import statistics of India.\(^{16}\)

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\(^{15}\)Top Destination APEDA, International Trade, APEDA ([http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx](http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx) accessed on 29.08.2017)

\(^{16}\)India Import APEDA, International Trade, APEDA ([http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx](http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx) accessed on 29.08.2017)
As can be seen from the tables above, India imports more than 10 times (in value terms) of its preserved pineapple exports. Moreover, the quantum of imports has grown by almost 100% during the last five years which suggests increasing preference of the Indian consumer market towards preserved pineapples.

4.4 Pineapple Products

Apart from direct consumption, pineapple products like jams, marmalades, jellies, fruit paste etc. are very much in common these days. These are processed products of pineapple and have very large shelf life as compared to raw pineapple. Moreover, processed form makes it more compact and easy in transports.

4.4.1 India Export and Import of pineapple products

During 2016-17, India exported 533 MTs of pineapple products worth 0.55 million USD. UAE has been the consistent leading importer for India which constantly increasing import quantities over the years. Recently in 2016-17, UAE imported 298 tonnes worth 0.27 million USD, more than half of India’s total exports. Other importing countries are Spain, Oman, Russia, and Qatar. The graph below compares the export quantities and their corresponding values for leading importers of pineapple products from India\(^\text{17}\).

\(^\text{17}\)Top Destination APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)
India imports very few amount of pineapple products to get the taste of the exotic flavors that are not grown in India. Recent imports have been from Belgium, Thailand, China and Turkey. Belgium was the largest exporter in 2016-17 followed by Thailand. The table below shows the import statistics of India for pineapple products in the last 5 years.

<table>
<thead>
<tr>
<th>Table 12: Import Statistics of Pineapple products in India in terms of quantities and their corresponding values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exporters</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Belgium</td>
</tr>
<tr>
<td>Thailand</td>
</tr>
<tr>
<td>China</td>
</tr>
<tr>
<td>Turkey</td>
</tr>
<tr>
<td>Malaysia</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

**Source:** India Import Statistics, APEDA

4.5 Pineapple Juice (brix value less than equal to 20)

4.5.1 World Export and Import of pineapple Juice (brix value less than equal to 20)

Pineapple Juice imports have boosted in recent years. The biggest importers of this particular variety are European countries and USA. USA is the biggest importer followed by Netherlands. In 2014, USA imported 64 thousand tonnes of Pineapple Juice. Netherlands imports have increased from 39 thousand tonnes in 2012 to 51 thousand tonnes in 2014. The graph below compares the world import statistics of Pineapple Juice with brix value less than or equal to 20.

**Source:** International Trade Statistics, APEDA

4.5.2 India Export and Import of pineapple Juice (brix value less than equal to 20)

Indian export market is not big enough to serve the leading importers and annual exports have been observed with high variance. Netherlands recently has become India’s largest export market. In 2016-17, India exported 28.46 thousand tonnes of Pineapple Juice to the tune of 79.81 thousand USD.

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18India Import APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)
17, it imported 414 MTs of pineapple juice accounting for more than 80% of India’s total export. Other importer countries for Indian market are Spain, Nepal, Malaysia and Philippines. The table below compares the export quantities and values for leading importers of Indian market in the last 5 years.\textsuperscript{20}

### Table 13: Export Statistics of Pineapple Juice with Brix value <= 20 in India in terms of quantities and their corresponding values

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity (in tonnes)</td>
<td>Value (in 1000 USD)</td>
<td>Quantity (in tonnes)</td>
<td>Value (in 1000 USD)</td>
<td>Quantity (in tonnes)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>288</td>
</tr>
<tr>
<td>Spain</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nepal</td>
<td>27.904</td>
<td>21.81</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Philippines</td>
<td>44.916</td>
<td>46.93</td>
<td>3.6</td>
<td>7.23</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44.916</strong></td>
<td><strong>46.93</strong></td>
<td><strong>3.6</strong></td>
<td><strong>7.23</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

*Source: India Export Statistics, APEDA*

India imports significantly high quantity of Pineapple juice as compared to its exports. The imports have been increasing yearly at an annual growth of approximately 20% from 2012 to 2016. While a dip was seen in 2014, the import boosted significantly in the period of next two years. Moreover, UAE is a leading importer of fresh pineapple in the Indian market and is now an exporter of processed form in the Indian market. Hence, increasing imports highlights the increasing demand of pineapple juice in the Indian market asking for value chain development of the indigenous production. The table below shows the import quantities and values of leading exporters in the Indian market of pineapple juice.\textsuperscript{21}

### Table 14: Import Statistics of Pineapple Juice with brix Value <= 20 in India in terms of quantities and their corresponding values

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity (in tonnes)</td>
<td>Value (in 1000 USD)</td>
<td>Quantity (in tonnes)</td>
<td>Value (in 1000 USD)</td>
<td>Quantity (in tonnes)</td>
</tr>
<tr>
<td>Philippines</td>
<td>97.664</td>
<td>84.9</td>
<td>86.986</td>
<td>87.81</td>
<td>55.808</td>
</tr>
<tr>
<td>UAE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.838</td>
<td>2.87</td>
<td>0</td>
<td>0</td>
<td>7.27</td>
</tr>
<tr>
<td>Thailand</td>
<td>51.293</td>
<td>78.84</td>
<td>78.382</td>
<td>152.41</td>
<td>1.404</td>
</tr>
<tr>
<td>Turkey</td>
<td>1.75</td>
<td>7.64</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>151.545</strong></td>
<td><strong>174.25</strong></td>
<td><strong>170.368</strong></td>
<td><strong>258.26</strong></td>
<td><strong>66.768</strong></td>
</tr>
</tbody>
</table>

*Source: India Import Statistics, APEDA*

#### 4.6 Pineapple Juice (brix value more than 20)

##### 4.6.1 World Export and Import of Pineapple Juice (brix value more than 20)

The import statistics of Pineapple juice with brix value greater than 20 resembles a similar trend with its other variety (Brix value less than or equal to 20). While the quantity of imports is similar, Netherlands here is the largest importer followed by USA. Netherlands import have decreased while USA exports increased from 25 thousand tonnes in 2012 to 47 thousand tonnes in 2017, expected to surpass Netherlands in the coming years. Other importing countries are Spain, Italy and France.\textsuperscript{22}

\textsuperscript{20}Top Destination APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)

\textsuperscript{21}India Import APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)

\textsuperscript{22}International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/ProductDetail.aspx?prdc=200949 accessed on 29.08.2017)
4.6.2 India Export and Import of Pineapple Juice (brix value more than 20)

The export market in India for this variety is bigger than the other one. Exported quantities have increased from 194 tonnes in 2012-13 to 1589 tonnes in 2016-17. Netherlands, the world leading importer imports small quantity from India but is the biggest player in the Indian market. It imported 922 tonnes of the product in 2016-17, approximately 58% of the India’s total export. Other importers are Germany, USA, Singapore and Spain. The table below further illustrates the export statistics of Pineapple juice from India in recent years.

The import has the same characteristics as the one with the other variety, however it is much bigger market. While the imports are from neighbouring countries, the quantity has shown has shown increasing trend in the last four years. India imported 1.84 thousand tonnes on pineapple juice of this variety in 2016-17, compared to only 0.8 thousand tonnes in 2013-14. Thailand is the biggest exporter which 82% share in the Indian import market. It exported 1.51 thousand tonnes in 2016-17 compared to only 0.6 thousand tonnes in 2012-17. India needs to learn from the neighbouring countries and develop its value chain to satisfy the demand of the product with in house production.

Table 15: Export Statistics of Pineapple Juice with Brix value > 20 in India in terms of quantities and their corresponding values

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity (in tonnes)</td>
<td>Value (in 1000 USD)</td>
<td>Quantity (in tonnes)</td>
<td>Value (in 1000 USD)</td>
<td>Quantity (in tonnes)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>36</td>
<td>50.06</td>
<td>0</td>
<td>0</td>
<td>157</td>
</tr>
<tr>
<td>Germany</td>
<td>106.4</td>
<td>138</td>
<td>23.65</td>
<td>30.35</td>
<td>78.65</td>
</tr>
<tr>
<td>USA</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Singapore</td>
<td>16.27</td>
<td>23.73</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spain</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>194.234</td>
<td>309.01</td>
<td>39.513</td>
<td>69.28</td>
<td>263.152</td>
</tr>
</tbody>
</table>

Source: India Export Statistics, APEDA

The import has the same characteristics as the one with the other variety, however it is much bigger market. While the imports are from neighbouring countries, the quantity has shown has shown increasing trend in the last four years. India imported 1.84 thousand tonnes on pineapple juice of this variety in 2016-17, compared to only 0.8 thousand tonnes in 2013-14. Thailand is the biggest exporter which 82% share in the Indian import market. It exported 1.51 thousand tonnes in 2016-17 compared to only 0.6 thousand tonnes in 2012-17. India needs to learn from the neighbouring countries and develop its value chain to satisfy the demand of the product with in house production.

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23Top Destination APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)

24India Import APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)
Pineapple Squash is prepared from fresh pineapple with an addition of sugar and preservatives to prepare thick dense liquid of pineapple. This squash on addition of water to it acts as an ideal fruit drinks during the summers.

### 4.7 Pineapple Squash

Indian export market is not diverse enough in pineapple squash. The export quantities have been fluctuating every year depending upon the production and consumption within the country. UAE was once a biggest importer now imports significantly less. Some new countries have also been added to the importers list of India showing the increasing demand of pineapple squash in the world. The table below is a comparison of recent export statistics of pineapple squash from India.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>24.382</td>
</tr>
<tr>
<td>Guinea</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5.904</td>
</tr>
<tr>
<td>UAE</td>
<td>41.798</td>
<td>25.44</td>
<td>0</td>
<td>0</td>
<td>7.6</td>
</tr>
<tr>
<td>Bhutan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10.85</td>
<td>1</td>
</tr>
<tr>
<td>Oman</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.68</td>
<td>0.75</td>
</tr>
<tr>
<td>Total</td>
<td>58.844</td>
<td>62.56</td>
<td>2.43</td>
<td>13.88</td>
<td>54.29</td>
</tr>
</tbody>
</table>

Source: India Export Statistics, APEDA

India imports very small amount of Pineapple Squash, mostly from the neighboring countries. Import statistics have various peaks and valleys over the years depending upon the demand in the country. In 2016-17, India imported 12.24 tonnes of Pineapple Squash alone from Thailand. Other exporters of India were China and Nepal.

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26India Import APEDA, International Trade, APEDA (http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx accessed on 29.08.2017)
4.8 Potential opportunity for Manipur

Based on the above analysis, it is understood that the demand side presents a significant opportunity to boost the country’s overall pineapple processing industry. The overall demand for preserved/processed pineapple has registered reasonably good growth trend both in domestic as well as international markets. Having said this, this may not provide an immediate opportunity for Manipur to leverage both because of its structural issues (such as low scale production, remoteness) and absence of related and supporting industries. However, it will definitely help Manipur in case it can emerge as a preferable sourcing point of raw material/fresh produce.
5 Recommendations/ Proposed Action Plan

Considering the gaps that exist at each level of the pineapple value chain in Imphal East, it is essential to adopt an integrated approach for value chain development. The interventions must address both the low productivity and low price realisation. They must also suggest ways and means to absorb incremental production which can be a reality in case productivity improvement measures are adopted and/or more area is brought in under pineapple. The interventions must also take into cognizance the geographic terrain of the state and overall economic vulnerability of marginal and small pineapple producers. With this context, the following interventions are recommended.

The Mission for Integrated Development of Horticulture recognizes the important role of developing existing pineapple value chain in the cluster. Various centrally and state sponsored schemes have provided the necessary stimulus to the horticulture sector, which has enabled the achievement of a healthy growth rate in the past. However, to compete sustainably in global market and under liberalized trade regime, necessity is recognized to focus on both productivity enhancement as well as value chain development for increased profitability and improved market access.

Having studied the challenges and constraints faced by the sector, a holistic approach comprising of combination of both soft and hard interventions is proposed to be implemented for increasing apple production and productivity in the region and facilitating value addition.

- Soft interventions (training and capacity building) are proposed to be implemented across the district and would consist of production, post-harvest management and processing/value addition related short term training & exposure visit envisaged to enhance the technical skill for farmers as well as technician, extension workers, entrepreneurs and other operating in the sector. Such interventions are proposed to be delivered through institutions specialising in the subject area.

- Hard interventions (infrastructural assistance) are majorly being proposed to meet cluster specific requirements based on the assessed need. Hard interventions under the programme shall cater to all the value nodes of the pineapple value chain and primarily aim at creating tangible common/community based assets to support the developmental requirement of pineapple value chain in Imphal East

An effort has been made to align the activities with the overall objective of horticulture mission and initiatives being undertaken by other agencies (State governments, bilateral and multilateral organisations). Leveraging CSR funds have also been kept in mind while developing the resource mobilisation strategy to meet the investment requirement of value chain development activities.

Integral with the objective of the interventions, the proposed soft & hard interventions are focused on forging the vertical as well as horizontal linkage along the pineapple value chain. Placing the proposed interventions in the value chain context, the soft & hard interventions have been categorized into 5 components viz.

a) Production related

b) Evacuation and Post-harvest

c) Transportation and Market

d) Processing (transformational)

e) Overarching (horizontal linkage)
<table>
<thead>
<tr>
<th>Component</th>
<th>Objective</th>
<th>Constrains</th>
<th>Required Intervention</th>
<th>Recommended Action Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production Related</strong></td>
<td>Increasing production as well as productivity through area expansion and adherence to recommended package of practice</td>
<td>Planting Material • Use of planting material of standard quality • Unavailability of nurseries both in public and private domain Cultivation Practice • Low density cultivation • Non-adherence to recommended packages of practices especially related to weeding, mulching and nutrition management Other constraints • Low scale of production at individual level • Difficulty in evacuation due to the geographic conditions including inaccessibility</td>
<td>• Area expansion under pineapple so that the cluster achieved economies of scale for value chain related interventions • Development of nurseries integrated with demonstration plots to cater to the need of quality planting material • Training of existing as well as new farmers (to be brought in under area expansion) on packages of practices • Distribution of input kits which may provide required nutritional support/mulching material to farmers</td>
<td>Hard Interventions (Infrastructural Assistance): • Setting-up of nurseries integrated with demonstration plots at decentralized locations • The nurseries will provide required planting material • Demonstration plots can be used as training venues • Area Expansion through providing appropriate incentive (in the form of planting material, input kits) in close co-ordination with the forest department Soft Interventions (Training &amp; Exposure Visit/Study Tour) • Training of farmers on packages of practices including high density cultivation • Training of Trainer(s) which may be the extension officers, village agent or progressive farmers • Exposure tours within &amp; outside State for growers/technical staff/field functionaries</td>
</tr>
<tr>
<td><strong>Post harvest infrastructure</strong></td>
<td>Creation of appropriate infrastructure to aid in smooth evacuation of the produce and arrest value loss</td>
<td>Evacuation • Timely evacuation is not possible due to unfriendly terrain and inadequate labour coupled with inaccessibility • Lack of farm level infrastructure to support evacuation Primary Processing • Produce is being sold without any sorting, grading or proper packaging resulting in value loss • Farmers are not aware about various processing activities • Transit storage facility is not available leading to wastage in case there are no takers of the produce</td>
<td>Development of farm level collection centers (in close proximity to pineapple farms) • Development of sorting, grading yards integrated with alternate energy (solar/bio-mass based) air cooled transit storage facilities • Training of farmers on various aspects of post-harvest management</td>
<td>Hard Interventions (Infrastructural Assistance): • Formation of 20 Farm Level Collection centers at Major Panchayats • With aggregation and temporary storage before the produce is transported further • Such collection centers can be developed in community land and managed by farmer groups • Development of post harvest infrastructure in 10 locations • Such facilities will have sorting, grading facilities • A cold room will be attached to the facility for short term storage • The cold room may run on alternate energy • Such post harvest infrastructure can be developed in community land and managed by farmer groups • Both the collection center and post harvest infrastructure may collect minimum user fee to meet operating costs Soft Intervention (Training &amp; Exposure Visit) • Training of farmers on post-harvest management/primary processing • Training of Trainer(s) which may be the extension officers, village agent or progressive farmers</td>
</tr>
<tr>
<td>Component</td>
<td>Objective</td>
<td>Constrains</td>
<td>Required Intervention</td>
<td>Recommended Action Points</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Marketing and Transportation| • Improved interface between farmer and traders                             | • There is no proper markets place for the producers to sell their produce. Existing markets do not have minimum infrastructure such as trading platforms, storage or utilities  
  • Produce is being transported in pick up vans and is exposed to heat, rain, dust etc resulting in value loss  
  • Transportation is a key constraints especially during the peak harvesting season (which coincides with monsoon) | • Development of community markets  
  • Provision of insulated vans                                                                 | Hard Interventions (Infrastructural Assistance):  
  • Development of 2 community markets  
    - Facilities for trading, price information, storage, ripening, etc to be included  
    - Land can be procured from the community  
    - The markets can also deal with other produce  
  • Provision of 5 insulated vans (one each per two post harvest infrastructure)  
  Soft Interventions:  
  - Training of selected individuals on pineapple (other fruit) processing  
  - Training on cluster formation and common cluster activities |
| Processing                  | • To enhance the market for the produce and initiate further value addition | • Quantum of processing is very low in the cluster and is confined to cottage and small scale industries  
  • In the absence of processing industries farmers do not have enough market to sell their produce and during the glut are resorting to distress sale | • Development of pineapple processing cluster                                                                                                  | Hard Interventions (Infrastructural Assistance):  
  • Cottage based micro and small pineapple processing units may be encouraged in the cluster area  
    - Such units may be clusterised further and common facilities may be created by leveraging available govt. schemes/programmes  
  Soft Interventions:  
  - Training of selected individuals on pineapple (other fruit) processing  
  - Training on cluster formation and common cluster activities |
| Collective Action and Branding| • Improve economies of scale to further develop the value chain (considering the current scale of production at individual levels)  
  • Improve bargaining power of the farmers  
  • Develop capacities at group level to operate and manage the common facilities  
  • Promote organic nature of the produce | • Current scale of production at individual level is very low and no common action is observed  
  • In the absence of a proper scale of production farmers are not able to effectively interact with the market forces | • Develop Farmer Interest groups/Producer Groups  
  • Promote organic nature of the produce through sustained campaigns                                                                 | Soft Interventions:  
  • Formation and development of approximately 200 FIGs  
    - SFAC guideline may be followed  
  • Training of FIGs/FIG representatives on  
    - Operation and Maintenance of Common Facilities  
    - Market interaction  
    - Collective action  
  • Sustained campaigns to promote the organic nature of the produce |
5.1 Production Related

Those activities focusing on increased productivity by way ensuring quality planting material supply, transferring best practices, facilitating use of appropriate inputs are covered under this category. The activities would include training / capacity building & setting up of infrastructure facilities related to dissemination of production technologies, supply of planting material, etc.

5.1.1 Hard Interventions: Infrastructural Assistance

5.1.1.1 Setting-up of nurseries along with demonstration plots

As has been mentioned earlier, farmers are procuring planting material from fellow farmers/own fields. In such cases, the quality (because of delay in replacement of mother plant) of planting material may be inferior. While a latent need for procuring appropriate planting material was felt during the discussion with various stakeholders, the farmers in absence of any private/govt. nursery are forced to use the same planting material.

As has already been described, the farmers in the cluster are adopting low density plantation which is further affecting the productivity. While there are multiple reasons behind low density plantation (such as unavailability of labour, lack of adequate market demand, etc) availability of quality planting material may also be a reason behind this. To address the issue of planting material, while tissue culture may be an option, considering the overall socio-economic context its viability is questionable.

Thus model nurseries may be established in the cluster which can supply mother plants to the farmers at reasonable prices. The nurseries may be integrated with demonstration plots which can be used for training purposes. As per MIDH norms, model nurseries can be established at a cost of Rs.15 lakh/ha. MIDH provides for 100% assistance towards establishment of such nurseries. Each nursery of 1 hectare is expected to supply 25000 saplings (in case of pineapple this can be up to 60000 suckers) to the beneficiaries. Considering the requirement of area expansion, five (5) nurseries each over 10 ha may be established. While these nurseries may not be adequate to provide required number of suckers to the farmers, given the land constraint this seems to be the optimal solution.

Each of these nurseries can be integrated with a demonstration plot of one hect which can be used to demonstrate/impart training on best practices in cultivation and post harvest management. Recurring cost towards these demonstration plots may either be met through State Govt. Sources or CSR funding.

5.1.1.2 Area expansion through establishment of new pineapple farms

Current scale of production in the cluster is very low to bring in any significant secondary processing/value addition as it requires minimum critical volume of production from certain area to operate economy of scale. While productivity enhancement will address the issue to some extent, more area may be brought in under pineapple. Farmers who are already practising pineapple cultivation may be encouraged further to increase the area. It may be aimed to at least double the pineapple area in next 5 years. This would mean bringing in approximately 1250 hectare more under pineapple.

It may be noted that in the context of Manipur, supply of cultivable land is limited. So for area expansion under pineapple diversion may be required from other crops which are comparatively less remunerative than pineapple. Suitable forestland may also be identified for area expansion. For this close coordination with forest department may be required.

As per MIDH norms, cost of Rs.87,500/- (without micro-irrigation) per ha for pineapple cultivation has been fixed. In North East India, MIDH provided 50% of the cost as grant assistance. Considering the socio-economic vulnerability of the marginal and small farmers of the cluster, remaining 50% of the cost may be borne by State Govt. or through CSR funding.
5.1.3 Input Kits

As has been mentioned earlier, farmers are not using any input other than FYM. This is affecting the soil nutrition level and in turn the productivity. Considering the economic vulnerability of the farmers and un-remunerative prices, it is suggested that input kits having organic fertilizer, polythene for mulching, etc. may be distributed among interested/ needy farmers. Another important input for efficiency enhancement in harvesting is kit of materials like rubber gloves for easy holding of fruits while harvesting and removing the thorny leaves, goggles for eye protection, cutting saw and plastic kilta. This was successfully demonstrated by national horticulture board (2009-11) in Assam, in association with ICAR station Barapani, for commercialization and value enhancement.

While there is no budgetary provision for providing input kits with MIDH, CSR funds may be leveraged to meet the cost towards this.

5.1.2 Soft Intervention: Training & Capacity Building

5.1.2.1 Training-cum-exposure programme

Training

It is observed that farmers are inclined towards acquiring new knowledge and technique to improve their production. While some of them had undergone some on field training programme, the feedback on the same (especially on aspects such as the suitability of the training for hill slope farming) were not encouraging. In view of such feedback, it is essential that training programmes be customised to the requirement of the cluster. Based on the assessed need the following training programmes may be arranged for improving the overall production and productivity

- Training of farmers undertaking demo plantations: The farmers proposed to be associated with the demonstration plots to be trained well on proper management of elite plant material in their orchards by adopting improved package of practices for achieving highest productivity level.
- Training of farmers (including women): The farmer to be provided training on productivity enhancement techniques like high density plantation, INM, Soil Moisture Management (mulching), Cultural Practices such as weeding and post-harvest handling to extend shelf life and maintaining quality.
- Training of Facilitator (ToF) including the extension officers, dept. field functionaries, village agent or progressive farmers on the latest horticultural practices, nursery production, and other productivity enhancement technologies

Integrating the efforts and for greater impact of various proposed interventions, it is suggested that beneficiary farmers selected for these training should be the ones undertaking various production related activates proposed as sub-components of Production related interventions. Given the high participation of female farmers it would be natural to select approximately 50% female farmers as trainees.

Such training modules may be designed in consultation with Central Agriculture University, Imphal and State Horticulture Dept. If possible resources of Agriculture University may be leveraged for imparting the training programmes. As has already been mentioned the demonstration plots may be used as the on-field training venues.

In accordance with MIDH norms, cost assistance of upto Rs 1000/day per farmers to be provided for trainings conducted within the State (including transport). Cost assistance on actuals to be provided for trainings that would be conducted outside State. For training of nursery growers budget of Rs 15 lakhs to be set aside under the MIDH cost norms for HRD for Gardener. This financial assistance would be extended to the technical agency which would be implementing the Gardener training. For training of technical staff/ field functionaries, assistance of Rs 300/ day per participant is being budgeted (TA/DA would be additional as admissible). Possibility of convergence under scheme for Agri Sector Skill Development initiative may also considered.
Exposure visit/ Study Tours

Regular exposure visit/ study tours to be organized within & outside State for growers/ technical staff/ field functionaries to the apex research institutes, university farms, farms of the ICAR, model private farms to study best practices. It is also suggested that apart from government functionaries, the most progressive farmers should also be nominated at State level for participating in exposure visits/ study tours outside the country to study the best horticulture production technologies. Under MIDH 100% cost assistance to be provided for exposure programme as per actuals to maximum of Rs 4 lakh per participant for study tour outside India (including air fare). Tour/ Course related fee charges (If applicable) are to be also borne under Mission Management cost norms of MIDH.

Given the context of Manipur, to begin with such exposure visits of farmers may be limited to Assam and Meghalaya to understand the cultivation practices. In Meghalaya, farmers may also be exposed to the Strawberry Producer Groups, who from being small and marginal producers, have now become exporters of the produce. The exposure visit may also include processing facilities especially the Mega Food Park/Food Parks being established in the region. This would help the farmers in appreciating the need of the industry.

5.2 Evacuation and Post Harvest Related

As has been mentioned earlier evacuation is a major constraint in the overall pineapple value chain. Almost 25%-30% of the produce is being wasted at the field level itself as proper evacuation is not possible (because lack of connectivity with the farms which are located in remote hill slopes and inadequate labour force). In addition, there is no post harvest infrastructure in the cluster for sorting, grading or storage of the produce. This is resulting in wastage up to 10% (in addition to the field level losses due to lack of proper evacuation). Low scale of production, at individual farmer level, further adds to the difficulty as it is not financially remunerative for an individual to invest in evacuation or post-harvest infrastructure.

To address both the above issues, it is important that appropriate infrastructure for evacuation and post harvest infrastructure are in place. Moreover, it is also important that farmers understand the importance of appropriate post harvest management activities and learns to undertake the same at individual as well as group levels. It is also important that there is collective action among the farmers so that the post-harvest related activities become economically remunerative.

5.2.1 Hard Intervention: Infrastructure Assistance

5.2.1.1 Creation of Farm Level Common Service Centers

In order to address the issue of evacuation, it is suggested that Farm Level Common Service Centers be established in close proximity of the farm lands. Such CSC for collection of produce should have basic facilities for aggregation/temporary storage of the produce. While this may still at a distance from the farms (considering the fact that pineapple is cultivated in hill slopes) still it may help in reducing the labour and time involved in bringing in the produce straight to the roadside market from the farm. Besides, CSC will also serve as point of input supply timely in view of the fast changing weather. It is suggested that these CSCs be established at those panchayats which have higher production level. Initially 20 such panchayats may be identified. Land for the collection centers may be arranged from the community land. Creation of such CSCs may reduce the burden on the farmers to bring the produce to the road-side markets immediately after harvesting. The CSCs will act as aggregation points and thus may attract buyers. Moreover having a temporary storage will also help the farmers in managing the weather related risks. MIDH provides for 55% assistance (on a unit cost of Rs.15 lakh) for development of farm level collection centers.
5.2.1.2 Creation of Post-harvest Infrastructure

Pack House & Cold Room: As mentioned earlier, there is no post harvest infrastructure in the cluster for sorting, grading or storage of the produce. This is resulting in wastage up to 10% (in addition to the field level wastage). In order to address the same it is proposed that post harvest infrastructures consisting of small sorting/grading facility (pack house) and a small cold room of 10 MT capacities, preferably in CSC be established in around 10 locations (one facility for two collection centers). Considering the electricity supply constraints in the State, it is proposed that it may be air ventilated. Other Technologies are also available.

It is expected that the produced may be stored in the cold rooms on an average up to one day before they are sent to the market. Thus the cumulative handling capacity of 10 such cold rooms will be approximately 7500 MT (Considering 75 days of harvest) which is approximately 60% of the current production.

Insulated Van: As transportation was also found to be a constraint, it is proposed that five (5) insulated vans (one each for two post-harvest infrastructures) may be integrated with the cold rooms to facilitate hassle free transportation. Each insulated van may be of 2-4 MT capacity which should be sufficient to meet the demand of transportation. Excess capacity may be used to transport other perishables including fruits and vegetables.

MIDH provides for 50% assistance (on a unit cost of Rs.15 lakh for cold room and Rs.4 lakh for pack house) for development of such post harvest infrastructure.

5.2.2 Soft Intervention: Capacity building

5.2.2.1 Collectivization of Farmer Interest Groups & Training

The sustainability of the common infrastructures to a large extent depends on the ownership of the community and their ability to ensure smooth operation. While in Manipur the social cohesiveness is quite high, it is important that the same is translated to collective action to derive economic benefit. One of the ways to achieve the same is formation of Farmer Interest Groups of Producer Groups. Considering the low scale of production at individual level, it is more so important that the
farmers join hands and achieve certain scale of production so as to initiate value chain development related activities.

As has been discussed earlier most of the interventions require village level institutions. It is also expected that infrastructures at the field level require operation and management by these institutions. Thus it is important that producer collectives in the forms of farmer groups be created in the cluster. While formation of FPOs may take some time to materialise and may not be a practical solution in the given context, it is suggested that approximately 200 small farmer groups may be formed in two tehsils of Imphal East (Keirao Bitra and Sawombung). It may be noted that while the production is more concentrated in Keirao Bitra it is also suggested that Sawombung may also be considered for FIG formation.

<table>
<thead>
<tr>
<th>Production Cluster/ Block</th>
<th>Pineapple Production (Approx.) MT</th>
<th>No. of Farmer Group to be promoted</th>
<th>Targeted no. of member per Farmer Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1. Keirao Bitra</td>
<td>5500</td>
<td>150</td>
<td>10-15</td>
</tr>
<tr>
<td>Cluster 2. Sawombung</td>
<td>2000</td>
<td>50</td>
<td>10-15</td>
</tr>
</tbody>
</table>

These producer collectives can be informal bodies like women SHGs. Considering the fact that common community action is prevalent in Manipur, such informal bodies may find buy in from the individual farmers. As collective, FIGs can take up following responsibilities

- Investing in farm level infrastructures, if possible
- Operating and managing the infrastructures
- Providing extension and/or input services to member producers
- Act as aggregation/value addition nodes in the value chain

It is suggested that to ensure sustainability of such institutions the State should invest adequately in their capacity building mostly in the following areas

- Management of Common Infrastructures
  - Asset and Operations Management
  - Cash Management
- Governance
- Resource Mobilisation

The required financial assistance for mobilization and formation of Farmer Groups and for their capacity building to be availed as per norms of SFAC. Creation of farmer-linked and operated value added centres in the district is anticipated to encourage increased number farmers to associate with the established FIGs to avail services of Value Added Centre, which in turn would feed into its increased economic viability. For successful implementation of this model, the FIGs created under assistance from MIDH/SFAC would required continued handholding in development of the required infrastructure. It is therefore suggest that a suitably qualified technical agency should be engaged vide bid process to assist the department in integrated development of this activity including - mobilization of producer groups into FPO, facilitating setting up of required infrastructure and procurement of machinery, capacity building of FPOs for managing and operating the facility, handholding assistance for period of about two years. In accordance with MIDH cost norms, the cost assistance for the activity sub-components to be provided as follows:

In order to ensure effectiveness of the post harvest infrastructures it is essential that the farmers/users be provided proper training on

- Post harvest Activities: Including sorting, grading (on the basis of size and colour), packing, storage and transportation, etc.
- Operation and Maintenance of Common Facilities
5.3 Market Related

As has been mentioned earlier, there is dearth of market infrastructure in the cluster. Appropriate sheds, trading area, storage and utilities are not available in the road-side semi-urban or rural markets. In order to address the same hard intervention in the form of community markets may be thought of

5.3.1 Hard Interventions/Infrastructural Assistance

5.3.1.1 Creation of community markets

In order to address the above issue and keeping in mind the overall social fabric of the state (where community is more important than the individual), it is proposed that two community markets be developed in the cluster. Such markets may have facilities for

- Trading platform
- Sorting, grading and packing
- Price information,
- Storage,
- Ripening, etc.

The markets may also be well-equipped with utilities such as water-supply, electricity, toilets and solid waste management

Land for the same can be donated by the community. These markets, apart from pineapple, may also facilitate trade of other agricultural/horticultural produce. MIDH provides for 55% grant assistance (with a unit cost of Rs.25 lakh) for setting up of community markets which may be treated as rural markets to meet the requirement of MIDH guidelines.

5.3.2 Soft Intervention

5.3.2.1 Increasing Branding Recognition

Agriculture based produce is mostly considered as commodities. A commodity is a product so basic that it cannot be differentiated in the minds of consumers (Keller et al., 2008). Branding of produce as ‘products’ is the key make the consumer perceive the differentiating factor of product such that it convinces the consumer the product varies sustainably in quality and is worth higher prices than same unbranded products. Thus, brand building is an integral part of marketing strategy for making the supply chain of the targeted product sustainable and profitable. Brand can be built around certain unique aspects of a commodity which can result in either premium for the

Sohliya Strawberry Village: Example of Collectivisation and Branding

Sohliya used to be an unknown village in Ri-bhoi district of Meghalaya. However, within only about 12 years this has become a vibrant model of horticulture-led development, and the originator of Meghalaya’s strawberry revolution. With the sustained effort of their village headman and support from Technology Mission on Horticulture – North East (TMH-NE), the North Eastern Council (NEC) and the support extended by the State Government’s Centre of Excellence for Strawberries the village adopted commercial cultivation using appropriate technology. An association, Ri-Bhoi Strawberry Growers Association (RBSGA) was also formed to handle post-harvest management activities. The association has now emerged as a major exporter of Strawberry. The village has also developed a Horti-Eco Adventure Tourism project with strawberries as its USP and non motorized eco friendly adventure tourism sporting activities like mountain biking, trekking, paintball shooting and river rafting. Now the village is a brand in itself to produce or high demand or both

In case of the pineapple from Manipur, the organic nature may be highlighted and a brand synonymous with the same may be developed through sustained campaigns.
5.4 Processing Related

While pineapple processing is happening in and around Imphal their absorption of the produce from the cluster is low. Moreover, Govt. agencies have already put in efforts towards building skills of individuals on pineapple processing, the products of which can be used locally. In order to further improve the processing capacity in the cluster (so as improve the off take of pineapple for processing purpose), it is proposed that **cottage based micro and small pineapple processing units** may be encouraged in the cluster area. Minimum 10 units are required to develop a cluster. Units may have valid registration to avail the benefit. It is proposed that state govt may arrange required land and contribution on behalf of the beneficiaries.

The required financial assistance may be made available under Micro and Small Enterprises Cluster Development Programme (MSE-CDP) of Ministry of Micro, Small and Medium Enterprises (MSME), Government of India (GoI). As per scheme guidelines, the GoI grant is 90% for CFCs in NE, Clusters with more than 50% (a) micro/ village (b) women owned (c) SC/ST unit

5.5 Overarching

It is understood that there would be a set of interventions which would run parallel to the value chain development related activities. Such interventions would include

5.5.1.1 Policy for regulating market infrastructure

- Manipur does not have an Act/policy in place to regulate/manage agricultural marketing activities. Considering the economic vulnerability of the marginal producers of the state (against the more refined and educated market forces), the state may introduce a policy to regulate the price at which the products are sold

5.5.1.2 Creation of a State Level Nodal Agency

- The state may think of appointment/creation of an agency as the nodal agency for all implementation and co-ordination related activities. With the current mandate (nodal agency for implementation of MIDH), State MIDH cell can be thought of as the nodal agency for this

5.5.1.3 Interventions for Supporting Infrastructure

- Supporting infrastructures like power, logistics, packaging, quality control and branding are expected to play a major real in successful realisation of the value chain development objectives. In this context, it is proposed that the following interventions may be considered

  - **Transport Subsidy:** The state may leverage the available transport subsidy and develop a mechanism wherein the farmers derive benefit out of this.

  - **Electricity:** As supply of electricity is constrained in the state, alternative sources such as solar power, etc may be brought in to the villages so that common infrastructures run smoothly

  - **Last mile road connectivity:** As most of the farm lands are located in remote areas and do not have proper access roads, the state may consider constructing all weather roads to facilitate input supply as well as evacuation of the produce.
5.5.1.4 Development of Project Management & Monitoring Framework

In order to develop the pineapple value chain in Imphal East cluster, it is essential to create a strong, responsible, and responsive institutional structure. This is more so important when we consider the fact the core value chain actors (pineapple farmers) do not have adequate resources both in terms of finance and knowledge to improve their current situation. Thus, in the absence of a dedicated institutional structure the core objective of value chain development in the cluster may not be achieved.

Proposed Institutional Structure

As can be seen from the above diagram successful realisation of the cluster development objective shall, to a large extent, be dependent on the successful co-ordination among relevant departments and use of existing institutions like Central Agriculture Universities, Panchayats/Urban Local Bodies. While it is expected that the entire implementation shall be driven by MIDH cell as the nodal agency, in view of the involvement of multiple agencies, it is proposed that a state level steering committee headed by Mission Director, MIDH be formed to ensure timely project execution and co-ordination among all concerned stakeholders.

The committee may have representatives from different line departments such as Commerce and Industries, Agriculture and other agencies such as Agriculture University, Lead Bank, Panchayat/ULB Chairperson from the cluster area. It may also include some farmer representatives. The major tasks of the committee may include:

- Facilitating inter-departmental co-ordination
- Finding out/suggesting points of convergence
- Appointment of Cluster Facilitation Agency
- Monitoring and periodic review of the progress
- Setting or re-aligning strategic goals as per the requirement

Considering the fact that the proposed value chain development project adopting a cluster approach is complex in nature (considering both the involvement of multiple stakeholders and the quantum of cross-cutting activities), it is also proposed that a professional Cluster Facilitation Agency (CFA) be appointed to assist the nodal agency MIDH Cell in overall implementation of the value chain
development activities. The CFA is expected to bring in required technical inputs, knowledge and market interface to assist the state. Specifically, the functions of the CFA may include:

- Organising the farmers into Farmer Interest Groups/Producer Groups so as to bring in collective action in production as well as marketing. This common action may also lead to economies of scale during post harvest management activities.

- Assess the Capacity Building/Skill Development requirement of the farmer members

- Organising and delivering Skill Development related activities

- Assisting the Farmer Interest Groups/Producer Groups in procurement of required inputs either through direct linkage with the suppliers or through leveraging available schemes of Govt. of Manipur or both

- Assessing the requirement of common post-harvest/processing infrastructure for the pineapple farmers; developing a business case for the infrastructure so as to mobilize commercial funding, wherever available

- Assessment of the requirement for private markets including space and other infrastructure; Co-ordinating with Panchayats/ULBs and Nodal agency for development of private markets; development of a operation and maintenance mechanism for such markets; development of a business case for mobilizing commercial finance, wherever required

- Identify and develop sustainable market linkages for the produce

- Analyse Identify points of convergence among various schemes and suggest the nodal agency appropriate mechanism to leverage the convergence points

- Identify technologies/best practices which can be replicated in the cluster for overall value chain development

- Assisting the nodal agency in input/grant disbursement

- Assisting the nodal agency in monitoring the progress of the projects

- Represent the nodal agency in different forums, wherever required

6 Financial Outlay

The state being remote with limited connectivity and various infirmities, there is a need to provide adequate level of finance and technical support to promote pineapple value chain development in the State. The proposed strategy calls for an integrated approach adopting a program mode for developed of various production clusters in the State. Along with the enhanced levels of assistance, the state may also have to build physical infrastructure along the value chain as also supplement the efforts/assistance to strengthen value chain activities.

The total cost of suggested interventions is estimated Rs 2774.62 Lakhs. Out of which 72% of budgetary support of Rs 2002.87 lakhs may be sought under various Central Government Scheme/programme including MIDH. Whereas the remaining cost of Rs.771.75 lakhs are expected to be mobilised from State Govt or CSR fund.

Details of the financial outlay is provided below:
### Project components

**No. of Units**

**Cost per Unit (Rs. In Lakhs)**

**Estimated Total Cost (Rs. In lakhs)**

<table>
<thead>
<tr>
<th>GoI (MIDH/other schemes)</th>
<th>Proposed Outlay from State Government</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern of Assistance</td>
<td>Financial Assistance (in lakhs Rs)</td>
<td></td>
</tr>
</tbody>
</table>

**A. Production Related**

**Infrastructural Assistance**

**a. Planting Material**

| 1. Nurseries | 5 sub-units under the project (each having 10 hect) | Rs. 150 lakhs/Project @ Rs. 15 lakh per hect | 750.0 | 100% | 750 | - |

| 2. Demonstration Plots of 1 ha each along with nurseries (for a period of 5 years) | 5 sub units under the project | Rs. 5 lakh (recurring and establishment cost) | 25.0 | No assistance available | - | 25.0 |

While no assistance under MIDH is available, it is expected that Govt. of Manipur will arrange fund to meet the recurring and establishment cost towards maintaining the demonstration plots. Such plots may be used as the training venues for package of practices and post-harvest management.

**b. Area expansion through establishment of new orchards and replacement of Senile plantations**

| 1. Facilitating establishment of new pineapple farms or expanding area of existing farms (wherever additional land is available with farmers) | 1250 ha | Rs 87,500/- / ha | 1093.50 | @50% of cost in North East and Hilly areas | 546.75 | 546.75 |

It is understood that availability of land in Manipur is a constraint, given its terrain and high forest cover. It is to be noted that only 10% of the total geographic area of the state is available for agriculture purpose.

Because of this reason the area under pineapple is quite low and thus the production also does not have a scale to initiate value chain development related interventions.

In order to address the low scale of production and considering the constraint related to land, it is expected that an additional 1250 ha can put in under pineapple cultivation (this may require use of forest land and diversion from other crops).

While it is expected that 50% of the total cost to be borne by the beneficiaries, considering the socio-economic vulnerabilities either the state govt or some CSR agency may be approached to bear the initial cost.
### Project components

<table>
<thead>
<tr>
<th>No. of Units</th>
<th>Cost per Unit (Rs. In Lakhs)</th>
<th>Estimated Total Cost (Rs. In lakhs)</th>
<th>GoI (MIDH/other schemes) Pattern of Assistance</th>
<th>Financial Assistance (in lakhs Rs)</th>
<th>Proposed Outlay from State Government</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>c Input Kits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Distribution of Input Kits</td>
<td>1250 No.</td>
<td>Rs.10000/ unit</td>
<td>125.00</td>
<td>-</td>
<td>-</td>
<td>125.0</td>
</tr>
</tbody>
</table>

In order to ensure that the proper inputs are available for the farmers it is proposed that approximately 1250 kits be distributed among the existing farmers. While the cost of such inputs is already imputed for new farmers/area, for existing farmers the cost may be either met by State Govt. sources or CSR agencies.

### Training & Capacity Building

#### a Training programme

<table>
<thead>
<tr>
<th>Training programmes</th>
<th>No. of Units</th>
<th>Cost per Unit (Rs. In Lakhs)</th>
<th>Estimated Total Cost (Rs. In lakhs)</th>
<th>GoI (MIDH/other schemes Pattern of Assistance)</th>
<th>Financial Assistance (in lakhs Rs)</th>
<th>Proposed Outlay from State Government</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Training of farmers undertaking demo plantations</td>
<td>10 No. (for 7 day)</td>
<td>Rs 1000/day per farmers</td>
<td>0.70</td>
<td>100% assistance</td>
<td>0.70</td>
<td>-</td>
<td>The component of training should be linked with capacity building of beneficiary farmers being targeted under Area expansion</td>
</tr>
<tr>
<td>2. Training of farmers</td>
<td>1500 farmers (7 day training)</td>
<td>Rs 1000/day per farmers</td>
<td>105.0</td>
<td>100% assistance</td>
<td>105.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3. Training of Facilitator (ToF)</td>
<td>20</td>
<td>Rs 300/ day per participant</td>
<td>0.42</td>
<td>100% assistance</td>
<td>0.42</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

#### b Exposure visit

<table>
<thead>
<tr>
<th>Study tours</th>
<th>No. of Units</th>
<th>Cost per Unit (Rs. In Lakhs)</th>
<th>Estimated Total Cost (Rs. In lakhs)</th>
<th>GoI (MIDH/other schemes Pattern of Assistance)</th>
<th>Financial Assistance (in lakhs Rs)</th>
<th>Proposed Outlay from State Government</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Study tours within State</td>
<td>As per actual</td>
<td>As per actual</td>
<td>100% cost assistance</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Study tours outside</td>
<td>As per actual</td>
<td>As per actual</td>
<td>100% cost assistance</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### B. Post Harvest & Processing Related Infrastructure

#### Infrastructural Assistance

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>No. of Units</th>
<th>Cost per Unit (Rs. In Lakhs)</th>
<th>Estimated Total Cost (Rs. In lakhs)</th>
<th>GoI (MIDH/other schemes Pattern of Assistance)</th>
<th>Financial Assistance (in lakhs Rs)</th>
<th>Proposed Outlay from State Government</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Common Service Centers at Panchayat Level- with aggregation and Temporary Storage</td>
<td>20</td>
<td>Rs 15 lakhs/ unit</td>
<td>300.0</td>
<td>@ 55% of total cost</td>
<td>165</td>
<td>135</td>
<td>This would help the marginal and small farmers in value addition through primary processing. This would also help in proper evacuation. Overall it is expected that through this intervention almost 30-35% value loss can be arrested. In view of this it is expected that the state Govt. would also contribute towards the same</td>
</tr>
<tr>
<td>2. Pack house and Cold</td>
<td>10</td>
<td>Rs. 19 lakh</td>
<td>190.0</td>
<td>@50% of</td>
<td>95.0</td>
<td>95.0</td>
<td></td>
</tr>
</tbody>
</table>
## Pineapple Value Chain Analysis And Market Assessment For Imphal East district

### Project components

<table>
<thead>
<tr>
<th>Project components</th>
<th>No. of Units</th>
<th>Cost per Unit (Rs. In Lakhs)</th>
<th>Estimated Total Cost (Rs. In lakhs)</th>
<th>GoI (MIDH/other schemes)</th>
<th>Proposed Outlay from State Government</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room</td>
<td></td>
<td>(Rs.15 lakh for cold room and Rs.4 lakh for pack house)</td>
<td>total cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Insulated Vans</td>
<td>5</td>
<td>Rs.8 Lkah</td>
<td>40</td>
<td>As per norms issued by SFAC/NABARD</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>4. Promotion of FIGs, Producer Groups</td>
<td>200 (approximately 10-15 members each)</td>
<td>As per norms issued by SFAC/NABARD</td>
<td>As per norms issued by SFAC/NABARD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Training & Capacity Building

| Training on Post Harvest Management | 3 day training per farmer for 1500 farmers @ Rs.1000/day | 45.0 | 100% | 45 | - |

### Market Related

| Setting-up of Community markets | 2 | Rs.25 lakhs | 50 | at 55% of eligible project cost | 250 | Land can be procured from community. Market can cater to other products also |

### Processing Related

| Setting up of Pineapple Processing Cluster | 1 | Rs. 50 Lakh | 50 | At 90% from Ministry of MSME | 45.0 | 5.0 | Minimum 10 units are required to develop a cluster. Units may have valid registration to avail the benefit. It is proposed that state govt may arrange required land and contribution on behalf of the beneficiaries |

| TOTAL (Rs. In Lakh) | 2774.62 | 2002.87 | 771.75 | | | |